

CLEMSON
UNIVERSITY

RECORD
SEVENTY-FIFTH YEAR

CATALOG NUMBER
1967-1968

PRELIMINARY ANNOUNCEMENTS, 1968-1969

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UNIVERSITY CALENDAR

SUMMER SESSIONS 1967

First Session

(Classes meet Monday-Friday)

Matriculation and registration	May 15
Classes begin	May 16
Examinations	June 21, 22

Second Session

(Classes meet Monday-Friday except as indicated)

Matriculation, new students	June 26
Matriculation and registration	June 27
Classes begin	June 28
Classes meet	July 1
Independence Day holidays	July 3, 4
Classes meet	July 8
Classes meet	July 29
Examinations	August 2, 3
Faculty meeting to consider candidates for grad.	August 5
Graduation	August 5

SESSION 1967-1968

First Semester

Matriculation, new students	August 18
Matriculation, current students	August 19
Registration, new students	August 21
Registration, current students	August 21, 22
Late registration fee applies at noon	August 22
Classes begin, abbreviated class schedule	August 23
Last day for matriculation	August 29
Last day to add a subject	September 5
Last day to drop a subject without record of drop ..	September 19
Last day to order diploma for mid-year grad.	September 19
Preliminary reports due	October 9
Graduate Record Examinations required of all seniors ..	October 24
Last day to withdraw without having grades recorded ..	November 10
Last day to drop a subject	November 10
Classes suspended	November 11
Thanksgiving holidays *	November 23-25
Clemson-Carolina game	November 25
Reading Day	December 6
Examinations begin	December 7
Faculty meeting to consider candidates for grad.	December 15
Mid-year graduation	December 16

* Follow Thursday, Friday, Saturday schedule on Monday, Tuesday, Wednesday, November 20, 21, 22.

Second Semester

Matriculation, new students	January	3
Registration, all students	January 5,	6
Late registration fee applies at noon	January	6
Classes begin, regular schedule	January	8
Last day for matriculation	January	12
Last day to add a subject	January	19
Last day to drop a subject without record of drop	February	2
Last day to order diploma for May graduation	February	2
Preliminary reports due	February	19
Spring holidays begin at noon	March	9
Classes resume	March	18
Last day to withdraw without having grades recorded	April	1
Last day to drop a subject	April	1
Honors and Awards Day— classes suspended at 12 noon	April	3
Reading Day	April	23
Examinations begin	April	24
Faculty meeting to consider candidates for graduation	May	3
Commencement	May	4

SUMMER SESSIONS 1968

First Session

(Classes meet Monday-Friday)

Matriculation and registration	May	13
Classes begin	May	14
Examinations	June 19,	20

Second Session

(Classes meet Monday-Friday except as indicated)

Matriculation, new students	June	24
Matriculation and registration	June	25
Classes begin	June	26
Classes meet	June	29
Examinations	July 31, August	1
Faculty meeting to consider candidates for graduation	August	3
Graduation	August	3

SESSION 1968-1969

First Semester

Matriculation, new students	August 19,	20
Matriculation, current students	August 20,	21
Late registration	August	22
Late registration fee applies at noon	August	22
Classes begin, abbreviated class schedule	August	23
Last day for matriculation	August	29
Last day to add a subject	September	5
Last day to drop a subject without record of drop	September	19
Last day to order diploma for mid-year grad.	September	19
Homecoming, classes suspended	October	12
Preliminary reports due	October	14

Last day to withdraw without having grades recorded	November	9
Last day to drop a subject	November	9
Clemson-Carolina game—classes suspended	November	23
Thanksgiving holidays *	November	28-30
Reading Day	December	6
Examinations begin	December	7
Faculty meeting to consider candidates for grad.	December	16
Mid-year graduation	December	17

Second Semester

Matriculation, new students	January	6
Registration, all students	January 8,	9
Late registration fee applies at noon	January	9
Classes begin, abbreviated class schedule	January	10
Last day for matriculation	January	16
Last day to add a subject	January	23
Last day to drop a subject without record of drop	February	6
Last day to order diploma for May graduation	February	6
Preliminary reports due	March	3
Spring holidays begin at noon	March	15
Classes resume	March	24
Last day to withdraw without having grades recorded	April	7
Last day to drop a subject	April	7
Honors and Awards Day—		
classes suspended at 12 noon	April	9
Reading Day	April	29
Examinations begin	April	30
Faculty meeting to consider candidates for graduation	May	9
Commencement	May	10

SUMMER SESSIONS 1969

First Session

(Classes meet Monday-Friday)

Matriculation and registration	May	19
Classes begin	May	20
Examinations	June 25,	26

Second Session

(Classes meet Monday-Friday except as indicated)

Matriculation, new students	June	30
Matriculation and registration	July	1
Classes begin	July	2
Independence Day holiday	July	4
Classes meet	July	19
Classes meet	August	2
Examinations	August 6,	7
Faculty meeting to consider candidates for graduation	August	9
Graduation	August	9

* Follow Thursday, Friday, Saturday schedule on Monday, Tuesday, Wednesday, November 25, 26, 27.



PERSONNEL

PART I

PART I—Personnel

BOARD OF TRUSTEES

LIFE MEMBERS

EDGAR A. BROWN, <i>President of the Board</i>	Barnwell
JAMES F. BYRNES.....	Columbia
WINCHESTER SMITH.....	Williston
ROBERT R. COKER.....	Hartsville
JAMES C. SELF.....	Greenwood
FRANK J. JERVEY.....	Clemson
PATRICK N. CALHOUN.....	Charlotte, N. C.

TERM EXPIRES 1970

A. M. QUATTLEBAUM.....	Florence
L. D. HOLMES.....	Johnston
E. OSWALD LIGHTSEY.....	Hampton

TERM EXPIRES 1972

PAUL QUATTLEBAUM, JR.	Charleston
W. GORDON McCABE, JR.	Greenville
T. KENNETH CRIBB.....	Spartanburg

A. W. RIGSBY, <i>Secretary</i>	Clemson
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BOARD OF VISITORS 1967

J. B. HARRIS, JR.	Greenwood
(Hold-Over Member)	
HARRY S. BELL.....	Ward
JOHNSON CRAIG.....	Greenwood
W. E. DARGAN.....	Darlington
CLYDE A. ELTZROTH.....	Hampton
R. M. ERWIN.....	Laurens
E. B. FUNDERBURK.....	Lancaster
BENJAMIN O. JOHNSON.....	Spartanburg
C. B. MITCHELL.....	Bethune
CAROLINA PARDUE.....	Charleston
TOM W. SMITH.....	Williston
B. THOMAS WHITE.....	Florence

EXECUTIVE OFFICERS

ROBERT COOK EDWARDS, B.S., LL.D.	<i>President</i>
VICTOR HURST, Ph.D.	<i>Vice-President for Academic Affairs and Dean of the University</i>
WALTER THOMPSON COX, B.S.	<i>Vice-President for Student Affairs and Dean of Students</i>
MELFORD A. WILSON, B.S. in Commerce.....	<i>Vice-President for Business and Finance and Comptroller</i>
WILLIAM WRIGHT BRYAN, B.S., Litt.D., LL.D.,	<i>Vice-President for Development</i>

ADMINISTRATIVE OFFICERS AND STAFF

PRESIDENT'S OFFICE

ROBERT COOK EDWARDS, B.S., LL.D.	<i>President</i>
ALLEN WOOD RIGSBY, M.A., LL.B.	<i>Assistant to the President and University Counsel</i>
DOROTHY L. ABBOTT, A.B.	<i>Secretary to the President</i>

ACADEMIC AND RESEARCH ADMINISTRATION

VICTOR HURST, Ph.D.	<i>Vice-President for Academic Affairs and Dean of the University</i>
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COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES *

WILLIAM HENRY WILEY, Ph.D.	<i>Dean, College of Agriculture and Biological Sciences</i>
OLEN BRANFORD GARRISON, Ph.D. ...	<i>Director of Agricultural Experiment Station; Director of Research in Agriculture</i>
JAMES EDWIN HALPIN, Ph.D.	<i>Associate Director of Agricultural Experiment Station</i>
JESS WILLARD JONES, Ph.D.	<i>Director of Resident Instruction and Assistant to the Dean</i>
WILLIAM JOSEPH LANHAM, Ph.D.	<i>Head, Department of Agricultural Economics and Rural Sociology</i>
LOWERY HEYWOOD DAVIS, Ph.D.,	<i>Head, Department of Agricultural Education†</i>
ABSALOM WEST SNELL, Ph.D.,	<i>Head, Department of Agricultural Engineering†</i>
ULYSSES SIMPSON JONES, Ph.D.	<i>Head, Department of Agronomy and Soils</i>
RICHARD FERMAN WHEELER, Ph.D.	<i>Head, Department of Animal Science</i>
WILLIAM MONROE EPPS, Ph.D. ...	<i>Head, Department of Botany and Bacteriology</i>
WILLIS ALONZO KING, Ph.D.	<i>Head, Department of Dairy Science</i>
JAMES HARVEY COCHRAN, Ph.D.	<i>Head, Department of Entomology and Zoology</i>
WOODIE PRENTISS WILLIAMS, Ph.D.	<i>Head, Department of Food Science and Biochemistry</i>
KOLOMAN LEHOTSKY, Ph.D.	<i>Head, Department of Forestry</i>
TAZE LEONARD SENN, Ph.D.	<i>Head, Department of Horticulture</i>
BOBBY DALE BARNETT, Ph.D.	<i>Head, Department of Poultry Science</i>

* See also College of Agriculture and Biological Sciences Staff, including Public Service Activities, on page 339.

† Agricultural Education curriculum is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.

‡ Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

SCHOOL OF ARCHITECTURE

HARLAN EWART MCCLURE, M.Arch., F.A.I.A. . . . *Dean, School of Architecture*
ROBERT HOWARD HUNTER, M.F.A. *Head, Department of Visual Studies*

COLLEGE OF ARTS AND SCIENCES

HOWARD LOUIS HUNTER, Ph.D. *Dean, College of Arts and Sciences*
HAROLD GARTH SPENCER, Ph.D. *Head, Department of Chemistry
and Geology*
HEADLEY MORRIS COX, Ph.D. *Head, Department of English and
Modern Languages*
CLAYTON VERL AUCOIN, Ph.D. *Head, Department of Mathematics*
HENRY ELLIOTT VOGEL, Ph.D. *Head, Department of Physics*
ROBERT STANSBURY LAMBERT, Ph.D. . . . *Head, Department of Social Sciences*
ELMER NEWTON TYNDALL, M.B.A., Colonel, United States Air Force—
Head, Department of Aerospace Studies
MELVIN CHARLES BROWN, M.A., Colonel, United States Army—
Head, Department of Military Science
LIDA MASON WILLIAMS, B.S.N.E., . . . *Acting Director, Department of Nursing*

SCHOOL OF EDUCATION

HAROLD FOCHONE LANDRITH, Ed.D. *Dean, School of Education;
Head, Department of Elementary and Secondary Education*
LOWERY HEYWOOD DAVIS, Ph.D., *Head, Department of Agricultural Education*†
ALFRED FRANKLIN NEWTON, Ed.D., *Head, Department of Industrial Education*
HERBERT BRANTLEY, Ph.D. *Head, Department of Recreation
and Park Administration*
EARL THOMAS CARPENTER, Ed.D. . . . *Director, Research Coordinating Unit*
ARTHUR KENNETH JENSEN, Ph.D. *Director, Vocational Education
Media Center*

COLLEGE OF ENGINEERING

LINVIL GENE RICH, Ph.D. *Dean, College of Engineering*
 STANLEY GOSANKO NICHOLAS, B.S. in M.E. . . *Director of Engineering Research*
 ROBERT ALLEN BANISTER, M.S. *Coordinator, Office of Industrial
 and Municipal Relations*
 ABSALOM WEST SNELL, Ph.D., *Head, Department of Agricultural Engineering*
 GILBERT CHASE ROBINSON, B.Cer.E. *Head, Department of
 Ceramic and Metallurgical Engineering*
 CHARLES EDWARD LITTLEJOHN, Ph.D. *Head, Department of Chemical
 Engineering*
 ARNOLD EDWARD SCHWARTZ, Ph.D. . . *Head, Department of Civil Engineering*
 LYLE CHESTER WILCOX, Ph.D. . . *Head, Department of Electrical Engineering*
 ROBERT WARDLAW MOORMAN, Ph.D. *Head, Department of Engineering
 Mechanics*
 JOHN F. ANDREWS, Ph.D. *Head, Department of Environmental Systems
 Engineering*
 EVERETT LAITALA, M.E. *Head, Department of Industrial Engineering*
 THURMAN CRAIG HARDIN, Ph.D., *Head, Department of Mechanical
 Engineering*

* Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

† Agricultural Education curriculum is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

WALLACE DABNEY TREVILLIAN, Ph.D. . . . *Dean, School of Industrial Management
and Textile Science*
THOMAS DANIEL EFLAND, M.S. *Associate Dean, Director of Research*
HARVEY JAMES WHEELER, Ph.D. *Head, Department of Economics*
CLINTON HOWARD WHITEHURST, JR., Ph.D. *Head, Department of
Industrial Management*
THOMAS ALEXANDER CAMPBELL, JR., M.Ed. . . . *Head, Department of Textiles*

GRADUATE SCHOOL AND UNIVERSITY RESEARCH

FLOYD IRVING BROWNLEY, JR., Ph.D. *Dean of the Graduate School
and Director of Research*
ROBERT WALTER HENNINGSON, Ph.D. *Assistant Director of Research*

SUMMER SESSIONS

CLAUD BETHUNE GREEN, Ph.D. *Director of the Summer Sessions
and Extended Programs*

DIRECTOR OF THE LIBRARY

JOHN WALLACE GORDON GOURLAY, A.M.L.S. *Director of the Library*

EDUCATIONAL COUNCIL

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C. B. GREEN, H. L. HUNTER, J. W. JONES, H. F. LANDRITH, M. C. LONG,
H. E. MCCLURE, L. G. RICH, J. E. SHERMAN, J. N. THURSTON, W. D. TRE-
VILLIAN, K. N. VICKERY, W. H. WILEY, M. A. WILSON, and A. W. RIGSBY,
Secretary.

TEACHING AND RESEARCH FACULTIES

ROBERT COOK EDWARDS

President

B.S., Clemson University; LL.D., The Citadel; LL.D., Wofford College

VICTOR HURST

*Vice-President for Academic Affairs and Dean of the University
Professor of Dairy Science*

B.S., 1938, M.S., 1940, Rutgers University; Ph.D., University of Missouri, 1948

MAIN CAMPUS

ABERNATHY, ATWELL RAY, *Associate Professor of Civil Engineering and Environmental Engineering.*

A.B., Lenoir-Rhyne College, 1953; M.S.P.H., 1959, Ph.D., 1963, University of North Carolina.

ACORN, JOHN THOMSON, *Associate Professor of Architecture.*

B.A., Montclair State College, 1959; M.F.A., Cranbrook Academy of Art, 1961.

ADAMS, HEWITT DAYNE, *Instructor in History.*

B.S., United States Naval Academy, 1937; M.A., Claremont Graduate School, 1964.

ADKINS, THEODORE ROOSEVELT, JR., *Associate Professor of Entomology and Zoology.*

B.S., 1952, M.S., 1954, Ph.D., 1958, Auburn University.

ALEXANDER, PAUL MARION, *Assistant Professor of Horticulture.*

B.S., California State Polytechnic College, 1953; M.S., 1955, Ph.D., 1958, Ohio State University.

ALLEN, JOE FRANK, *Assistant Professor of Chemistry.*

A.B., Berry College, 1955; M.S., University of Mississippi, 1959; Ph.D., Georgia Institute of Technology, 1963.

ALLEN, ROBERT MAX, *Belle W. Baruch Professor of Forestry.*

B.S., 1947, M.S., 1951, Iowa State College; Ph.D., Duke University, 1958.

ALLEY, FORREST CHRISTOPHER, *Associate Professor of Chemical Engineering.*

B.S., 1951, M.S., 1956, Alabama Polytechnic Institute; Ph.D., University of North Carolina, 1962; P. E.

ALPHIN, JOHN GILBERT, *Assistant Professor of Agricultural Engineering.*

B.S., 1960, M.S., 1962, Ph.D., 1965, North Carolina State University.

ANDERSON, GRANT WILLIAM, *Associate Professor of Zoology and Veterinary Medicine.*

B.S., D.V.M., Iowa State College, 1932; M.S., Virginia Polytechnic Institute, 1934.

ANDERSON, ROBERT ARGUS, *Assistant Professor of Military Science.*

Major, Artillery, United States Army; B.A., University of Omaha, 1962.

ANDREWS, JOHN F., *Head of Department of Environmental Systems Engineering; Professor of Civil Engineering and Environmental Engineering.*

B.S.C.E., 1951, M.S., 1953, University of Arkansas; Ph.D., University of California, 1964; P. E.

ANTRIM, JOHN DE COURCY, *Associate Professor of Civil Engineering.*

B.S., Lehigh University, 1956; M.S., 1958, Ph.D., 1964, Purdue University; P. E.

ARBENA, JOSEPH LUTHER, *Instructor in History.*

A.B., George Washington University, 1961.

ARRINGTON, OTTIE WARD, *Instructor in English.*

B.A., Winthrop College, 1934; M.S., Clemson University, 1961.

ASHWORTH, RALPH PAGE, *Professor of Botany and Bacteriology.*

B.S., Wake Forest College, 1939; M.A., 1945, Ph.D., 1960, University of North Carolina.

AUCOIN, CLAIRE RUSSELL, *Assistant Professor of Mathematics.*

A.B., Shorter College, 1951; M.S., Auburn University, 1954.

AUCOIN, CLAYTON VERL, *Head of Mathematics Department and Professor of Mathematics.*

B.A., Louisiana College, 1951; M.S., 1953, Ph.D., 1956, Auburn University; Post Doctorate, Stanford University, 1960-1961.

- BAILEY, ROY HORTON, JR., *Assistant Professor of Chemistry*.
B.S., 1948, Ph.D., 1958, University of North Carolina.
- BALL, WALTER LEE, *Associate Professor of Electrical Engineering*.
B.E.E., 1949, M.E.E., 1955, Clemson University; P. E.
- BANISTER, ROBERT ALLEN, *Associate Professor of Engineering Graphics; Coordinator, Office of Industrial and Municipal Relations*.
B.S., Clemson University, 1939; M.S., Bradley University, 1949.
- BARDES, BRUCE PAUL,* *Assistant Professor of Metallurgical Engineering*.
S.B., 1961, S.M., 1962, Sc.D., 1965, Massachusetts Institute of Technology.
- BARDSLEY, CHARLES EDWARD, JR., *Associate Professor of Agronomy and Soils*.
B.S., University of Rhode Island, 1948; M.S., 1950, Ph.D., 1959, Mississippi State University.
- BARDSLEY, VIRGINIA OWEN, *Associate Professor of History*.
B.A., Mississippi State College for Women, 1928; M.A., University of Mississippi, 1931; Ph.D., Mississippi State University, 1961.
- BARFIELD, JOHN R., *Assistant Professor of Economics*.
B.B.A., 1961, M.B.A., 1963, University of Georgia.
- BARKER, ROBERT H., *Associate Professor of Textiles and Chemistry*.
B.S., Clemson University, 1959; Ph.D., University of North Carolina, 1963.
- BARLAGE, WILLIAM BERDELL, JR., *Associate Professor of Chemical Engineering*.
B.S., Lehigh University, 1954; M.Ch.E., University of Virginia, 1955; Ph.D., North Carolina State College, 1960.
- BARNES, WILLIAM CARROLL, *Superintendent and Professor of Horticulture, Truck Experiment Station*.
B.S., Clemson University, 1931; Ph.D., Cornell University, 1935.
- BARNETT, BOBBY DALE, *Head of Poultry Science Department; Professor of Poultry Science*.
B.S., 1950, M.S., 1954, University of Arkansas; Ph.D., University of Wisconsin, 1957.
- BARNHILL, JAMES WALLACE, *Assistant Professor of History*.
B.A., Presbyterian College, 1947; M.A., Northwestern University, 1949.
- BARRIER, JAMES MARTIN, *Instructor in Zoology*.
B.S., East Tennessee State College, 1965; M.S., North Carolina State University, 1967.
- BARTMESS, EUGENIE VENTRE, *Instructor in Mathematics*.
B.S., 1945, M.S., 1949, Louisiana State University.
- BAUKNIGHT, LEHMAN M., JR., *Associate Professor of Agricultural Economics and Rural Sociology*.
B.S., 1935, M.S., 1949, Clemson University.
- BAULD, NELSON ROBERT, JR., *Associate Professor of Engineering Mechanics*.
B.S.M.E., 1958, M.S., 1960, West Virginia University; Ph.D., University of Illinois, 1963.
- BAXTER, ANN WEBSTER, *Assistant Professor of Botany and Bacteriology*.
B.A., Rockford College, 1938; M.A.T., 1964, Ph.D., 1967, University of North Carolina.
- BAXTER, LUTHER WILLIS, *Associate Professor of Botany and Bacteriology*.
B.S., Eastern Kentucky State College, 1950; M.S., 1952, Ph.D., 1954, Louisiana State University.
- BECKWITH, WILLIAM FREDERICK, *Assistant Professor of Chemical Engineering*.
B.S., 1957, M.S., 1961, Ph.D., 1963, Iowa State University.
- BEINHART, ERNEST GEORGE, JR.,* *Plant Physiologist (USDA); Lecturer in Botany and Bacteriology*.
B.S., Pennsylvania State University, 1949; M.S., North Carolina State College, 1952; Ph.D., Duke University, 1959.
- BELL, MARSHALL CORNETT, *Associate Professor of Mathematics*.
A.B., 1933, M.A., 1936, University of North Carolina.
- BERRY, TERRY GENE, *Assistant Professor of Military Science*.
Captain, Quartermaster Corps, United States Army; B.S., Florence State College, 1961.
- BEYERLEIN, ADOLPH LOUIS, *Assistant Professor of Chemistry*.
B.S., Fort Hays Kansas State College, 1960; Ph.D., University of Kansas, 1966.
- BIERER, BERT W., *Laboratory Director and Professor of Poultry Science, Live-stock-Poultry Laboratory, Columbia*.
V.M.D., University of Pennsylvania, 1934.
- BIGGS, SAMUEL SHIRLEY, *Assistant Professor of Aerospace Studies*.
Captain, United States Air Force; A.B., East Carolina College, 1956.

* On leave.

14 Teaching and Research Faculties

- BINSSE, MARIE IRENE, *Instructor in Speech*.
B.A., Marietta College, 1963; M.A., University of Illinois, 1964.
- BIRKHEAD, PAUL KENNETH, *Assistant Professor of Geology*.
A.B., 1951, A.M., 1960, University of Missouri; Ph.D., University of North Carolina, 1965.
- BIRTMAN, KENNETH DAVID, *Instructor in Sociology*.
B.A., Northwestern State College, 1966; M.A., Stephen F. Austin State College, 1967.
- BISHOP, ASA ORIN, JR., *Instructor in Electrical Engineering*.
B.S., Virginia Military Institute, 1959; M.S., Clemson University, 1966.
- BISHOP, CARL BARNES, *Assistant Professor of Chemistry*.
B.S., Clemson University, 1954; Ph.D., Michigan State University, 1959.
- BISHOP, MURIEL BOYD, *Assistant Professor of Chemistry*.
B.A., Huntington College, 1952; M.S., Emory University, 1955; Ph.D., Michigan State A & M University, 1961.
- BLACKMON, CYRIL WELLS, *Assistant Professor of Botany and Bacteriology, Edisto Experiment Station*.
B.S., Virginia Polytechnic Institute, 1949; M.S., Trinity University, 1953; Ph.D., Texas University, 1958; Post Doctorate, Yale University, 1958-1959.
- BOLEN, CLAUDE WALDRON, *Professor of History*.
A.B., Emory and Henry College, 1931; M.A., 1935, Ph.D., 1941, Duke University.
- BOND, JOHN HOWARD, *Associate Professor of Botany and Bacteriology*.
B.S., 1948, M.S., 1949, Louisiana State University.
- BOONE, MERRITT ANDERSON, *Professor of Poultry Science*.
B.S., University of Nebraska, 1941; M.S., Michigan State University, 1947; Ph.D., University of Georgia, 1962.
- BORGMAN, ROBERT FREDERIC, *Associate Professor of Food Science and Biochemistry*.
D.V.M., 1947, M.S., 1949, Michigan State College; Ph.D., Kansas State University, 1959.
- BOSE, ANIL KUMAR, *Assistant Professor of Mathematics*.
B.S., 1948, M.S., 1956, Calcutta University; Ph.D., University of North Carolina, 1964.
- BOST, WILLIAM VICK, *Instructor in English*.
A.B., 1963, M.A., 1964, University of North Carolina.
- BOUKNIGHT, JUDITH ADELL, *Instructor in Nursing*.
B.S., Newberry College, 1964.
- BOWEN, WILLIAM CLAYTON, *Associate Professor of Agricultural Education*.
B.S., Clemson University, 1932; M.S., Colorado A & M College, 1940.
- BOYD, VIRLYN ALEXANDER, *Associate Professor of Agricultural Economics and Rural Sociology*.
B.S.A., Berry College, 1941; M.S.A., University of Kentucky, 1948.
- BRADBURY, DOUGLAS WILSON, *Professor of Machine Design*.
B.M.E., Clemson University, 1940; M.S.E., University of Michigan, 1959; P.E.
- BRANDT, GRAYDON WILLIAM, *Associate Professor of Dairy Science*.
B.S., Ohio State University, 1936; M.S., University of Nebraska, 1938; Ph.D., Ohio State University, 1958.
- BRANNOCK, DURANT YORK, JR., *Assistant Professor of French*.
A.B., Elon College, 1954; A.M., Duke University, 1956.
- BRANNON, CARROLL CLEVELAND, *Associate Professor of Dairy Science*.
B.S., Clemson University, 1934.
- BRANTLEY, HERBERT, *Head of Recreation and Park Administration Department; Associate Professor of Recreation and Park Administration*.
A.B., 1956, M.A., 1958, Ph.D., 1966, University of North Carolina.
- BRAWLEY, JOEL VINCENT, JR., *Assistant Professor of Mathematics*.
B.S., 1960, M.S., 1962, Ph.D., 1964, North Carolina State University.
- BRITTON, JOSEPH DANIEL, *Assistant Professor of Military Science*.
Captain, Artillery, United States Army; B.S., University of Mississippi, 1961.
- BRITZ, RONALD JOSEPH, *Assistant Professor of Military Science*.
Captain, Corps of Engineers, United States Army; B.S., Kansas State University, 1960.
- BROCK, JOHN LELAND, *Professor of Industrial Education*.
B.S., Clemson University, 1927; M.A., George Peabody College, 1936.

- BROWN, FARRELL BLENN, *Associate Professor of Chemistry*.
B.S., Lenoir-Rhyne College, 1957; M.S., 1960, Ph.D., 1962, University of Tennessee;
Post Doctorate, A & M College of Texas, 1962-1963.
- BROWN, JONAS WILLIAM, *Associate Professor of Mathematics*.
B.S., North Carolina State College, 1931; M.A. Duke University, 1948.
- BROWN, LAMAR HAMILTON, *Associate Professor of Architecture*.
B.Arch., Alabama Polytechnic Institute, 1948.
- BROWN, MELVIN CHARLES, *Head of Military Science Department; Professor of Military Science*.
Colonel, Infantry, United States Army; B.S., United States Military Academy, 1938;
M.A., George Washington University, 1961.
- BROWN, ROBERT L., *Part-Time Visiting Lecturer in Industrial Management*.
A.B., Howard College, 1947; M.A., University of Alabama, 1951; Ph.D., Purdue University, 1957.
- BROWN, SUSAN HENRIETTA, *Assistant Professor of Industrial Management*.
A.B., 1947, LL.B., 1950, University of Georgia.
- BROWNLEY, FLOYD IRVING, JR., *Dean of the Graduate School and Director of Research; Professor of Chemistry*.
B.S., Wofford College, 1939; M.S., Virginia Polytechnic Institute, 1941; Ph.D., Florida State University, 1952; D.Sc., Wofford College, 1966.
- BOYLES, HARMON EUSTACE, *Associate Professor of Electrical Engineering*.
B.S., 1927, E.E., 1928, Virginia Polytechnic Institute.
- BRULEY, DUANE FREDERICK, *Associate Professor of Chemical Engineering*.
B.S., University of Wisconsin, 1956; M.S., Stanford University, 1959; Ph.D., University of Tennessee, 1963; P. E.
- BRUNER, MARLIN HARNER, *Associate Professor of Forestry*.
B.S., Pennsylvania State College, 1931; M.F., Yale University, 1932.
- BRYANT, HALLMAN BELL, *Assistant Professor of English*.
B.A., Emory University, 1959; M.A., University of North Carolina, 1962; Ph.D., Vanderbilt University, 1967.
- BUNGAY, HENRY ROBERT, III, *Professor of Environmental Systems Engineering*.
B.Ch.E., Cornell University, 1949; Ph.D., Syracuse University, 1954; P. E.
- BURDEN, CHARLES A., *Assistant Professor of Industrial Management*.
B.S., Clemson University, 1959; M.B.A., Georgia State College, 1965.
- BURNETT, ROY PAUL, *Assistant Professor of Aerospace Studies*.
Major, United States Air Force; A.S., Amarillo College, 1952; B.S., 1962, M.S., 1965, Utah State University.
- BURT, PHILIP BARNES, *Assistant Professor of Physics*.
A.B., 1956, M.S., 1958, Ph.D., 1961, University of Tennessee.
- BURTNER, FRANK ALAN, *Professor of Sociology*.
B.A., M.A., University of Texas, 1938; Ph.D., University of North Carolina, 1958.
- BUSCHING, HERBERT WILLIAM, *Assistant Professor of Civil Engineering*.
B.A.B.S., Valparaiso University, 1958; M.S., 1963, Ph.D., 1966, Purdue University.
- BUTLER, JOHN HARRISON,* *Director of Bands; Assistant Professor of Music Education*.
B.M.E., West Texas State College, 1955; M.F.A., University of Georgia, 1960.
- BYRD, LAURIE LAWSON, *Assistant Professor of Education*.
B. A., Furman University, 1950; M.Ed., University of South Carolina, 1954; Ed.D., Duke University, 1966.
- BYRD, WILBERT PRESTON, *Experiment Station Statistician; Professor of Experimental Statistics; in Charge, Experimental Statistics and Statistical Services*.
B.S., 1949, M.S., 1952, North Carolina State University; Ph.D., Iowa State University, 1955.
- CAFFEY, CLETUS BARNARD, *Assistant Professor of Psychology*.
B.A., St. Vincent College, 1956; M.A., 1963, Ph.D., 1966, Catholic University.
- CALHOUN, JAMES NEEL, *Assistant Professor of Aerospace Studies*.
Captain, United States Air Force; B.S., Clemson University, 1955.
- CALHOUN, RICHARD JAMES, *Professor of English*.
B.A., Peabody College, 1948; M.A., Johns Hopkins University, 1950; Ph.D., University of North Carolina, 1959; Post Doctorate, Duke University, 1964-1965.

* On leave.

16 Teaching and Research Faculties

- CAMPBELL, THOMAS ALEXANDER, JR., *Head of Textile Department; Professor of Textiles.*
B.S., Clemson University, 1928; M.Ed., Pennsylvania State College, 1947.
- CAMPER, NYAL DWIGHT, *Assistant Professor of Botany and Bacteriology.*
B.S., 1962, Ph.D., 1966; North Carolina State University.
- CAPEL, WILLIAM CLYDE, JR., *Assistant Professor of Sociology.*
A.B., Washington and Lee University, 1932; M.A., Columbia University, 1933.
- CARD, EDITH BRYSON, *Instructor in Music Education.*
A.B., Furman University, 1944; M.M.E., Florida State University, 1957.
- CARPENTER, EARL THOMAS, *Director of Research Coordinating Unit.*
B.S., 1948, M.Ed., 1954, Ed.D., 1960, University of Missouri.
- CARPENTER, KENNETH EDSON, *Assistant Professor of Architecture.*
B.Arch., University of Oklahoma, 1962; M.Arch., University of Minnesota, 1967; A.I.A.
- CARTER, CLIFTON WALKER, *Assistant Professor of Engineering Graphics.*
B.S., Clemson University, 1933.
- CARTER, ROBERT MILES, *Assistant Professor of Aerospace Studies.*
Captain, United States Air Force; B.S., Clemson University, 1955.
- CASKEY, CLAIRE OMAR, *Associate Professor of English.*
B.S., Appalachian State Teachers College, 1947; A.M., Duke University, 1948.
- CASTRO, WALTER ERNEST, *Assistant Professor of Engineering Mechanics.*
A.S., Delhi Agricultural and Technical Institute, 1954; B.S., Indiana Technical College, 1959; M.S., Clemson University, 1962; Ph.D., University of West Virginia, 1965.
- CHAPLIN, ROBERT LEE, JR., *Associate Professor of Physics.*
B.S., Clemson University, 1948; M.S., 1953, Ph.D., 1962, North Carolina State College.
- CHALUPA, WILLIAM VICTOR, *Associate Professor of Dairy Science.*
B. S., 1958, M.S., 1959, Ph.D., 1962, Rutgers University.
- CHISMAN, JAMES ALLEN, *Assistant Professor of Mechanical Engineering.*
B.S., University of Akron, 1958; M.S., 1960, Ph.D., 1963, State University of Iowa; P. E.
- CHOLEWINSKI, FRANK MICHAEL, *Associate Professor of Mathematics.*
E.P., 1958, M.S., 1959, Auburn University; Ph.D., Washington University, 1964.
- CLARK, HOWARD G., III, *Associate Professor of Textile Chemistry.*
A.B., Samford University, 1947; M.S., University of Notre Dame, 1949; Ph.D., University of Maryland, 1954.
- COCHRAN, JAMES HARVEY, *Head of Entomology and Zoology Department; Professor of Entomology and Zoology; State Entomologist.*
B.S., Clemson University, 1935; M.S., 1936, Ph.D., 1946, Iowa State College.
- COHOON, DANIEL FRED, *Superintendent and Associate Professor of Botany and Bacteriology, Edisto Experiment Station.*
B.S., University of Western Ontario, 1952; Ph.D., Rutgers University, 1956.
- COKER, EDWARD CALER, JR., *Associate Professor of Mathematics.*
B.S., University of South Carolina, 1928; M.A., University of North Carolina, 1930.
- COLEMAN, ROY LLOYD, *Instructor in French.*
A.A., Campbell College, 1956; A.B., 1960, M.A., 1966, University of North Carolina.
- COLLINS, THOMAS FRANK,* *Assistant Professor of Physics.*
A.B., Mercer University, 1956; M.S., Clemson University, 1958.
- COOK, BRUCE FARRELL, *Visiting Assistant Professor of Music Education; Director of Bands.*
B.M.E., 1954, M.A., 1965, West Texas State University.
- COOL, BINGHAM MERCUR, *Professor of Forestry.*
B.S., Louisiana State University, 1940; M.S., Iowa State College, 1941; Ph.D., Michigan State University, 1957.
- COOLEIDGE, HAROLD NORMAN, JR.,* *Alumni Professor of Architecture.*
B.S., 1943, B.Arch, 1950, Harvard University; M.A., 1957, Ph.D., 1964, University of Pennsylvania.
- COOPER, JAMES BRONAUGH, *Associate Professor of Poultry Science.*
B.S., 1935, M.S., 1938, University of Kentucky.
- COUCH, JAMES HOUSTON, *Associate Professor of Industrial Engineering.*
B.S., 1941, M.S., 1954, Clemson University.

* On leave.

- COVER, ALAN SEYMOUR, *Assistant Professor of Mathematics.*
B.S., Indiana State College, 1954; M.A., 1960, Ph.D., 1964, Pennsylvania State University.
- COX, HEADLEY MORRIS, *Head of English and Modern Languages Department; Professor of English.*
A.B., 1937, M.A., 1939, Duke University; Ph.D., University of Pennsylvania, 1958.
- CRADDOCK, GARNET ROY, *Professor of Agronomy and Soils.*
B.S., Virginia Polytechnic Institute, 1952; Ph.D., University of Wisconsin, 1955.
- CRAIG, JAMES TELFORD, *Assistant Professor of Agricultural Engineering.*
B.S., Clemson University, 1951; M.S., University of Georgia, 1960.
- CRAIG, KIRK ROBINS, *Lecturer in Architecture.*
B.S., Clemson University, 1951; B.Arch, Cornell University, 1954; M.Arch., Harvard University, 1957; A.I.A.
- CRAWFORD, JAMES H., *Assistant Professor of Horticulture.*
B.S., 1949, M.S., 1961, Clemson University.
- CROOK, LYNN, *Assistant Professor of Food Science and Biochemistry.*
B.S., Furman University, 1955; M.A., Johns Hopkins University, 1957; Ph.D., Emory University, 1966.
- CROSS, JOAN TILTON, *Instructor in English.*
A.B., Stetson University, 1965; M.A., University of North Carolina, 1966.
- CROSS, ROBERT LYMAN, *Instructor in English.*
A.B., Stetson University, 1964; M.A., University of North Carolina, 1966.
- DAVENPORT, DOROTHY HUDGENS, *Assistant Professor of Nursing.*
B.S., Furman University, 1948; M.Ed., Bridgewater State College, 1962.
- DAVENPORT, JOHN DOUGLAS, *Assistant Professor of Psychology.*
B.S., Clemson University, 1943; M.A., Furman University, 1958; Ph.D., University of Maryland, 1967.
- DAVIS, CECIL COOK, *Professor of Industrial Management.*
B.B.A., 1947, M.B.A., 1949, University of Georgia; C.P.A., 1966.
- DAVIS, LOWERY HEYWOOD, *Head of Agricultural Education Department; Professor of Agricultural Education.*
B.S., 1948, M.S., 1952, Alabama Polytechnic Institute; Ph.D., Ohio State University, 1956.
- DAVIS, RUBY SELLERS, *Assistant Professor of History.*
A.B., 1946, M.A., 1947, University of Georgia.
- DEAN, JORDAN ARTHUR, *Associate Professor of Modern Languages.*
A.B., Wofford College, 1933; M.A., Vanderbilt University, 1934.
- DiBENEDETTO, GUY ROBERT, *Instructor in History.*
B.A., Brooklyn College, 1963; M.A., University of North Carolina, 1966.
- DICKEY, JOSEPH FREEMAN, *Assistant Professor of Dairy Science.*
B.S., 1956, M.S., 1962, N. C. State College; Ph.D., Pennsylvania State University, 1965.
- DILLARD, GARY EUGENE, *Assistant Professor of Botany and Bacteriology.*
A.B., 1960, M.S., 1962, Southern Illinois University; Ph.D., North Carolina State University, 1966.
- DILLMAN, BUDDY L., *Assistant Professor of Agricultural Economics.*
B.S., 1959, M.S., 1961, University of Arkansas.
- DINWIDDIE, JOSEPH GRAY, JR., *Professor of Chemistry.*
B.S., Randolph-Macon College, 1942; Ph.D., University of Virginia, 1949.
- DOUGLASS, THOMAS ERNEST, *Assistant Professor of English.*
B.A., 1953, M.A., 1955, Ph.D., 1965, University of Arkansas.
- DOWDLE, MARION WALKER, JR., *Assistant Professor of Military Science.*
Captain, Armor, United States Army; B.A., Presbyterian College, 1959.
- DOWLER, WILLIAM MINOR, *Plant Pathologist (USDA); Lecturer in Botany and Bacteriology.*
B.S., 1954, M.S., 1958, University of Missouri; Ph.D., University of Illinois, 1961.
- DRAKE, THOMAS LYNN, *Assistant Professor of Mechanical Engineering and Electrical Engineering.*
B.S., Tri-State College, 1958; M.S., 1959, Ph.D., 1964, Michigan State University.
- DRESKIN, ERVING ARTHUR, *Lecturer in Medical Technology; Co-director, School of Medical Technology, Greenville General Hospital.*
B.S., 1940, M.D., 1943, Tulane University.

18 Teaching and Research Faculties

- DREW, LELAND OVERBEY, *Associate Professor of Agricultural Engineering*.
B.S., Clemson University, 1943; M.S., Iowa State College, 1945; Ph.D., Michigan State University, 1963; P. E.
- DUNPACE, ANN J., *Lecturer in Entomology*.
B.S., Vassar College, 1958; Ph.D., Harvard University Medical School, 1964.
- DUNKLE, BERNARD EDWARD, *Associate Professor of Engineering Graphics*.
B.S., United States Naval Academy, 1935; M.S., A & M College of Texas, 1956.
- DUNKLE, SUE KING, *Assistant Professor of Mathematics*.
B.A., Southwestern Louisiana Institute, 1934; M.A., University of Texas, 1936; M.A., Columbia University, 1940.
- DURANT, JOHN ALEXANDER, III, *Assistant Professor of Entomology and Zoology, Pee Dee Experiment Station*.
B.S., 1961, M.S., 1963, Clemson University; Ph.D., Auburn University, 1966.
- DUVAL, JOHN CALMES, *Assistant Professor of Speech*.
B.A., 1958, M.A., 1961, University of Arkansas.
- EDWARDS, JAMES LEON, *Professor of Mechanical Engineering*.
B.M.E., Clemson University, 1941; M.S., Pennsylvania State College, 1951; P. E.
- EDWARDS, ROBERT LEE, *Associate Professor of Animal Science*.
B.S., Berea College, 1946; M.S., 1954, Ph.D., 1958, North Carolina State College.
- EFLAND, THOMAS DANIEL, *Associate Dean, School of Industrial Management and Textile Science, Director of Research, Professor of Textiles*.
B.S., North Carolina State College, 1949; M.S., Georgia Institute of Technology, 1956.
- ELLING, RUDOLF ERNEST, *Assistant Professor of Civil Engineering*.
B.S., Michigan State University, 1950; M.S., University of Illinois, 1952; Ph.D., Stanford University, 1967.
- ELROD, ALVON CREIGHTON,* *Associate Professor of Mechanical Engineering*.
B.M.E., 1949, M.M.E., 1951, Clemson University; Ph.D., Purdue University, 1959; P. E.
- EPPS, WILLIAM MONROE, *Head of Botany and Bacteriology Department; Professor of Botany and Bacteriology; State Plant Pathologist*.
B.S., Clemson University, 1937; Ph.D., Cornell University, 1942.
- ERICKSEN, ARTHUR RANDOLPH, *Assistant Professor of Military Science*.
Major, Signal Corps, United States Army; B.S., Auburn University, 1958.
- ESKEW, ELIAS BENTON, *Associate Professor of Agronomy and Soils*.
B.S., Clemson University, 1943; M.S., Ohio State University, 1951.
- EUDE, JOSETTE ANDREE, *Visiting Instructor in French*.
Licence, 1942, Diploma, 1963, Certificat, 1967, University of Paris.
- FAIN, CHARLES CLIFFORD, *Assistant Professor of Ceramic Engineering*.
B.Cr.En., 1954, M.S., 1957, Clemson University; Ph.D., Ohio State University, 1967.
- FANNING, JAMES COLLIER, *Associate Professor of Chemistry*.
B.S., The Citadel, 1953; M.S., 1956, Ph.D., 1960, Georgia Institute of Technology; Post Doctorate, Tulane University, 1960-1961.
- FAZIO, MARY JEAN, *Instructor in French*.
B.A., Radford College, 1965; M.A., University of North Carolina, 1966.
- FEAR, ARTHUR J., *Associate Professor of Speech*.
A.B., DePauw University, 1935; M.A., State University of Iowa, 1939; Ph.D., University of Southern California, 1967.
- FELDER, HERMAN McDONALD, JR., *Associate Professor of English*.
A.B., Wofford College, 1930; M.A., Vanderbilt University, 1937.
- FERA, CESARÉ D., *Visiting Professor of Architecture*.
Doctor of Engineering in Architecture, University of Genoa, 1950; A.A. Dipl. Architectural Assoc. in London, England, 1953.
- FERNANDEZ, ELENA GONZALES, *Lecturer in Spanish*.
A.B., Instituto de la Habana, 1942.
- FERNANDEZ, GASTON JUAN, *Assistant Professor of Spanish*.
B.L.S., Instituto de Segunda Enseñanza de Remedios; LL.D., University of Havana, 1942.
- FLATT, JAMES LEVERN, *Associate Professor of Mathematics*.
B.S., Bethel College, 1949; M.A., 1950, Ph.D., 1965, George Peabody College.
- FORD, JOHN MARTIN, *Associate Professor of Civil Engineering*.
B.C.E., Clemson University, 1946; M.S., University of North Carolina, 1950; P. E.

* On leave.

- FOX, RICHARD CHARLES, *Associate Professor of Entomology and Zoology; Chairman, Research Faculty Council.*
B.S., 1948, M.For., 1949, Ph.D., 1958, Michigan State University.
- FRAKER, JOHN RICHARD, *Instructor in Industrial Engineering.*
B.S., 1956, M.S., 1965, University of Tennessee.
- FREDLAND, RICHARD ALAN, *Instructor in Political Science.*
A.B., Wofford College, 1958; M.A., American University, 1965.
- FREEZE, CHESTER RICHARD, *Associate Professor of Education.*
B.S., Marion College, 1953; M.Ed., University of South Dakota, 1954; Ed.D., University of Alabama, 1963.
- FRYE, REVIS MILLER, *Assistant Professor of Recreation and Park Administration.*
B.S., Western Carolina College, 1942; M.A. Columbia University, 1947.
- FULMER, JOHN PATRICK, *Assistant Professor of Horticulture.*
B.S., 1953, M.S., 1955, Clemson University.
- FULMER, LOUISE GRAY, *Instructor in Mathematics.*
A.B., Winthrop College, 1937.
- FULTON, JOHN DAVID, *Assistant Professor of Mathematics.*
B.S., 1960, M.S., 1963, Ph.D., 1965, North Carolina State University.
- GAMBRELL, CARL E., *Assistant Professor of Horticulture, Sand Hill Experiment Station.*
B.S., 1948, M.S., 1960, Clemson University.
- GANIM, VIRGINIA LYNN, *Instructor in English.*
B.A., 1963, M.A., 1966, University of North Carolina.
- GARNER, THOMAS HAROLD, *Associate Professor of Agricultural Engineering.*
B.S., 1952, M.S., 1956, Ph.D., 1964, North Carolina State.
- GARRISON, OLEN BRANFORD, *Director of Agricultural Experiment Station; Director of Research in Agriculture; Professor of Horticulture.*
B.S., Clemson University, 1933; M.S., Louisiana State University, 1934; Ph.D., Cornell University, 1939.
- GELDARD, JOHN FRANCIS, *Assistant Professor of Chemistry.*
B.Sc., 1958, M.Sc., 1959, Ph.D., 1964, University of Sydney; Post Doctorate, University of Illinois, 1963-1965.
- GETTYS, WILLIAM EDWARD, *Associate Professor of Physics.*
B.S., 1960, M.S., 1961, Clemson University; Ph.D., Ohio University, 1964.
- GIBSON, PRYCE BYRD, *Geneticist (USDA), Lecturer in Agronomy and Soils.*
B.S., 1938, B.S., 1940, M.S., 1942, Auburn University; Ph.D., University of Wisconsin, 1950.
- GILLILAND, BOBBY EUGENE, *Assistant Professor of Electrical Engineering.*
B.S., Louisiana Polytechnic Institute, 1958; M.S., 1964, Ph.D., 1967, University of Arkansas.
- GILREATH, JOHN ATKINS, *Instructor in Physics.*
B.S., 1958, M.S., 1960, Clemson University.
- GING, JOHN LEONARD, *Assistant Professor of Physics.*
B.A., Alfred University, 1953; M.S., Carnegie Institute of Technology, 1955; Ph.D., University of North Carolina, 1960.
- GODLEY, WILLIE CECIL, *Professor of Animal Science.*
B.S., Clemson University, 1943; M.S., 1949, Ph.D., 1955, North Carolina State College.
- GOLDEMBERG, MAURICE, *Associate Professor of Textile Chemistry.*
B.S., Colbert University, 1918; Chemical Engineering, Ecole Nationale Supérieure de Chimie, 1921; M.S., Sorbonne University, 1921.
- GOODIN, CURTIS PAUL, *Associate Professor of Electrical Engineering.*
B.S., University of Kentucky, 1948; M.S., Georgia Institute of Technology, 1957.
- GORDON, JOHN STARKE, *Assistant Professor of Political Science.*
A.B., Dickinson College, 1960; M.A., Duke University, 1963.
- GOREE, JAMES GLEASON, *Assistant Professor of Engineering Mechanics.*
B.S., University of Florida, 1960; M.S., University of Washington, 1962; Ph.D., University of Alabama, 1966.
- GOSSETT, BILLY JOE, *Associate Professor of Agronomy and Soils.*
B.S., University of Tennessee, 1957; M.S., 1959; Ph.D., 1962, University of Illinois.
- GOSWAMI, BHUVENESH C., *Visiting Lecturer in Fiber Physics.*
B.S., Delhi Polytechnic, 1959; M.S., Victoria Jubilee Technical Institute, 1963; Ph.D., Manchester University, 1966.
- GRABEN, HENRY WILLINGHAM, *Associate Professor of Physics.*
B.S., Birmingham-Southern College, 1957; M.S., 1961, Ph.D., 1962, University of Tennessee.

20 Teaching and Research Faculties

- GRAHAM, MARGARET SCHWEITZER, *Instructor in German*.
B.S., Pennsylvania State University, 1964; M.Ed., Temple University, 1967.
- GRAHAM, WILLIAM DOYCE, JR., *Assistant Professor of Agronomy and Soils*.
B.S., Texas Technology College, 1962; M.S., 1965, Ph.D., 1967, Purdue University.
- GRAY, FURMAN R., *Visiting Lecturer in Industrial Management*.
B.A., Furman University, 1951; CPA, S. C. Board of Examiners, 1956; M.S., University of Georgia, 1967.
- GREEN, CLAUD BETHUNE, *Director of the Summer Sessions and Extended Programs; Professor of English*.
B.A., 1935, M.A., 1938, University of Georgia; Ph.D., Duke University, 1953.
- GRIFFIN, DEUEL NORTON, *Instructor in English*.
A.A., Anderson College, 1955; A.B., Erskine College, 1956; M.A.T., Duke University, 1960.
- GRIFFIN, VILLARD STUART, JR., *Assistant Professor of Geology*.
B.A., 1959, M.S., 1961, University of Virginia; Ph.D., Michigan State University, 1965.
- GRUBB, CHARLES ALAN, *Instructor in History*.
B.A., Washington and Lee University; M.A., Columbia University, 1964.
- GUIDE, VINCENT DANIEL RICHARD, *Assistant Professor of Military Science*.
Lieutenant Colonel, Infantry, United States Army; B.A., University of Kentucky, 1960.
- GUM, COBURN, *Associate Professor of English*.
A.B., 1954, Ph.D., 1962, Duke University.
- GUNNIN, EMERY AARON, *Professor of Architecture*.
B.S., Clemson University, 1950; A.I.A.; P. E.
- GUNTER, EDITH GEORGIANA, *Instructor in Nursing*.
B.S.N., Duke University, 1944.
- GUNTER, THOMAS H., JR., *Assistant Professor of Industrial Management*.
B.S.T.M., Georgia Institute of Technology, 1954; M.B.A., Georgia State College, 1965.
- HAHN, MARSHALL STERLING, *Assistant Professor of Industrial Education*.
A.B., 1954, M.S., 1959, Nebraska State College; Ph.D., University of Minnesota, 1967.
- HALPIN, JAMES EDWIN, *Associate Director of Agricultural Experiment Station; Associate Professor of Botany and Bacteriology*.
B.S., 1950, M.S., 1951, Ph.D., 1955, University of Wisconsin.
- HALL, JAMES WAYNE, *Associate Professor of Chemical Engineering*.
B.S., A & M College of Texas, 1950; M.S., 1961, Ph.D., 1963, University of Texas.
- HALTIWANGER, MARION EUGENE, *Assistant Professor of Military Science*.
Major, Artillery, United States Army; B.S., The Citadel, 1955.
- HAMILTON, MAX GREENE, *Associate Professor of Horticulture, Edisto Experiment Station*.
B.S., North Carolina State College, 1949; Ph.D., Cornell University, 1953.
- HAMMOND, ALEXANDER FRANCIS, *Associate Professor of Engineering Graphics*.
B.E.E., 1949, M.S., 1957, Clemson University.
- HANDLIN, DALE LEE, *Assistant Professor of Animal Science*.
B.S., Kansas State College, 1951; M.S., A & M College of Texas, 1954.
- HANNAH, HOWARD BARRY, *Assistant Professor of English*.
M.A., 1966, M.F.A., 1967, University of Arkansas.
- HARDEN, JOHN CHARLES, JR., *Associate Professor of Mathematics*.
B.S., Mississippi College, 1947; M.A., University of Tennessee, 1949.
- HARDIN, THURMAN CRAIG, *Head of Mechanical Engineering Department; Professor of Mechanical Engineering*.
B.S.M.E., University of Tennessee, 1946; M.S.M.E., Virginia Polytechnic Institute, 1949; Ph.D., Georgia Institute of Technology, 1965.
- HARE, WILLIAM RAY, JR., *Associate Professor of Mathematics*.
B.S., Henderson State Teachers College, 1957; M.S., 1959, Ph.D., 1961, University of Florida.
- HAILEY, JAMES HADLEY, *Part-Time Instructor of Engineering Mechanics*.
B.S.C.E., Clemson University, 1946.
- HARRIS, RANSOM BAINE, *Assistant Professor of Philosophy and Religion*.
A.A., Mars Hill College, 1946; B.A., The University of Richmond, 1948; B.D., The Southern Baptist Theological Seminary, 1951; M.A., The University of Richmond, 1954; M.A., Emory University, 1960.

- HARRISON, EUGENE, *Draper Professor of Mechanical Engineering.*
B.S., 1951, M.S., 1952, A & M College of Texas, Ph.D., Michigan State University, 1962.
- HARSHMAN, RICHARD CALVERT, *Associate Professor of Chemical Engineering.*
B.A., Ohio Wesleyan University, 1947; M.S., 1949, Ph.D., 1951, Ohio State University.
- HARVEY, LAWRENCE HARMON, *Assistant Professor of Agronomy and Soils.*
B.S., 1952, M.S., 1959, University of Georgia.
- HASELTON, GEORGE MONTGOMERY, *Assistant Professor of Geology.*
B.A., Colby College, 1951; M.A., Boston University, 1958; Ph.D., Ohio State University, 1967.
- HASH, JOHN ALEX, *Assistant Professor of Agricultural Education.*
B.S., Virginia Polytechnic Institute, 1956; M.S., Cornell University, 1964.
- HATCHER, ROBERT DEAN, JR., *Assistant Professor of Geology.*
B.A., 1961, M.S., 1962, Vanderbilt University; Ph.D., University of Tennessee, 1965.
- HAUN, JOSEPH RHODES, *Associate Professor of Horticulture.*
A.B., Berea College, 1946; M.S., 1950, Ph.D., 1951, University of Maryland.
- HAYS, RUTH LANIER, *Assistant Professor of Entomology and Zoology.*
B.A., Berea College, 1962; Ph.D., Auburn University, 1966.
- HAYS, SIDNEY BROOKS, *Assistant Professor of Entomology and Zoology.*
B.S., 1953, M.S., 1958, Auburn University; Ph.D., Clemson University, 1962.
- HEATON, RALPH BEACHAM, JR., *Instructor in English.*
B.A., Furman University, 1964; M.A., University of Virginia, 1965.
- HENNINGSON, ROBERT WALTER, *Professor of Dairy Science; Assistant Director of Research.*
B.S., 1950, M.S., 1952, Ph.D., 1956, Cornell University.
- HENRY, LOUIS LEE, *Assistant Professor of English.*
B.S., Clemson University, 1953; M.A., 1958, Ph.D., 1965, Florida State University.
- HENSON, JOSEPH LAWRENCE, *Lecturer in Nursing.*
B.S., Bob Jones University, 1953; M.S., 1963, Ph.D., 1965, Clemson University.
- HERLINGER, WILLIAM BILL, *Associate Professor of Modern Languages.*
L.A.M., University of Vienna, 1929; D.K.F.M., University of Berlin, 1931.
- HILL, JAMES RILEY, JR., *Associate Professor of Animal Science.*
B.S., 1956, M.S., 1958, Clemson University; Ph.D., North Carolina State University, 1965.
- HILL, PATRICIA KNEAS, *Assistant Professor of History.*
A.B., Vassar College, 1935; A.M., University of Pennsylvania, 1938.
- HILL, ROBERT WHITE, *Instructor in English.*
A.B., 1963, M.A., 1964, University of North Carolina.
- HIND, ALFRED THOMAS, JR., *Professor of Mathematics.*
A.B., 1934, M.A., 1936, Emory University; Ph.D., University of Georgia, 1952.
- HITE, JAMES CLEVELAND, *Assistant Professor of Agricultural Economics and Rural Sociology.*
B.S., Clemson University, 1963; M.A., Emory University, 1964; Ph.D., Clemson University, 1966.
- HOBSON, JAMES HARVEY, *Professor of Chemistry.*
B.S., University of South Carolina, 1939; M.A., 1947, Ph.D., 1953, Emory University.
- HODGES, VERNON SEYMOUR, *Associate Professor of Architecture.*
S.B., Harvard College, 1934; M.Arch., Harvard University, 1939.
- HOLMAN, HARRIET R., *Associate Professor of English.*
A.B., Winthrop College, 1934, A.M., University of Michigan, 1939; Ph.D., Duke University, 1948.
- HOLT, ALBERT HAMILTON, *Associate Professor of English.*
A.B., 1939, M.A., 1947, University of North Carolina; Ph.D., Vanderbilt University, 1958.
- HOOD, CLARENCE ELAM, JR., *Assistant Professor of Agricultural Engineering.*
B.S., 1959, M.S., 1961, Ph.D., 1964, North Carolina State.
- HOWARD, GORDON EDWARD, *Assistant Professor of Recreation and Park Administration.*
B.A., 1963, M.A., 1964, University of North Carolina.
- HUBBARD, JULIUS CLIFFORD, JR., *Associate Professor of Textiles.*
B.S., Clemson University, 1942; M.S., Georgia Institute of Technology, 1950.

22 Teaching and Research Faculties

- HUBBARD, JOHN WILLIAM, *Associate Professor of Agricultural Economics and Rural Sociology.*
B.S., Berea College, 1944; M.S., 1958, Ph.D., 1962, University of Kentucky.
- HUDSON, WILLIAM GARRAUX, *Associate Professor of Mechanical Engineering.*
B.M.E., 1946, M.S., 1957, Clemson University; M.S., University of Michigan, 1965; P.E.
- HUFF, LORENZ DITMAR, *Professor of Physics.*
A.B., 1927, M.S., 1928, Oklahoma University; Ph.D., California Institute of Technology, 1931.
- HUFFMAN, JOHN WILLIAM, *Professor of Chemistry.*
B.S., Northwestern University, 1954; A.M., 1956, Ph.D., 1957, Harvard University.
- HUGHES, MORRIS BURDETTE, *Professor of Horticulture, Edisto Experiment Station.*
B.S., Michigan State University, 1935; Ph.D., University of California, 1943.
- HULBERT, SAMUEL F., *Assistant Professor of Ceramic Engineering.*
B.S. Cer. Engr., 1958, Ph.D. Cer. Science, 1964, Alfred University.
- HUNTER, HOWARD LOUIS, *Dean, College of Arts and Sciences; Professor of Chemistry.*
B.Chem., 1925, Ph.D., 1928, Cornell University.
- HUNTER, ROBERT HOWARD, *Head, Visual Studies Department; Associate Professor of Architecture.*
B.S., 1951, M.F.A., 1953, University of Oregon.
- HUTCHINSON, JOHN PAUL, *Instructor in Sociology.*
B.A., Baylor University, 1966; M.A., Stephen F. Austin State College, 1967.
- IDOL, JOHN LANE, JR., *Assistant Professor of English.*
B.S., Appalachian State Teachers College, 1958; M.A., 1961, Ph.D., 1965, University of Arkansas.
- ISRAEL, CHARLES MONT, *Instructor in English.*
A.B., Wofford College, 1961; A.M., Emory University, 1963.
- JACKSON, JOSEPH EARL, *Instructor in Music Education.*
A.B., Carson-Newman College, 1955; M.A., East Carolina College, 1964.
- JAMES, RICHARD DAVID, *Assistant Professor of Military Science.*
Captain, Infantry, United States Army; B.S., United States Military Academy, 1963.
- JAMESON, LAKE HUGH, *Associate Professor of Engineering Graphics.*
B.S., Clemson University, 1942; M.S., North Carolina State College, 1952.
- JANZEN, JACOB JOHN, *Associate Professor of Dairy Science.*
B.S.A., University of Manitoba, 1944; M.S., 1947, Ph.D., 1952, University of Wisconsin; Post Doctorate, University of Wisconsin, 1952-1953.
- JENNINGS, CARROLL WADE, *Assistant Professor of English.*
B.A., 1960, Ph.D., 1965, Texas Technological College.
- JENSEN, ARTHUR KENNETH, *Director of Vocational Education Media Center; Associate Professor of Education.*
B.S., 1951, M.S., 1956, Ph.D., 1961, University of Wisconsin.
- JOHNSON, JAMES KARL, JR., *Assistant Professor of Mechanical Engineering.*
B.M.E., 1950, M.S., 1958, Clemson University; M.S., Georgia Institute of Technology, 1966; P. E.
- JOHNSTON, WALTER EDWARD, *Assistant Professor of Experimental Statistics.*
B.S., 1960; M.S., 1965, Texas A & M University.
- JOINER, CHARLES L., *Part-Time Lecturer in Economics.*
A.B., Central Wesleyan College, 1962; M.A., University of Alabama, 1967.
- JONES, CHAMP McMILLIAN, *Professor of Agronomy and Soils.*
B.S., Clemson University, 1939; M.S., Cornell University, 1940; Ph.D., Michigan State College, 1952.
- JONES, JESS WILLARD, *Director of Resident Instruction; Professor of Agronomy.*
B.S., Clemson University, 1937; M.S., 1938, Ph.D., 1953, Cornell University.
- JONES, ULYSSES SIMPSON, *Head of Agronomy and Soils Department; Professor of Agronomy and Soils.*
B.S., Virginia Polytechnic Institute, 1939; M.S., Purdue University, 1942; Ph.D., University of Wisconsin, 1947.
- JORDAN, WRIGHT SINQUEFIELD, *Assistant Professor of Horticulture.*
B.S.A., 1959, M.S., 1961, University of Georgia; Ph.D., Pennsylvania State University 1965.
- JUTRAS, MICHEL WILFRID, *Assistant Professor of Agronomy and Soils.*
B.S., University of Massachusetts, 1958; M.S., University of Connecticut, 1961; Ph.D., Iowa State University, 1964.

- KAPELIS, ZIGURTS, Assistant Professor of Architecture.**
B.Arch., University of Melbourne, 1956; Dip. T.C.P., University of Sydney, 1964; R.A.I.A.
- KAUFMANN, ANDERS J., Assistant Professor of Architecture.**
B.Arch., Cornell University, 1956; M.Arch., University of Pennsylvania, 1962; A.I.A.
- KEEGAN, HARRY J., J. E. Sirrine Visiting Lecturer in Textile Science.**
B.M.E., George Washington University, 1940.
- KEITH, MARVIN OWEN, Assistant Professor of Recreation and Park Administration.**
B.S., North Carolina State University, 1958; M.S., University of North Carolina, 1961.
- KELLER, FREDERICK JACOB, Assistant Professor of Physics.**
B.S., Marshall University, 1960; M.S., 1962, Ph.D., 1965, University of Tennessee.
- KELLY, JAMES WELBORN, Assistant Professor of Dairy Science.**
B.S., 1939, M.S., 1962, Clemson University.
- KENELLY, JOHN WILLIS, JR., Associate Professor of Mathematics.**
B.S., Southeastern Louisiana College, 1957; M.S., University of Mississippi, 1957; Ph.D., University of Florida, 1961.
- KERSEY, ROBERT NOEL, JR., Associate Professor of Electrical Engineering.**
B.S. in E.E., Georgia School of Technology, 1942; M.S. Clemson University, 1959.
- KILGORE, DONALD GIBSON, JR., Lecturer in Medical Technology; Co-Director, School of Medical Technology, and Pathologist, Greenville General Hospital.**
M.D., Southwestern Medical College of the University of Texas, 1949.
- KING, EDWIN WALLACE,* Professor of Entomology and Zoology.**
B.S., University of Massachusetts, 1941; M.S., Virginia Polytechnic Institute, 1947; Ph.D., University of Illinois, 1951.
- KING, WILLIS ALONZO, Head of Department of Dairy Science; Professor of Dairy Science.**
B.S., Clemson University, 1936; M.S., 1938, Ph.D., 1940, University of Wisconsin.
- KINGSLAND, GRAYDON CHAPMAN, Associate Professor of Botany and Bacteriology.**
B.S., University of Vermont, 1952; M.S., University of New Hampshire, 1955; Ph.D., Pennsylvania State University, 1958.
- KIRKLEY, FRANCIS EDWARD, Associate Professor of Agricultural Education.**
B.S., Clemson University, 1929; M.S., University of Kentucky, 1951.
- KIRKWOOD, CHARLES EDWARD, JR., Associate Professor of Mathematics; Analyst, Computer Center.**
A.B., Lynchburg College, 1935; M.S., University of Georgia, 1937.
- KNAPP, RONALD JAMES,* Assistant Professor of Sociology.**
B.A., Albion College, 1960; M.A., Bowling Green State University, 1963.
- KNOWLAND, RALPH EDWARD, Associate Professor of Architecture.**
B.Arch., University of Manitoba, 1944; M.B.A., University of Western Ontario, 1966; R.A.I.C.
- KWAK, NO KYOON, Assistant Professor of Industrial Management.**
B.A., California Western University, 1956; M.A., University of California, 1959; Ph.D., University of Southern California, 1964.
- LAFLUR, KERMIT S., Associate Professor of Agronomy and Soils.**
B.A., 1937, M.S., 1964, Colby College, Ph.D., Clemson University, 1966.
- LAGRONE, JOHN WALLACE, Associate Professor of Mathematics.**
B.S., Clemson University, 1932; M.A., Vanderbilt University, 1934.
- LAITALA, EVERETT, Head of Industrial Engineering Department; Professor of Industrial Engineering.**
B.S.M.E., 1934, M.S., 1937, M.E., 1945, University of Minnesota.
- LAITHWAITE, PETER R. P., Instructor in Industrial Management.**
Applied Economics, University of Rhodesia, 1963; Chartered Accountant, Rhodesia Society of Accountants, 1965; M.B.A., University of Georgia, 1967.
- LAMBERT, JERRY ROY, Assistant Professor of Agricultural Engineering.**
B.A.E., 1958, M.S.E., 1962, University of Florida; Ph.D., North Carolina State, 1964; P.E.
- LAMBERT, ROBERT STANSBURY, Head of Social Sciences Department; Professor of History.**
A.B., 1942, M.A., 1948, Ph.D., 1951, University of North Carolina.
- LANDER, ERNEST MCPHERSON, JR., Professor of History.**
A.B., Wofford College, 1937; M.A., 1939; Ph.D., 1950, University of North Carolina.

* On leave.

24 Teaching and Research Faculties

- LANDERS, KNOX SCHAFFER, *Assistant Professor of Chemistry*.
B.S., 1951, M.S., 1955, University of Alabama.
- LANDRITH, HAROLD FOCHONE, *Dean, School of Education; Head, Department of Elementary and Secondary Education; Professor of Education*.
B.S., Clemson University, 1948; M.A., Vanderbilt University, 1949; Ed.D., University of Houston, 1960.
- LANE, CARL LEATON, *Assistant Professor of Forestry*.
B.S., 1952, M.S., 1961, North Carolina State College.
- LANHAM, WILLIAM JOSEPH, *Head of Agricultural Economics and Rural Sociology Department; Professor of Agricultural Economics and Rural Sociology*.
B.S., 1943, M.S., 1959, Clemson University; Ph.D., North Carolina State College, 1963.
- LAROCHE, EVANS ALLEN,* *Associate Professor of Textiles*.
B.S., Clemson University, 1942; M.S., Georgia Institute of Technology, 1951.
- LATORRE, DONALD RUTLEDGE, *Assistant Professor of Mathematics*.
B.A., Wofford College, 1960; M.A., 1962, Ph.D., 1964, University of Tennessee.
- LATORRE, JUEL GILLAM, *Instructor in Mathematics*.
A.B. Coker College, 1959; M.A., University of Tennessee, 1964.
- LAW, ALBERT GILES, *Associate Professor of Engineering Mechanics*.
B.S.C.E., University of Illinois, 1954; M.S.C.E., 1960, Ph.D., 1965, University of Wisconsin; P. E.
- LAWS, HERBERT LIVINGSTON, *Instructor in German*.
B.A., Presbyterian College, 1955; M.A., University of Tennessee, 1957.
- LAZAR, JAMES TARLTON, JR., *Professor of Dairy Science*.
B.S., Clemson University, 1943; M.S., Cornell University, 1949; Ph.D., North Carolina State College, 1955.
- LEEMHUIS, ROGER PHILLIP, *Assistant Professor of History*.
A.B., Villanova University, 1959; M.A., University of Massachusetts, 1961.
- LEFORT, HENRY GERARD, *Assistant Professor of Ceramic Engineering*.
B.Cr.E., Clemson University, 1952; M.S.Cr.E., 1957, Ph.D., 1960, University of Illinois.
- LEHOTSKY, KOLOMAN, *Head of Forestry Department; Professor of Forestry*.
Ing., Bohemian Technical University, Prague, Czechoslovakia, 1928; Ph.D., University of Michigan, 1934.
- LEWIS, ALEXANDER DODGE, *Professor of Mechanical Engineering*.
B.S. in M.E., University of Tennessee, 1939; M.M.E., Yale University, 1946, P. E.
- LIGON, JAMES TEDDIE, *Associate Professor of Agricultural Engineering*.
B.S., Clemson University, 1957; M.S., 1959, Ph.D., 1961, Iowa State University; P. E.
- LINDSTROM, FREDERICK JOHN, *Associate Professor of Chemistry*.
B.S., 1951, M.S., 1953, University of Wisconsin; Ph.D., Iowa State University, 1959.
- LITTLEJOHN, CHARLES EDWARD, *Head of Chemical Engineering Department; Professor of Chemical Engineering*.
B.S., Clemson University, 1940; M.Ch.E., North Carolina State College, 1941; Ph.D., Virginia Polytechnic Institute, 1952; P. E.
- LONG, JIM THOMAS, *Associate Professor of Electrical Engineering*.
B.E.E., Clemson University, 1943; M.S. in E.E., 1949, Ph.D., 1963, Georgia Institute of Technology.
- LUKAWECKI, ANN RUSSELL, *Assistant Professor of Nursing*.
A.B., Shorter College, 1949; B.S., Emory University, 1952; M.A., University of Chicago, 1959.
- LUKAWECKI, STANLEY MICHAEL, *Associate Professor of Mathematics*.
B.S., Southwestern Louisiana College, 1963; M.S., 1957, Ph.D., 1961, Auburn University.
- LYON, KENNETH STEWART, *Assistant Professor of Military Science*.
Captain, Infantry, United States Army; B.S., Kansas State University, 1963.
- LYONS, DONALD W., *Assistant Professor of Textile Science and Mechanical Engineering*.
B.M.E., 1961, Ph.D., 1966, Georgia Institute of Technology; P. E.
- LYTLE, JOHN STEVENS, *Assistant Professor of Agricultural Economics and Rural Sociology*.
B.S., 1962, M.S., 1963, Ph.D., 1966, Ohio State University.
- MACAULAY, HUGH HOLLEMAN, JR., *Alumni Professor of Economics*.
B.S., 1947, M.S., 1948, University of Alabama; Ph.D., Columbia University, 1957.

* On leave.

- McCLAIN, EUGENE FREDERICK, *Assistant Professor of Agronomy and Soils.*
B.S., University of Idaho, 1954; M.S., University of California, 1956.
- McCLURE, HARLAN EWART, *Dean, School of Architecture; Professor of Architecture.*
A.B., B.Arch., George Washington University, 1937; ARK, KKH, Royal Swedish Academy, 1938; M.Arch., Massachusetts Institute of Technology, 1941; A.I.A., 1946; F.A.I.A., 1962.
- McCORMAC, JACK CLARK, *Associate Professor of Civil Engineering.*
B.S., The Citadel, 1948; M.S., Massachusetts Institute of Technology, 1949; P.E.
- McCUTCHEN, ALAN JOHNSTONE, *Associate Professor of Civil Engineering.*
B.S., United States Military Academy, 1928; C.E., University of California, 1932.
- McGEE, CHARLES MCKAY, JR., *Associate Professor of English.*
A.B., Furman University, 1934; A.M., Duke University, 1941.
- McGREGOR, WILLIAM HENRY DAVIS, *Associate Professor of Forestry.*
B.S., Clemson University, 1951; B.S.F. and M.F., University of Michigan, 1953; Ph.D., Duke University, 1958.
- McHUGH, CARL MANNING, *Associate Professor of Engineering Graphics.*
B.S., Clemson University, 1936; P.E.
- McLELLON, WALDRON MURRILL, *Associate Professor of Agricultural Engineering.*
B.S., U. S. Naval Academy, 1941; B.C.E., 1944, M.C.E., 1945, Rensselaer Polytechnic Institute; M.S., Ohio State University, 1952; M.S., 1964, Ph.D., 1967, Rensselaer Polytechnic Institute; P.E.
- McNATT, JO ANN, *Instructor in French and Spanish.*
B.A., Furman University, 1956; M.A., Emory University, 1959.
- MACY, JACQUES BERR, *Instructor in French.*
A.B., 1962, M.A.T., 1963, University of North Carolina.
- MALPHRUS, LEWIS DANIEL, *Associate Professor of Agricultural Economics and Rural Sociology.*
B.S., Clemson University, 1938; M.S., University of Tennessee, 1940; Ph.D., Purdue University, 1954.
- MANN, MARION EDMOND, *Assistant Professor of Military Science.*
Captain, Infantry, United States Army; B.S., North Georgia College, 1959.
- MANVILLER, ALFRED, *Associate Plant Breeder, Pee Dee Experiment Station.*
B.S., 1938, M.S., 1939, Iowa State College; Ph.D., Pennsylvania State College, 1944.
- MARTIN, JOHN ALLEN, JR., *Associate Professor of Horticulture.*
B.S., Clemson University, 1936.
- MARTIN, JOHN CAMPBELL, *Professor of Electrical Engineering.*
B.E.E., Clemson University, 1948; M.S., Massachusetts Institute of Technology, 1953; Ph.D., North Carolina State College, 1962.
- MARTIN, OWEN MITCHELL, *Assistant Professor of Military Science.*
Captain, Infantry, United States Army; B.S., Clemson University, 1963.
- MARULLO, NICASIO PHILIP, *Associate Professor of Chemistry.*
B.S., Queens College, 1952; Ph.D., Polytechnic Institute of Brooklyn, 1961; Post Doctorate, California Institute of Technology, 1960-1961.
- MARVIN, JOHN HENRY, JR., *Associate Professor of Textiles.*
B.S., Clemson University, 1941; M.S., Georgia Institute of Technology, 1960.
- MATHEWS, ANDREW CLARK, *Professor of Botany and Bacteriology.*
A.B., 1928, M.A., 1931, Ph.D., 1939, University of North Carolina.
- MEANS, GEORGE CALVIN, JR., *Professor of Architecture.*
B. of Arch., Western Reserve University, 1947; M.Arch., Georgia Institute of Technology, 1955; A.I.A.
- MEEKS, CHARLES DAVENPORT, *Assistant Professor of Engineering Graphics.*
B.M.E., Clemson University, 1942.
- MEENAGHAN, GEORGE FRANCIS, *Professor of Chemical Engineering.*
B.S., 1952, M.S., 1954, Ph.D., 1956, Virginia Polytechnic Institute.
- MICKELBERRY, WILLIAM CHARLES, *Associate Professor of Food Science and Biochemistry.*
B.S., Washington State University, 1955; M.S., 1960, Ph.D., 1962, Purdue University.
- MILES, JAMES FRANKLIN, *Associate Professor of Agricultural Economics and Rural Sociology.*
A.B., 1938, M.A., 1939, University of South Carolina; Ph.D., Cornell University, 1951.

26 Teaching and Research Faculties

- MILLER, DONALD PIGUET, *Associate Professor of Physics*.
B.S., A & M College of Texas, 1948; M.S., Tulane University, 1952; Ph.D., Polytechnic Institute of Brooklyn, 1962.
- MILLER, MAX GARDNER, *Associate Professor of Physics*.
B.S., 1953, Ph.D., 1961, University of North Carolina.
- MITCHELL, CHARLIE R., *Assistant Professor of Engineering Mechanics*.
B.S., Virginia Polytechnic Institute, 1956; M.S.C.E., West Virginia University, 1961.
- MITCHELL, JACK HARRIS, JR., *Professor of Food Science and Biochemistry*.
B.S., Clemson University, 1933; Ph.D., Purdue University, 1941.
- MIXON, ROBERT FLOYD, *Assistant Professor of Modern Languages*.
B.S., Clemson University, 1954; M.A., University of North Carolina, 1961.
- MOORMAN, ROBERT WARDLAW, *Head of Engineering Mechanics Department; Professor of Engineering Mechanics*.
B.C.E., Clemson University, 1940; M.S., 1947, Ph.D., 1955, State University of Iowa; P.E.
- MORGAN, BARBARA WALKER, *Assistant Professor of Education*.
A.B., 1947, M.Ed., 1959, University of South Carolina.
- MORGAN, HARVEY EUGENE, JR., *Assistant Professor of Industrial Education*.
B.S., 1951, M.S., 1956, Clemson University.
- MORGAN, RICHARD PARKER, *Instructor in History*.
A.B., Western Reserve University, 1963; A.M., Indiana University, 1965.
- MORRIS, FRANK P., *Lecturer in Architecture*.
Washington and Lee University, 1916-1918; A.G.C.
- MULLINS, JOSEPH CHESTER, *Assistant Professor of Chemical Engineering*.
B.S., 1955, M.S., 1960, Ph.D., 1965, Georgia Institute of Technology.
- MURRAY, BOBBY KEITH, *Assistant Professor of Aerospace Studies*.
Major, United States Air Force; B.S., University of Georgia, 1954.
- MUSEN, HAROLD LOUIS, *Associate Professor of Agronomy, Edisto Experiment Station*.
B.S., Tennessee Polytechnic Institute, 1949; M.S., Alabama Polytechnic Institute, 1951; Ph.D., Rutgers University, 1955.
- NAHORY, WILLIAM FRANCIS, *Assistant Professor of Architecture*.
B.Arch., Miami University, 1952; M.C.P., University of North Carolina, 1954; A.I.A.
- NALLEY, DONALD WOODROW, *Instructor in Electrical Engineering*.
B.S.E.E., Clemson University, 1961; M.S.E.E., University of Arkansas, 1965.
- NASH, RICHARD FULLER, JR., *Instructor in Entomology and Zoology*.
B.S., 1956; M.S., 1965, Auburn University.
- NATION, THOMAS CHRISTOPHER, *Lecturer in Medical Technology; Director of Medical Technology, Anderson Memorial Hospital*.
B.S., Piedmont College, 1942; M.D., Emory University, 1951.
- NEWMAN, RAY DEAN, *Assistant Professor of Military Science*.
Captain, Infantry, United States Army; B.A., Northeast Louisiana State College, 1964.
- NEWTON, ALFRED FRANKLIN, *Head of Industrial Education Department; Associate Professor of Industrial Education*.
B.S., 1952, M.S., 1958, Clemson University; Ed.D., University of Tennessee, 1961.
- NICHOLAS, STANLEY COSANKO, *Director of Engineering Research*.
B.S. in M.E., Northwestern University, 1950.
- NICHOLSON, JAMES HARVEY, *Assistant Professor of Mathematics*.
B.A., Southern Methodist University, 1950; M.A., University of Texas, 1957.
- NOWACK, ROBERT FRANCIS, *Associate Professor of Engineering Mechanics*.
B.S., Carnegie Institute of Technology, 1948; M.S., University of Pittsburgh, 1952.
- O'DELL, GLEN DEWITT,* *Assistant Professor of Dairy Science*.
B.S., 1953, M.S., 1955, Clemson University.
- OCLE, WAYNE LEROY, *Professor of Horticulture*.
B.S., University of Tennessee, 1948; M.S., University of Delaware, 1950; Ph.D. University of Maryland, 1952.
- OLSEN, NORMAN LACOUR, JR., *Assistant Professor of English*.
B.A., Dartmouth College, 1956; M.A., 1959, Ph.D., 1963, Duke University.
- OLSON, EDWARD STURE, *Associate Professor of Textile Chemistry*.
B.S., 1938, M.S., 1960, Clemson University.

* On leave.

- O'REILLY, MICHAEL FRANCIS, *Assistant Professor of Mathematics.*
B.S., Queens's University, 1960; Ph.D., University of Manchester, 1965.
- OWEN, WILLIAM BURRAGE, *Assistant Professor of Mathematics.*
B.S., 1961, M.S., 1963, Ph.D., 1965, Colorado State University.
- OWENS, RAMETH RICHARD, *Assistant Professor of History.*
B.A., Agnes Scott College, 1956; M.A., Florida State University, 1961.
- OWENS, WALTON HARRISON, JR., *Assistant Professor of Political Science.*
A.B., Emory University, 1958; M.A., 1961, Ph.D., 1967, Florida State University.
- OWINGS, MARVIN ALPHEUS, *Alumni Professor of English; University Marshal.*
A.B., Wofford College, 1931; M.A., 1932, Ph.D., 1941, Vanderbilt University.
- PACKARD, GARY CLAIRE, *Assistant Professor of Entomology and Zoology.*
B.S., University of Illinois, 1960; M.A., 1963, Ph.D., 1966, University of Kansas.
- PACKER, MYRTON ALFRED, *Associate Professor of Education.*
A.B., 1936, B.D., 1939, M.Ed., 1961, Wittenberg University; Ed.D., Florida State University, 1964.
- PAGE, EDNA EARLE, *Assistant Professor of Vocational Education.*
B.S., 1963, M.S., 1966, Winthrop College.
- PAGE, NORWOOD RUFUS, *Head of Agricultural Chemical Services Department; Professor of Agronomy and Soils.*
B.S., Clemson University, 1939; M.S., North Carolina State College, 1941; Ph.D., University of Georgia, 1959.
- PALMER, MERRILL CRAIG, *Director of Computer Center; Associate Professor of Mathematics.*
B.S., University of Chattanooga, 1947; M.A., Vanderbilt University, 1948.
- PARK, EUGENE, *Associate Professor of Mathematics.*
A.B., University of Georgia, 1939; M.A., Lehigh University, 1941.
- PARK, SANG OH, *Associate Professor of Industrial Management.*
B.A., 1957, M.A., 1959, Florida State University; Ph.D., University of North Carolina, 1962.
- PARKER, CHARLES DAVID, *Assistant Professor of Aerospace Studies.*
Major, United States Air Force; B.S., Clemson University, 1954.
- PARRADO, PEDRO FRANCISCO, *Instructor in Spanish.*
LL.D., University of Havana, 1941.
- PARRY, THOMAS HERBERT, *Assistant Professor of Education.*
B.A., University of Florida, 1950; M.Ed., 1958, Ed.D., 1967, University of Virginia.
- PATTON, MICHAEL FRANKLIN, *Lecturer in Medical Technology; Director of Medical Technology, Spartanburg General Hospital.*
M.D., Medical College of South Carolina, 1949.
- PAYNTER, MALCOLM JAMES BENJAMIN, *Assistant Professor of Environmental Systems Engineering.*
B.Sc., 1959, M.Sc., 1962, Ph.D., 1964, Sheffield University, England.
- PEARCE, JOHN FRANKLIN, *Associate Professor of Economics.*
B.S., Furman University, 1954; M.A., University of Pennsylvania, 1962; Ph.D., University of Alabama, 1966.
- PEELE, THOMAS CHRISTOPHER, *Professor of Agronomy and Soils.*
B.S., North Carolina State College, 1929; Ph.D., Cornell University, 1933.
- PERRY, LEONARD THOMAS, *Instructor in Spanish.*
Certificado de Aptitud, Escuela Cential de Idiomas de Madrid, 1960; B.A., John Carroll University, 1964.
- PERRY, ROBERT LINDSAY, *Associate Professor of Engineering Graphics.*
B.M.E., 1947, M.M.E., 1953, Clemson University.
- PINCKNEY, JOHN EDWARD, *Associate Professor of Architecture.*
B.Arch., Clemson University, 1958; M.L.A., University of Pennsylvania, 1960.
- PINDER, ALBERT REGINALD, *Fred Harvey Hall Calhoun Professor of Chemistry.*
B.Sc., 1941, Ph.D., 1948, D.Sc., 1963, University of Sheffield; D.Phil., University of Oxford, 1950.
- PITNER, JOHN BRUCE, *Superintendent and Professor of Agronomy and Soils, Pee Dee Experiment Station.*
B.S., 1938, M.S., 1939, Mississippi State College; Ph.D., University of Wisconsin, 1944.
- POE, HERBERT VERNON, *Associate Professor of Electrical Engineering.*
B.S., North Carolina State College, 1944; M.S., A & M College of Texas, 1950; P.E.
- POLK, HENRY TASKER, *Professor of Chemistry.*
B.S., 1931, M.S., 1933, University of Kentucky; Ph.D., Cornell University, 1938.

28 Teaching and Research Faculties

- POPE, ROBERT MARTIN, JR., *Instructor in Economics*.
B.S., College of Charleston, 1965; M.A., Tulane University, 1966.
- PORTER, JOHN J., *Associate Professor of Textile Chemistry*.
B.S. in Ch.E., 1956, Ph.D., 1960, Georgia Institute of Technology.
- POTAT, LAURENCE ERNEST, *Associate Professor of Metallurgical Engineering*.
B.M.E., North Carolina State College, 1950; M.S., Stanford University, 1953; Ph.D., North Carolina State University, 1965; P. E.
- PREVOST, AILEEN SAIN, *Assistant Professor of Nursing*.
B.S.N., Queen's College, 1947; M.N., Emory University, 1957.
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- ITCHIE, ROBERT RUSSELL, *Professor of Animal Science*.
B.S., 1926, M.S., 1938, Iowa State College.
- ROBERTS, BEVERLEY D., *Instructor in Nursing*.
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B.Cer.E., North Carolina State College, 1940; P. E.
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- SCHOENIKE, ROLAND ERNST, *Associate Professor of Forestry.*
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30 Teaching and Research Faculties

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- SITTERLY, WAYNE ROBERT, *Professor of Botany and Bacteriology, Truck Experiment Station*.
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- SKARDON, BEVERLY NORTON, *Assistant Professor of English*.
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- SKELLEY, GEORGE CALVIN, JR., *Associate Professor of Animal Science*.
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- SOBCZYK, ANDREW FLORIAN, *Samuel Maner Martin Professor of Mathematics*.
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- SORRELLS, ROBERT TALIAFERRO, *Assistant Professor of English*.
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- SPENCER, HAROLD GARTH, *Head of Chemistry and Geology Department; Associate Professor of Chemistry*.
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B.S., University of Tennessee, 1935; M.S., 1951, Ph.D., 1956, University of Florida.
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- STANLEY, EDWARD LEMUEL, *Associate Professor of Mathematics*.
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- STEADMAN, MARK SIDNEY, JR., *Associate Professor of English*.
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- STEINER, PINCKNEY ALSTON, *Assistant Professor of Physics*.
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- STEMBRIDGE, GEORGE EUGENE, *Associate Professor of Horticulture*.
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- THORNING, MARGO M., *Instructor in Economics*.
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- THURSTON, JAMES NORTON, *Alumni Professor of Electrical Engineering; President, Faculty Senate*.
B.E.E., Ohio State University, 1936; S.M., 1943; Sc.D., 1950, Massachusetts Institute of Technology; P. E.
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- TOMBES, AVERETT SNEAD, *Associate Professor of Entomology and Zoology*.
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- TOWELL, ROBERT DANIEL, *Instructor in Psychology*.
B.S., Clemson University, 1957; M.D.D., Southeastern Theological Seminary, 1960; M.A., Furman University, 1965.
- TREVILLIAN, WALLACE DABNEY, *Dean, School of Industrial Management and Textile Science; Professor of Economics*.
B.S., 1940, M.A., 1947, Ph.D., 1954, University of Virginia.
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- TUTTLE, JACK EDWIN, *Associate Professor of History and Political Science*.
B.A., 1940, M.A., 1948, Pennsylvania State College.
- TYNDALL, ELMER NEWTON, *Head of Aerospace Studies Department; Professor of Aerospace Studies*.
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32 Teaching and Research Faculties

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- YOUNG, FRANKLIN ALDEN, JR., *Assistant Professor of Metallurgical Engineering.*
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- YOUNG, JOSEPH LAURIE, *Professor of Architecture.*
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- FERRELL, WANDA R., *Instructor in Physics*.
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- ANDERSON, JACOB CLARENCE, JR., *Assistant Professor of Mathematics*.
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JAMES PEARSON BURNS *Manager, Technical Services*
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CHARLES WILLIAM HARALSON *Supervisor, Central Photography*

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CLEMSON ALUMNI ASSOCIATION

1968

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<i>District</i>	<i>Term Expires</i>
1	—1969—Edward S. Olson, '38 Clemson, S. C.
2	—1969—Goode Bryan, '18 Greenville, S. C.
3	—1969—Philip H. Prince, '49 Spartanburg, S. C.
4	—1969—Walter T. Jenkins, Jr., '43 Rock Hill, S. C.
5	—1969—Edward L. Proctor, '47 Conway, S. C.
6	—1969—E. Hugh Agnew, '16 Starr, S. C.
7	—1969—Frank W. Atkinson, Jr., '50 . . North Augusta, S. C.
8	—1970—C. Ken Powell, '61 Columbia, S. C.

<i>District</i>	<i>Term Expires</i>
9	—1970—Henry F. Frierson, '47.....Orangeburg, S. C.
10	—1970—Daniel S. Lesesne, Jr., '38....Mt. Pleasant, S. C.
11	—1970—John B. Butt, '56.....New Haven, Conn.
12	—1970—Davis T. Moorhead, '54.....Annandale, Va.
13	—1970—J. Will Patterson, '30.....Charlotte, N. C.
14	—1970—Samuel L. Lucas, '56.....Winston-Salem, N. C.
15	—1968—A. Cary Cox, '49.....Atlanta, Ga.
16	—1968—G. Charles Hope, '60.....Jacksonville, Fla.
17	—1968—Thomas C. Breazeale, Jr., '42....Knoxville, Tenn.
18	—1968—Walter C. Snyder, '30.....Midland, Texas
At-Large	—1969—C. Calhoun Lemon, '32.....Barnwell, S. C.
Past President	—1969—Thomas E. Thornhill, '48.....Charleston, S. C.
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President	
Clemson Foundation	Patrick N. Calhoun, '32.....Charlotte, N. C.
Presidents of the following:	
Faculty Senate, Research Faculty, Extension Senate, Student Government,	
Senior Class, Junior Class, Sophomore Class, Freshman Class.	



INFORMATION

PART II

PART II—Information

GENERAL INFORMATION

Clemson is a land-grant, state-supported university. Clemson is fully accredited by the Southern Association of Colleges and Schools.

The thirty-eight undergraduate and sixty-two graduate curriculums under the Colleges of Agriculture and Biological Sciences, Arts and Sciences, and Engineering and the Schools of Architecture, Education, and Industrial Management and Textile Science, and the Graduate School form a background of training for the hundreds of occupations and professions in which Clemson graduates engage. The University is organized on a basis whereby it retains a clear entity through the interrelationships of colleges, schools, and departments providing a well-balanced fundamental and general educational program.

The enrollment of Clemson has grown from 446 students at the opening of the University in 1893 to 6,474 for the first semester, 1967-1968, including 417 at the Greenville and Sumter campuses. Since the opening of the University, through the first semester 1967-1968, 53,572 students have attended Clemson, and through December 1967, 18,665 have been awarded the bachelor's degree. During this same period, 27 associate degrees, 1,009 masters' degrees, and 77 Doctor of Philosophy degrees have been awarded.

ADMINISTRATIVE ORGANIZATION

The government of the University is vested in a Board of 13 members, including 6 elected by the Legislature and 7 life and self-perpetuating members, in accord with the Clemson will. The President of the University is the chief executive and administrative officer appointed by the Board of Trustees; and under the President there are four areas of administration, each headed by a chief administrative officer responsible to the President. The organizational units under each of these officers are outlined below:

- I. Vice-President for Academic Affairs
and Dean of the University
 - A. College of Agriculture and
Biological Sciences
 - B. School of Architecture
 - C. College of Arts and Sciences
 - D. School of Education

- E. College of Engineering
 - F. School of Industrial Management
and Textile Science
 - G. The Graduate School
 - H. Extended Programs
 - I. The University Library
 - J. The Summer Sessions
 - K. The Computer Center
 - L. ROTC
 - M. Water Resources Research Institute
 - N. Clemson University at Greenville
 - O. Clemson University at Sumter
- II. Vice-President for Student Affairs and
Dean of Students
- A. Office of the Dean of Men
 - B. Office of the Dean of Women
 - C. Office of Admissions, Registration,
and Financial Aid
 - D. Student Center and Y. M. C. A.
 - E. Counseling Center
 - F. Placement Office
 - G. Athletic Department
 - H. Student Health Service
 - I. Department of Bands
- III. Vice-President for Business and
Finance and Comptroller
- A. Accounting Division
 - B. Personnel Division
 - C. Physical Plant Division
 - D. Purchasing Division
 - E. Auxiliary Enterprises
 - F. The Clemson House Hotel
- IV. Vice-President for Development
- A. Alumni Relations
 - B. Public Relations
 - C. Communications Center
 - D. Planning
 - E. Corporate Support
 - F. Fund Development

REQUIREMENTS FOR ADMISSION

To receive consideration for admission to Clemson, the applicant must, as a rule, present a transcript of his high school record giving evidence of graduation with a minimum of sixteen credits, and submit an official copy of his scores for the College Board tests used as an entrance examination. In reaching an admissions decision, the examination scores along with the student's academic preparation, rank in class, and the recommendation of the high school principal will be weighed carefully.

In addition, students may qualify for entrance by:

(1) Achieving satisfactory scores on the College Board examinations and presenting a South Carolina High School Certificate (awarded by certificate examination).

(2) Achieving satisfactory scores on the College Board examinations and completing a minimum of 12 high school units. Students in this category must have earned both a high school record and College Board scores that are distinctly above average.

(3) Achieving satisfactory scores on the College Board examinations and meeting the additional requirements for entrance with advanced standing.

As minimum additional criteria, the transfer applicant must present a statement of honorable dismissal from the institution last attended, an original transcript of his record from each college or university attended, and an official statement that he is eligible to return to the institution last attended. Candidates meeting these requirements will then be considered carefully in the light of the quality of their previous record, and work completed in other colleges with a grade at least one letter grade higher than the lowest passing mark will be evaluated in terms of equivalent courses in the curriculum at Clemson selected by the student.

Furthermore, in order for a transfer student to be considered for enrollment, his complete application, including test scores, transcripts and statement of eligibility, must be on file in the Admissions Office at least two weeks prior to the date of desired matriculation. Exception will be made only in the case of a student enrolled in another college who is applying for mid-year entrance.

Finally, various non-intellective factors will be considered in the case of both freshman and transfer applicants about whom it is

impossible to make a positive decision on the strength of aptitude and previous academic performance alone.

Although not required, students planning to apply for entrance to Clemson are advised to include in their high school curriculums the following units:

English	4	Geometry	1
Algebra	2	Physics	1
Chemistry	1	Trigonometry	$\frac{1}{2}$

It is appropriate for students planning to enroll in Agriculture, Biology, Medical Technology, or Pre-Medicine to include biology in their science program.

An admissions deposit is required following the issuance of a provisional or final acceptance. Instructions concerning this deposit will be included in the acceptance letter.

Application Forms. Forms to be used in applying for admission to the University may be obtained by writing the Office of Admissions and Registration, Clemson University, Clemson, S. C. 29631.

Entrance Examinations. With the single exception of those who already hold a bachelor's or higher level degree from an accredited college or university, all candidates for admission to Clemson on the undergraduate level must complete the College Entrance Examination Board Scholastic Aptitude Test. In addition, all candidates, with the exception of those transferring acceptable college credit in mathematics, should take one of the mathematics achievement tests. Although the score earned on either of the mathematics tests will be considered, it is suggested that candidates take the Level I examination. Applicants who have completed the required tests previously are advised that for a fee of \$1 and upon request, the College Entrance Examination Board will furnish Clemson an official transcript of scores. Unofficial score reports from other sources are not acceptable.

Freshman applicants may secure a Bulletin of Information and an application for the tests from their local high school principals or guidance counselors. Transfer candidates will often be able to obtain this material from someone in the student personnel division of their present colleges. If this literature is not available locally, the applicant should write to College Entrance Examination Board, Box 592, Princeton, New Jersey 08540 (Box 1025, Berkeley, California 94701, for Western residents), requesting a Bulletin of Information/Admissions Testing Program.

All candidates are reminded to forward applications for the entrance examinations as indicated in the Bulletin of Information, and not to Clemson University.

Three other very important points are:

(1) Be sure to list Clemson on the application for the College Board examinations as one of the schools to receive your scores.

(2) Consideration will be given to your examination results only in the event that an official application for entrance to the University is on file in the Admissions Office.

(3) Up to five weeks is required for College Board to furnish scores, and you must schedule your tests at a date sufficiently early to allow time for them to be received prior to your anticipated entrance date.

Advanced Placement by Examination. In addition to earning credit by the usual method involving classroom attendance, students may receive credit toward their degree by completing a course successfully by examination only. Freshmen interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Examination program, and have the results of these tests sent to Clemson.

Matriculation. Upon arrival for the opening of the session, new students report to the Office of Admissions and Registration to complete enrollment. A student's matriculation is equivalent to his pledge to conform to the rules of the institution. Any admission gained or matriculation made irregularly is subject to cancellation.

Students from Other Countries. A limited number of well-qualified students from other countries are accepted. The application for admission must be in English on the official application form furnished by the Office of Admissions and Registration. Official transcripts of all high school and college level work which the applicant has undertaken should accompany the application. They must also complete the entrance examination requirements discussed previously, although in a few unusual cases a substitute examination is authorized.

In addition to academic and personal qualifications equivalent to those required of United States citizens, the applicant from another country is required to submit evidence of his possessing dollar resources adequate without assistance from the University for at least the first year of his course of study, including round trip travel expenses. The University is unable to grant scholarship or loan

assistance to students from abroad, and there is little likelihood that any type of employment may be secured.

If accepted, students from other countries should have a minimum of \$1,000 in their possession upon reporting to the University. This amount is sufficient to make the entrance payment which includes tuition, fees, and living expenses for a semester, and for books and supplies. Foreign students will also be required to purchase student accident and health insurance.

EDUCATIONAL BENEFITS FOR VETERANS AND WAR ORPHANS

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration office to determine whether or not he is entitled to any educational benefits.

SELECTIVE SERVICE REGULATIONS

Registration. For the benefit of students who become 18 years of age during the school year, provision has been made for such students to register for Selective Service in the Office of Admissions and Registration on the campus. The registration is then sent through channels to the registrant's local board.

Deferment. The following Selective Service Regulations published in the summer of 1967 are quoted for the guidance of undergraduates:

"In Class II-S shall be placed any registrant *who has requested such deferment* and who is satisfactorily pursuing a full-time course of instruction at a college, university, or similar institution of learning, such deferment to continue until such registrant completes the requirement for his baccalaureate degree, fails to pursue satisfactorily a full-time course of instruction, or attains the twenty-fourth anniversary of the date of his birth, whichever occurs first.

"In determining eligibility for deferment in Class II-S, a student's academic year shall include the 12-month period following the beginning of his course of study.

"A student shall be deemed to be satisfactorily pursuing a full-time course of instruction when, during his academic year, he has earned, as a minimum, credits towards his degree which, when added to any credits earned during prior academic years, represent

a proportion of the total number required to earn his degree at least equal to the proportion which the number of academic years completed bears to the normal number of years established by the school to obtain such degree. For example, a student pursuing a four-year course should have earned 25% of the credits required for his baccalaureate degree at the end of his first academic year, 50% at the end of his second academic year, and 75% at the end of his third academic year.

"It shall be the *registrant's* duty to provide the local board each year with evidence that he is satisfactorily pursuing a full-time course of instruction at a college, university, or similar institution of learning."

EXPENSES

Settlement of University Fees. The schedule of semester charges for all undergraduate students—full-time, part-time, and auditing—is shown on the pages which follow. The entire semester's expenses are due and payable at the beginning of each semester, and no student is officially enrolled until all semester expenses have been satisfied. In special cases the University will accept at the beginning of a semester a non-interest bearing promissory note for a portion of the semester dormitory rent and semester-plan board fee. Amounts up to \$65 for room rent and \$115 for board fee may be included in the note. In such cases, a note for the first semester charges will be due October 10, and a note for the second semester charges will be due March 1.

A \$60 advance payment of room rent is required for a room reservation for the fall semester. This payment must be made by cash, check or money order and should be sent to the Dormitory Manager's Office with the completed "Student Application for Room Reservation" card not later than July 1. The \$60 advance payment of room rent will be deducted from the amount otherwise due for the first semester's expenses. All other transactions relating to payments should be conducted with the Accounting Division. All checks and money orders should be made payable to Clemson University. A personal check given in payment of University expenses which is returned by the bank unpaid, immediately creates an indebtedness to the University.

The University reserves the right to adjust charges to current costs.

Past Due Student Accounts. Any indebtedness to the University which becomes past due immediately jeopardizes the student's en-

rollment, and no such student will be permitted to graduate or register for a subsequent semester or summer school term. Further, any student who fails to pay all indebtedness to the University may not be issued an honorable discharge, transcript, or diploma.

Refund of Academic Fees for Students Enrolled for Less than a Full Semester. No adjustments in charges will be made on a semester's tuition and fees after five weeks from the date classes begin for the semester. Charges for periods of attendance of five weeks or less during a semester shall be made on the following basis:

Two weeks or less	20%
More than 2 but not more than 3 weeks	40%
More than 3 but not more than 4 weeks	60%
More than 4 but not more than 5 weeks	80%
More than 5 weeks	100%

Special provision has been made for a student who is required to discontinue his enrollment to report for active duty in the Armed Forces of the United States. Such students shall be charged for tuition, maintenance and activity fee, and medical fee on a daily pro rata basis, holidays excepted, instead of the percentage basis stated above, provided that such discontinuance of enrollment is the result of circumstances, conditions, or actions over which the student has no control.

Refund of Dining Hall and Dormitory Fees. Specific information relating to living-expense refunds is given in the sections on dormitories and dining hall.

Schedule of Charges. The schedule of semester charges for the 1968-1969 session is as follows:

SCHEDULE OF SEMESTER CHARGES 1968-69 SESSION

Resident of South Carolina (Full-time student)

	Men	Women
Tuition	\$ 75.00	\$ 75.00
Matriculation Fee	5.00	5.00
Maintenance and Activities Fee	136.00	136.00
Medical Fee	20.00	20.00
Library Fee	12.00	12.00
	<hr/>	<hr/>
Semester Total Excluding Room and Board ..	\$248.00	\$248.00

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Room:

West Campus Residence Halls:

Johnstone Hall (except A and F Sections) ..	\$125.00
A and F Sections, Johnstone Hall	140.00
Donaldson, Bowen, Wannamaker, Bradley, and Norris Halls	125.00
Benet, Young, Cope, Geer, and Sanders Halls (Air-Conditioned)	150.00

East Campus Residence Halls:

Mauldin, Barnett, Manning and High Rise #2 (Air-Conditioned)	160.00	\$160.00
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Board (Semester Plan)*	238.00	238.00
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Semester Total Including Room and Board † ..	\$611.00	\$646.00
or	\$626.00	
or	\$636.00	
or	\$646.00	

Non-Resident of South Carolina (Full-time student)

	<i>Men</i>	<i>Women</i>
Tuition	\$200.00	\$200.00
Matriculation Fee	5.00	5.00
Maintenance and Activities Fee	261.00	261.00
Medical Fee	20.00	20.00
Library Fee	12.00	12.00

Semester Total Excluding Room and Board ...	\$498.00	\$498.00
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Room:

West Campus Residence Halls:

Johnstone Hall (except A and F Sections) ..	\$125.00
A and F Sections, Johnstone Hall	140.00
Donaldson, Bowen, Wannamaker, Bradley, and Norris Halls	125.00
Benet, Young, Cope, Geer, and Sanders Halls (Air-Conditioned)	150.00

East Campus Residence Halls:

Mauldin, Barnett, Manning and High Rise #2 (Air-Conditioned)	160.00	\$160.00
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* Students have the option of paying the semester board fee or of paying cash at the end of the serving line for each item of food selected.

† Variation due to difference in room rentals.

Board (Semester Plan)*	238.00	238.00
Semester Total Including Room and Board † ..	\$861.00	\$896.00
or	\$876.00	
or	\$886.00	
or	\$896.00	

Part-time Student. Undergraduate students taking less than 12 semester credit hours will be charged each semester according to the following schedule:

	<i>S. C. Student</i>	<i>Non-Resident Student</i>
Matriculation Fee (non-refundable)	\$ 5.00	\$ 5.00
Tuition (per semester hour)	6.00	16.00
Maintenance and Activities Fee (per semester hour)	10.00	19.00
Library Fee (per semester hour) .....	.75	.75

Auditing. Charges for auditing are made each semester according to the following schedule:

Tuition (per semester hour)	\$ 3.00	\$ 8.00
Maintenance and Activities Fee (per semester hour)	5.00	9.50
Library Fee (per semester hour) .....	.75	.75

Graduate Students. For further information concerning advanced degrees see *The Graduate Bulletin*, which may be obtained from the Offices of Admissions and Registration or the Dean of the Graduate School.

Definition of Residence for the Purpose of Determining Status for Enrollment in Clemson University

1. A resident student is one who was continuously domiciled in South Carolina for twelve months immediately preceding his initial enrollment in the University. The term "domiciled in South Carolina" excludes those students in the State primarily to attend the institution and whose abode in South Carolina has been established as a technical bar to the higher tuition and fee charges.

2. Attendance at an educational institution is usually interpreted as temporary residence. Accordingly, a student neither gains nor

* Students have the option of paying the semester board fee or of paying cash at the end of the serving line for each item of food selected.

† Variation due to difference in room rentals.

loses residence solely by such attendance. Registration for voting, the act of voting, purchase of property, payment of taxes and employment in South Carolina are not necessarily by themselves proof of residence in the State for the purpose of enrolling in the University; nor does birth in South Carolina or direct descent from South Carolina forebears necessarily prove domicile in South Carolina.

3. The residence of a married woman is that of her husband, if living together; however, a wife not living with her husband may establish separate domicile. A non-resident woman who marries a resident of South Carolina shall be accepted as a resident student at the beginning of the next semester following such marriage; and a resident woman who marries a non-resident shall keep her residence status so long as she maintains continuous enrollment in the University. A non-resident man who marries a resident woman does not thereby gain resident status.

4. The residence of a minor child (under 21 years of age) is that of the father; or of the mother if the father be not living or if the parents are separated and the child habitually resides with the mother; or, if both parents are dead, with his legally appointed guardian, or anyone else with whom he habitually resides in the absence of formal legal designation.

5. A minor may become emancipated (freed from parental domicile) through marriage, formal court action, abandonment by parents, or positive action on his own part evidential of his alienation of parental domicile. To qualify under the latter category, a minor must have completely separated himself from the parental domicile and have proved that such separation is complete and permanent. Mere absence from the parental domicile is not proof of its complete abandonment. If an applicant can provide adequate and satisfactory proof of complete emancipation and of his having come to South Carolina with the intention of establishing domicile, he may be granted resident classification at the next enrollment occurring after the expiration of twelve months following establishment of domicile, excluding time spent as a student at the University. The burden of proof of domicile and emancipation shall be upon the applicant.

6. If it is established to the satisfaction of the University that parents have moved to South Carolina with every intention of remaining permanently and establishing themselves as citizens of the State, the dependent children of such parents may be classified as resident students at the first enrollment after the parents move

into the State. If the parents of a resident student move to another state with the intention of establishing domicile there, the student shall at the first enrollment after twelve months from the date of establishment of said home by his parents be classified as a non-resident student; however, the student may continue in resident status if he reaches 21 years of age within the twelve-month period, or if he establishes evidence of emancipation.

7. A person enjoying majority privileges (over 21 years old or an emancipated minor) who has resided in South Carolina continuously for twelve months immediately preceding his initial enrollment in the University shall be classified as a resident. If, after enrollment, such person can provide adequate and satisfactory proof of his establishing domicile in South Carolina and his intention to remain permanently as a resident of the State, he may be granted resident classification at the next enrollment occurring after expiration of twelve months following establishment of domicile exclusive of time spent as a student at the University.

8. Dependents of members of the Armed Services and Federal employees stationed in South Carolina are permitted to attend the University, if accepted, by paying resident fees without regard to resident status, provided that if such military personnel or employees are ordered away from the State, their dependents may continue to have this privilege while they attend the University.

Any student or prospective student in doubt concerning his residence status must bear the responsibility for securing a ruling by stating his case in writing to the Director of Admissions and Registration.

Books and Supplies. The cost of books is not included in the Schedule of Semester Charges. The cost of books and supplies at the beginning of the semester will be approximately \$50, except for students enrolling in Architecture the cost will be approximately \$75.

Late Registration Fee. To prevent or reduce the problems incident to late registration, registration schedules are set for specific days, and certain definite procedures are outlined. A student has not completed registration until all of the required steps are taken, the final one being the return of the properly signed Class Registration Card to the Office of Admissions and Registration. Any student who fails to register for classes on the prescribed class registration days will be charged a late registration fee of \$10. This late registration fee applies to full-time and part-time students.

Student Depository. For the convenience of students, the University operates a depository in the Bursar's Office where money can be deposited and withdrawn as the occasion may demand. This service is purely local. Students are urged to deposit their money and not to keep it in their rooms.

Optional Expenses. It is not possible to give an estimate of a student's expenditures for such amusements as dancing, motion pictures, etc. This depends largely upon the disposition of the student. The University endeavors to reduce to a minimum the temptation to spend money needlessly, but the authorities cannot be responsible for a student's private expenditures. This must be a matter between the student and his parents.

Transcripts. Official transcripts of scholastic records are issued on request. One transcript is furnished free; additional copies are issued for \$1 each. Remittances for transcripts should be made payable to Clemson University, but should accompany transcript requests and should be mailed to the Office of Admissions and Registration.

STUDENT HOUSING

The University dormitories will accommodate 4,780, two students being assigned to a room. The University also has 289 individual units for its married students. The general policy concerning student housing is that all unmarried undergraduate students live in dormitories. Students who are assigned a room in University dormitories will be required to sign a Clemson University Housing Contract relating to terms and conditions of occupancy for the full academic year.

Application for Dormitories and Advance Payment. An application for dormitory accommodations will be forwarded to those students who are accepted by the University for the fall semester. These applications are to be completed and returned with a \$60 advance room payment to the Dormitory Manager's Office at the earliest practicable date.

Students who have made an advance payment and later decide not to enroll or to live in the dormitory may obtain a refund of the advance payment provided notification of intent and request for refund is received at the Dormitory Manager's Office prior to July 1. When such notification and refund request is not received by the deadline date, no refund of advance payment will be made.

Refund of the advance payment will not be made to students who apply for assignments after July 1.

Normally, dormitory accommodations are available to those students who enter the University at the beginning of the second semester; therefore, the advance payment is not now required of students entering at this time.

Assignment Preference. Students should indicate on their application their preference of room(s) and roommate. Priority of room assignments is given to continuing students who file application and make advance room payments during the priority periods established by the Dormitory Office. Preferences will be honored provided space is available in the desired dormitory and the request does not require exceptions to existing assignment procedures.

Notification of Assignments. As soon as room assignments are made, students are advised of the assignment and furnished information regarding occupancy.

Assignment Changes. Students who desire to move from the assigned room may apply at the Student Residence Office to change rooms. A service charge of \$4 is charged for moving, also charges will be made for students moving from a lower- to a higher-rated room. Rental refunds are made to students moving from a higher- to a lower-rated room on a prorated basis.

Opening and Closing of Dormitories. The University dormitories are officially open for undergraduate students at 8 a. m., the day prior to matriculation date for new students and close at 8 p. m., the day scheduled for graduation exercises of the term or semester. Dormitory fees cover only the time between the day before matriculation and the scheduled date of graduation exercises or end of term when no graduation exercises are scheduled.

For official holidays which occur during the course of a semester, the University reserves the right to close certain halls and to require students remaining on the campus to move to another hall for the duration of the holiday period.

Student Responsibility for Damages. The University holds resident students responsible for any damages other than normal wear that occurs to their rooms and furnishings. Damages will be assessed by the University and the student will be billed for repairs and replacements. Students should inform University officials immediately upon occupancy of any conditions reflecting prior damages which have not been corrected.

Responsibility for Student Possessions. Although every precaution is taken to maintain adequate security, the University cannot

assume the responsibility for the loss of or damage to student possessions resulting from any cause.

Refund of Dormitory Fee. Except for the stated regulations governing the \$60 advance payment to reserve a room for the first semester, refunds, when authorized, will be made on a daily pro rata basis.

Extra Dormitory Charges. Extra charges are made to students who occupy dormitories before or after the dates established for a semester or term. Rates are as follows:

West Campus Residence Halls		East Campus Residence Halls
\$1.50 per night	Non-Air-Cond.	
\$7.00 per week	Non-Air-Cond.	
\$2.00 per night	Air-Cond.	\$2.50 per night
\$8.50 per week	Air-Cond.	\$9.00 per week

One week and part of another week—weekly rate plus night rate for each additional night.

Students who are required by the University to be on campus prior to and after the scheduled term or semester may upon the approval of the Vice-President for Student Affairs be exempted from paying the extra dormitory charges.

Reservation of Right to Change Fees and Regulations. The University reserves the right to make changes in its fees, charges, rules, and regulations.

RESIDENCE HALLS

West Campus. The University has available 3,628 spaces in 11 dormitories. Five of these Halls, Benet, Young, Cope, Geer, and Sanders are fully air-conditioned. Each room in these five residence halls is furnished with walk-in type clothes lockers, individual study desks, single beds, and chairs. A lavatory is also installed in each room. Rooms in sections A and F of Johnstone Hall are equipped similarly to those in the five dormitories described above; however, these rooms are not air-conditioned. Rooms in Johnstone Hall, other than sections A and F, are furnished with individual clothes lockers, bunk-type beds, a study table and chairs. Lavatories are installed in each room. Five other non-air-conditioned residence halls are centrally located on the West Campus. The rooms in these buildings are furnished with clothes lockers, bunk-type beds, study desks and chairs.

All residence halls on the West Campus are men residence halls. See *Schedule of Semester Charges* for rates.

East Campus. The University has available 1,152 spaces in four dormitories. Two of these halls, Mauldin and Barnet, are modern four-story structures with wall-to-wall carpeting, air-conditioning, and a rooftop deck. Each will house 144 students in 72 rooms. Rooms are arranged in suites of six, accommodating 12 students. Each suite provides a study, bath, washing and drying facilities. Each room contains two closets, two chests of drawers with wall-hung mirrors, single beds, individual study desks, lamps, and chairs. The other two, Manning Hall and High Rise #2, are eleven-story structures, fully carpeted and air-conditioned. Each will accommodate 432 students. Rooms are arranged in suites of six accommodating 12 students. Each room contains two closets, two chests of drawers with wall-hung mirrors, single beds, individual study lamps, desks, and chairs. Draperies are to be provided by occupants. Studies and laundry room are available on each floor. The first floor is designed for group living. It includes lounges, a kitchenette, T.V., and recreational rooms. The basement floor includes club rooms, storage areas, and a large room equipped with coin-operated washers and dryers.

Women students are required to live in University dormitories. The only exceptions are married students, graduate students, those living with close relatives, and those who are 23 years of age or older and who have parental permission and a clear conduct record.

Both men residence halls and women residence halls are located on the East Campus. See *Schedule of Semester Charges* for rates.

MARRIED STUDENT HOUSING

Clemson provides comfortable and economical housing for its married students. There are three housing areas consisting of 139 single Prefab units, 100 East Campus apartments contained in 50 duplex buildings, and 50 Littlejohn apartments in 11 buildings.

All married student housing units have two bedrooms, living room, kitchen and bath. East Campus apartments are the newest units and are equipped with stove and refrigerator. The Littlejohn apartments and Prefabs are not equipped with stoves and refrigerators.

Booklets describing these facilities are available and will be furnished upon request to the Housing Office of the University. Monthly rental fees are: Prefabs, \$30; Littlejohns, \$45 for interior and \$48 for end units; East Campus, \$60.

STUDENT FOOD SERVICE

Dining Hall. The University Dining Hall offers a cafeteria-type meal to students. Six cafeteria lines provide timely service of quality foods. Completion of an additional dining facility on the East Campus is scheduled in 1968.

The University provides two food-service plans. The board plan provides for the payment of all meals served in the dining hall on a fixed-fee semester basis. The cash plan provides for cash payment at the end of the serving line for each item of food selected. After the initial selection of a food-service plan at the beginning of a semester, no change from one plan to another will be allowed during that semester.

Semester Plan Board Fee: \$238 per Semester. This plan allows a selection of quality foods from well-balanced menus. The fee covers the cost of all meals served in the Student Dining Hall from the day of matriculation through the day of graduation exercises, holidays excluded. These dates are listed in the University Calendar appearing in this catalog.

Cash Cafeteria Service. Quality food may be obtained at reasonable prices by paying cash at the end of the serving line for each item of food selected.

Refunds. Refunds, when authorized, will be made on a daily pro rata basis, holidays excepted.

LAUNDRY-DRY CLEANING

A plant with modern equipment is conveniently located on campus to service the laundry and dry-cleaning requirements of the student. Reasonable prices are charged for individual items on a cash-and-carry basis.

The University will not be liable for lost or damaged items unless reported within two days after the delivery date, and then for not more than the actual depreciated value of such articles as have been lost or damaged.

Coin-operated washing machines and dryers are available in the laundry building and several of the dormitories.

A commercially operated student linen-rental service is also available. Information regarding this service will be forwarded to all students who are accepted for enrollment in the University.

MEDICAL EXAMINATIONS

Completion of a medical history and physical examination record is required of all new students entering Clemson University for the first time and of all former students not in attendance for a period of 3 years or more. This examination must be completed by the student and the student's own physician or the health service of the school from which he graduates or transfers. This examination will be reported on a special form provided for this purpose by the University and mailed directly to the Director of Student Health Service. The four-page form revised August 1965 should be used. No other form is acceptable. No new student will receive final acceptance until this certificate is completed and has been received by the Director of the Student Health Service.

The University requires that all new students have a current tetanus toxoid series or booster (within three years), a smallpox vaccination (within four years) and also immunization against poliomyelitis. The oral (Sabin) type vaccine is preferred. All new students are also required to have a skin test for tuberculosis within one year prior to admission. If this test is positive, a chest X ray is also required. All positive reactors will then be required to have an annual chest X ray. These follow-up X rays after admission will be done at the Student Health Service. The University also requires that all continuing students have a repeat of the skin test every two years. This will be performed by the Health Service.

STUDENT HEALTH SERVICE

Student Health Service: Cost per Semester \$20. Payment of the Student Health Service fee is required of all students living in University residence halls and all full-time students even though they do not reside in University housing. The Student Health Service maintains a complete outpatient department and a 40-bed infirmary. The staff consists of three full-time physicians, including the director, a part-time psychiatrist, seven full-time registered nurses and a full-time registered laboratory technician and a full-time registered X-ray technician. In addition, a sufficient number of nurses aides, secretarial workers, orderlies and maids for 24-hour-a-day operations are employed. The best of modern equipment is available for student use.

The Student Health Service at Clemson University has several important functions. All of these are aimed at keeping the student in good health so that he may effectively pursue his school work.

There is, of course, the basic function of medical care for the ill and injured. This is a vital part of its work. In addition to this, the Student Health Service attempts to put strong emphasis on health rather than illness. This begins with the entrance medical form. In laying out this form an attempt is made to get information, examinations and preventive medical procedures carried out to better equip the staff in protecting the student from illness and to serve as a guide for the care of pre-existing medical problems.

As the student progresses through his academic experiences, other procedures may be required or highly recommended. These are primarily an effort to teach the individual self-responsibility for maintenance of his own health. The Health Service also has the position as the source of medical information as well as responsibility for indicated medical action: diagnostic, therapeutic and preventive.

The medical fee paid by each student covers the services of the University physicians and health service staff for most illnesses and injuries occurring on the campus. There are certain things, however, that it does not include, such as fees for routine physical examinations for employment or transfer to another school and fees for outside physicians when called in for consultation, medical or surgical services performed away from the University or for accidents occurring off the campus. The fee also covers medication for acute illness but not for chronic illness lasting over two weeks or for pre-existing illness. Although ambulance transportation to a general hospital for serious illness or injury occurring on campus will, of course, be arranged, the expense for this service is the responsibility of the student. Transportation for less urgent ailments and routine visits can be arranged through the Health Service at the expense of the student.

The right of the Director of the Student Health Service, with the approval of the proper University authority, to obtain any of these extra services in behalf of any student under his care is hereby expressly reserved.

The Student Government, with full approval of the administration, offers a plan of accident and sickness insurance to full-time students. Each year, prior to the beginning of the fall semester, complete information on this insurance plan will be sent to students. This insurance is inexpensive and is designed to cover major medical expense not covered by the Health Service. It is highly recommended.

UNDERGRADUATE FINANCIAL AID

General. The Office of Student Financial Aid is responsible for coordinating all types of financial assistance administered by the University except those honors and awards which are presented for special achievement and extracurricular grants-in-aid. Currently available financial aids consist of scholarships, student loans, and part-time employment. It must be realized that any program of financial assistance can only be supplementary and that the basic financial responsibility remains that of the applicant and his parents.

Application Procedure. Beginning in January of each year all eligible students may apply to the Student Financial Aid Office for any type of financial assistance desired for the coming school year. All application forms must be completed in their entirety as the answer to each question will have meaning to the committee considering the request. All requests—except for part-time employment—must be supported by a Parents' Confidential Statement filed directly with the College Scholarship Service, Box 176, Princeton, New Jersey 08540. Action on requests for aid will be based upon scholastic and activity records, eligibility to attend Clemson, and financial resources. Prospective students must complete the entrance examinations and be accepted for admission by the University before final action may be taken upon their requests for aid. Applicants will be notified when they are selected for specific types of assistance and should promptly indicate their acceptance. Further information and application forms may be secured by contacting the Student Financial Aid Office, Tillman Hall, Clemson University, Clemson, South Carolina 29631. Telephone 654-2421, Extension 411 (Area Code 803).

SCHOLARSHIPS FOR FRESHMEN

These awards will be based upon high school records, entrance examination scores, and other qualifications established by the selection committees. Completed entrance and scholarship applications, together with a transcript of high school work through the first semester of the senior year, must be submitted by March 1 in order to be considered. For purposes of scholarship application, the College Entrance Examination Board tests should be taken in time to allow our receipt of scores not later than March 1.

Dow Chemical Co. Scholarships. Two \$500 awards are available annually to students (freshmen and upperclassmen) majoring in Chemical Engineering. Awarded by Department of Chemical Engineering.

Educational Opportunity Grants. Non-reimbursable Federal grants, renewable if satisfactory academic progress is maintained, are available from the University for those entering freshmen of exceptional financial requirements. Grants must be matched by scholarships, loans, or other aid. Selection is based upon financial need and academic promise. Awarded by University.

Ferro Corporation Scholarship. A \$300 award is available annually to a student (freshman or upperclassman) majoring in Ceramic Engineering. Selection is based upon academic standing and leadership ability. Awarded by Department of Ceramic Engineering.

Harbison-Walker Refractories Company Scholarship. A \$500 award is available annually to a student (freshman or upperclassmen) majoring in Ceramic Engineering. Selection is based upon academic standing and leadership ability. Awarded by Department of Ceramic Engineering.

Jonathan Logan Scholarships. Two \$2,000 awards, to be paid in equal installments during four years of satisfactory undergraduate study, are provided annually by the David Schwartz Foundation to be available to freshmen who enroll in the School of Industrial Management and Textile Science. Awarded by School of Industrial Management and Textile Science.

R. F. Poole Alumni Scholarships. To encourage academic excellence, renewable \$1,000 scholarships are awarded annually to incoming freshmen with outstanding academic potential. Awarded by University.

Sears-Roebuck Foundation Agricultural Scholarships. Seven \$300 awards are available annually for freshmen from South Carolina who enroll in the College of Agriculture and Biological Sciences. An additional sophomore award is given the student making the highest scholastic average as a freshman Sears-Roebuck scholar. Awarded by College of Agriculture and Biological Sciences.

George E. and Leila Giles Singleton Scholarships. Income from a fund donated by Mr. G. H. Singleton ('19) provides an annual \$300 award for a farm boy who enrolls in the College of Agriculture and Biological Sciences. Residents of Oconee, Pickens, and Anderson counties are eligible, with preference in that order. The award is for an entering freshman and may be renewed for an additional year. Awarded by College of Agriculture and Biological Sciences.

Smith-Douglass Agricultural Scholarships. Two \$750 awards, to be paid during four years of satisfactory undergraduate study, are

available annually for freshmen who enroll in the College of Agriculture and Biological Sciences. Applicants must be residents of one of the following South Carolina counties: Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Lee, Marion, Marlboro, Sumter, or Williamsburg. Awarded by College of Agriculture and Biological Sciences.

South Carolina Fresh Fruit and Vegetable Association Scholarship. A \$1,200 award, to be paid during four years of satisfactory undergraduate study, is available annually to a male South Carolinian who enrolls in the Horticulture (Fruit and Vegetable major) curriculum. Awarded by Department of Horticulture.

South Carolina Pest Control Association Scholarship. A \$200 award is available annually for an Entomology major (entering freshman or upperclassman). Selection is based upon scholarship, leadership, character, and financial need. Awarded by Department of Entomology and Zoology.

South Carolina Poultry Improvement Association Scholarships. A \$300 award is available annually to a freshman majoring in Poultry Science. An additional \$300 award is available each year for a sophomore, junior, or senior. Awarded by Department of Poultry Science.

Southern Railway Scholarships. Two renewable annual awards of \$1,000 plus tuition and fees are available to entering freshmen. Priority is afforded sons and daughters of Southern Railway System employees residing in South Carolina. Selection is based upon scholastic excellence and financial need. Awarded by University.

J. P. Stevens & Co. Scholarship. A \$2,000 award, to be paid in equal installments during four years of satisfactory undergraduate study, is available annually to a freshman who enrolls in a Textile curriculum. Awarded by School of Industrial Management and Textile Science.

Western Electric Fund Scholarships. Two \$600 awards are available annually for freshmen who enroll in Electrical, Industrial, or Mechanical Engineering, and associated fields. May be renewed if satisfactory progress is made. Awarded by College of Engineering.

SCHOLARSHIPS FOR UPPERCLASSMEN

Recipients of the following awards are normally selected by the scholarship committees in early spring for the following school year. Completed applications must be submitted not later than March 1

to insure consideration. (Also note that some few freshman scholarships are equally available for upperclassmen.)

Jerry B. Addy Memorial Scholarship. Income from a fund donated by his relatives and friends provides a renewable annual award to a rising junior majoring in Mathematics, Physics, or Chemistry. Priority is given to residents of South Carolina. Selection is based upon academic proficiency and financial need. Awarded by University.

Agronomy Achievement Award. A \$200 scholarship from the National Plant Food Institute, Washington, D.C., is available annually to a rising sophomore who by leadership, scholarship, and character manifestations during his first year at Clemson has demonstrated that he has the potential to become an outstanding Clemson agronomy major. Awarded by Department of Agronomy and Soils.

Allied Chemical Foundation Scholarships. Two \$750 awards are given annually to upperclassmen majoring in a Textile curriculum. Award by School of Industrial Management and Textile Science.

G. Dewey Arndt Scholarship. Income from a fund established by FCX, Inc., and Carolina Cotton Growers Association, Inc., provides \$500 for one or more awards to outstanding students in the College of Agriculture and Biological Sciences, with preference given to students with an indicated interest in marketing and economics. Awarded by College of Agriculture and Biological Sciences.

Barney Lee Bickley Memorial Scholarship. Income from a fund donated by his relatives provides an annual award for a sophomore student. Priority is given to residents of South Carolina. Awarded by University.

Borden Agricultural Scholarship. A \$300 award is made annually to the rising senior in the College of Agriculture and Biological Sciences who has achieved the highest scholastic average on all college work prior to the senior year. Awarded by College of Agriculture and Biological Sciences.

Burlington Industries Foundation Scholarship. A \$1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a rising junior. Selection is based upon leadership, scholarship, and financial need. Preference will be given to students majoring in Textiles or Industrial Management. Awarded by University.

Callaway Mills Scholarship. A \$1,000 award, to be paid in equal installments during the last two years of undergraduate study, is

available annually to a rising junior enrolled in a Textile curriculum. Recipient must maintain a scholastic average in the upper third of his class. Awarded by School of Industrial Management and Textile Science.

The Carolina Yarn Association Scholarship. A \$500 scholarship is awarded annually to an upperclassman majoring in Textiles. Awarded by the School of Industrial Management and Textile Science.

The A. B. Carter, Incorporated, Scholarship. A \$500 scholarship is awarded annually to an upperclassman majoring in Textiles. Awarded by the School of Industrial Management and Textile Science.

Chemstrand Scholarship. A \$500 award is available annually to a rising junior majoring in Textiles or Textile Chemistry and planning a career in industry. Selection is based upon scholarship, financial need, and extracurricular activity. Awarded by School of Industrial Management and Textile Science.

Langdon Cheves Scholarship. Income from a fund donated by his family provides an annual \$400 award for a male undergraduate whose permanent place of residence is within the Southeastern United States. Selection is based upon academic progress, financial need, and participation in extracurricular activities. Awarded by University.

Coburg Dairy Scholarship. A \$1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a junior majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need. Awarded by Department of Dairy Science.

Gilbeart H. Collings Memorial Scholarship. An \$800 award, given by the South Carolina Plant Food Educational Society, to be paid in equal installments during the last two years of satisfactory undergraduate study is available each year to a rising junior majoring in Agronomy. Selection is based upon scholarship, leadership, character, and financial need. Awarded by Department of Agronomy and Soils.

Cotton Producers Association Scholarship. A \$900 award, to be paid in three equal installments during the sophomore, junior, and senior years, is available annually to a rising sophomore majoring in Agricultural Economics, Agricultural Education, Agricultural Engineering, Agronomy, Animal Science, Dairy Science, Ento-

mology, Food Science, Horticulture (Fruit and Vegetable), or Poultry Science. Selection is based upon scholarship, leadership, character, and financial need. Awarded by College of Agriculture and Biological Sciences.

Ethyl Corporation Scholarship. A \$500 award is available annually for a student majoring in Chemical Engineering. Selection is based upon scholastic ability and financial need. Awarded by Department of Chemical Engineering.

Forbes Chocolate Scholarship. A \$150 award is available annually to a sophomore majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need. Awarded by Department of Dairy Science.

W. T. Fort, Sr., Scholarship. A \$500 award is available on alternate years to rising seniors in Architecture or Building Construction. Selection is based primarily upon financial need. Awarded by University.

Foundry Educational Foundation Scholarships. Funds made available by grants from the Foundation provide one or more annual awards to students taking organized programs applicable to the casting of metals and foundry technology. Awarded by Department of Industrial Engineering.

Ben and Kitty Gossett Scholarship. Income from their contribution provides one or more annual awards for Textile students whose families are employed by the textile industry in South Carolina. Awarded by School of Industrial Management and Textile Science.

Greenville Concrete Company Scholarship. A \$200 award is available annually to a rising sophomore or junior majoring in Civil Engineering. Selection is based upon academic achievement, character, and an interest in materials of construction. Preference is afforded students residing in the Southeastern United States. Awarded by Department of Civil Engineering.

Pauline Hanckel Dairy Scholarship. A \$1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is provided annually by the Ladies Auxiliary of the South Carolina Dairy Association to be available to a junior majoring in Dairy Science. Selection is based upon scholarship, leadership, character, and financial need. Awarded by Department of Dairy Science.

Higgins Undergraduate Scholarships. Income from a fund donated by Mr. Higgins provides several annual awards for under-

graduate students enrolled in the College of Engineering. Selection is based upon scholarship and need. Awarded by College of Engineering.

Richard O. Hull Scholarships. Two \$500 awards are available annually for students majoring in Chemistry and Chemical Engineering who have achieved superior scholastic averages on all their college work. Selection is based primarily upon academic ability although financial need will also be taken into cognizance. Awarded by University.

John D. Lane Scholarship. A \$125 award is available each year to a rising junior. Selection is based upon financial need and scholastic ability with emphasis upon achievement in the field of English. Awarded by University.

Sherwood E. Liles ('00) Engineering Scholarship. Income from a fund donated by his four sons provides an annual tuition award for a deserving undergraduate enrolled in the College of Engineering. Awarded by College of Engineering.

Minnesota Mining & Manufacturing Company Scholarships. Two \$500 scholarships are awarded to students in the College of Engineering who have satisfactorily completed 50 to 75 credits at Clemson. Selections will be made from the top ten scholars in the College of Engineering. In addition to the scholastic requirement, selections will be based upon character and demonstrated leadership abilities. Awarded by College of Engineering.

Monsanto Scholarship. A \$500 award is available annually for a student majoring in Chemical Engineering. Awarded by Department of Chemical Engineering.

Owens-Corning Fiberglas Scholarships. Two \$500 awards (one in Ceramics) are available annually to rising juniors or seniors majoring in Engineering or Textiles. Selection is based upon academic ability, leadership qualities, and financial need. Awarded by University.

Peace Fund Scholarship. A \$500 award is available annually to a rising junior or senior. Selection is based upon journalistic ability, scholastic achievement, and evidence of good character. Awarded by University.

Pennsylvania Glass Sand Scholarship. A tuition award is given annually to an outstanding rising senior majoring in Ceramic Engineering. Selection is based upon scholastic achievement. Awarded by Department of Ceramic and Metallurgical Engineering.

Ralston Purina Scholarship. A \$500 award is given annually to a rising senior enrolled in the College of Agriculture and Biological Sciences. Selection is based upon scholarship, leadership, character, extracurricular activities, sincerity of purpose in agriculture, and financial need. Awarded by College of Agriculture and Biological Sciences.

J. C. Rich ('13) Agriculture Scholarship. Income from a fund donated by his sister provides an annual award for a deserving male undergraduate enrolled in the College of Agriculture and Biological Sciences. Preference is given relatives. Awarded by College of Agriculture and Biological Sciences.

Seydel-Woolley & Company Scholarship. A \$500 award is available annually to a rising junior or senior male student majoring in Textiles. Selection is based upon scholastic ability, evidence of leadership, potential to the Southern textile industry, and financial need. Awarded by School of Industrial Management and Textile Science.

The J. E. Sirrine Company Scholarship. A \$500 scholarship is awarded to an outstanding undergraduate student in Civil Engineering, Chemical Engineering, Electrical Engineering, or Mechanical Engineering. This award is based upon a consideration of character, scholarship, and interest in a particular professional field. Preference is given to rising sophomores. Financial need is not a specific requirement. Awarded by College of Engineering.

Sonoco Products Scholarships. Two \$500 awards are available annually for deserving undergraduates majoring in Textiles. Awarded by School of Industrial Management and Textile Science.

South Carolina Electric and Gas Scholarship. A \$500 scholarship is available each year to a student residing in one of the twenty-three counties served by the South Carolina Electric & Gas Company. Applicable counties are: Abbeville, Aiken, Allendale, Bamberg, Barnwell, Beaufort, Berkeley, Calhoun, Charleston, Colleton, Dorchester, Edgefield, Fairfield, Greenwood, Hampton, Jasper, Lexington, McCormick, Newberry, Orangeburg, Richland, Saluda, and Union. Selection is based upon academic standing, leadership qualities, and financial need. Awarded by University.

South Carolina Dairy Association Scholarships. A \$1,000 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a junior from South Carolina majoring in Dairy Science. Selection is based

upon scholarship, leadership, character, and financial need. Awarded by Department of Dairy Science.

Charles H. Stone Scholarship. A \$1,000 award is available annually to a rising sophomore. Selection is based primarily upon exceptional academic achievement plus financial need. Awarded by University.

United States Rubber Foundation Scholarship. An \$800 award, to be paid in equal installments during the last two years of satisfactory undergraduate study, is available annually to a rising junior planning a career in industry. Selection is based upon proven scholastic ability and financial need. Awarded by University.

Wallace Hatchery Poultry Scholarship. A \$500 award is available annually to a senior, junior, or sophomore majoring in Poultry Science. Selection is based upon scholarship, leadership, character, and financial need. Awarded by the Department of Poultry Science.

J. P. Williamson Memorial Grants. Income from a fund donated by his relatives and the Winn-Dixie Stores Foundation is available annually for renewable grants to academically qualified and needy upperclassmen. Grants must be matched by loans from one of the established programs with which the University is affiliated. Priority is given to residents of Anderson County. Awarded by University.

LOAN FUNDS

General prerequisites for the following aid are enrollment, or acceptance for enrollment, as a full-time student, substantiated need, and adequate academic capability or potential to maintain at least average college-level grades. Applicants for other types of financial assistance may also be considered for loans after contacting the Financial Aid Office. Availability is dependent upon adequacy of funds at hand. Normal cutoff date for loan applications is June 1.

Georgianna Camp Foundation Fund. A fund, donated in memory of Georgianna Camp by her husband and sons, is available to assist worthy students who are seeking a college education and need assistance to supplement their individual efforts and available sources of income.

Clemson Architectural Foundation. Needy Architecture students in the upper years of their curriculum who show professional promise will be considered for loans from the General Fund of the Foundation.

Clemson Student Loans. A number of interested faculty and staff members, alumni, students, families, and friends have made memorial donations to assist worthy students. Included are the following funds: Anderson Kiwanis, for juniors and seniors from Anderson County; Beta Tau Sigma, for residents of Horry County; George Cherry, for upperclassmen from Oconee County and the Pendleton area; William Wilson Finley, for students living in counties traversed by the Southern Railway System; Forestry Department, for deserving Forestry upperclassmen; Henry B. Harper, for Agriculture or Industrial Management students; Jerry Allen Harter, for Agriculture students; Richard Hughes Johnson, with family approval; R. F. Poole ('16), by his classmates; S. R. Rhodes, for deserving junior or senior Electrical Engineering students; Henry Thomas Stroud, for worthy upperclassmen.

Clemson University Foundation. A limited sum is available for emergency student loans. Included are donations from family and friends made in memory of J. C. Littlejohn ('08), J. H. Woodward, Jr. ('35), and his father, Uncle Jake ('02).

Daniel Memorial Fund. Income from a sum donated by officers of the Daniel Corporation in memory of James Fleming Daniel and Fred Adams Daniel is loaned to deserving students.

National Defense Student Loan Program. State and Federal monies are available to provide assistance to graduate and undergraduate students. Prerequisites are verified need and the demonstrated ability or potential to maintain normal and satisfactory academic progress. Cutoff dates for applications for these loans are: First Semester—June 1; Second Semester—December 1. (Under present legislation there can be no new or first-time borrowers from this program after June 30, 1968.)

Reid-Baskin Fund. Income from a fund donated in memory of Cecil L. Reid ('02) and John Baskin will be used to aid deserving students. Preference is given Newberry and York County residents.

Tile Council of America Fund. The Tile Council has made a grant to be used for interest-free loans to outstanding and needy students in the lower years of the Architecture curriculum.

United Student Aid Funds Loan Program. Clemson University is one of a large number of universities participating in this national nonprofit loan program for needy and deserving students. Full-time undergraduate students may borrow up to \$1,000 per year and graduate students may borrow as much as \$1,500 per year, but no student may borrow more than \$7,500. Interest is 6%

simple and payment of interest and principal begin the tenth month after graduation and may be anticipated. The financial aid officer recommends the loan, after consultation with the student, and the loan is negotiated at the student's home town bank on the student's own signature. This is the designated lending agency of the State of South Carolina. Under the provisions of the Higher Education Act of 1965, and depending upon family income, the U. S. Commissioner of Education may pay the interest on eligible loans while the student is in school and 3% simple interest during repayment period.

STUDENT PART-TIME EMPLOYMENT

Clemson University employs students in those positions where part-time services may be utilized to mutual employment advantage. Students in actual need of financial aid are usually given preference in filling positions, all other qualifications being equal. Part-time employment of first-year students is not encouraged as the University has found through long experience that the period of academic adjustment during the freshman year allows little time for such extracurricular activity. The Student Financial Aid Office maintains application files of students desiring part-time employment for the information of requesting academic departments and off-campus agencies and industries interested in securing such help. Applications must be filed after registration for each semester during which part-time work is desired. Clemson does not participate in the Federal College Work Study Program.

OTHER SOURCES OF FINANCIAL AID

The following types of assistance are not administered by Clemson University. Recipients will be required to furnish the supporting agencies with a schedule of payments due the Bursar if payment is desired to be made through the University. Such funds must be received by him on or before the due dates. Any other arrangements require approval of the Bursar.

National and State Agencies. Students should investigate such sources of financial aid as the following: Veterans Education, War Orphans Education, advanced ROTC programs, National Guard and Reserve training programs, National Merit Scholarships, American Legion free tuition for deceased or totally disabled veterans' children, and grants made to the handicapped through the State Department of Vocational Rehabilitation.

Other Agencies. Help is often received from grants or loans through Beta, FFA, and 4-H Club membership; local organizations

of the Daughters of the American Revolution, United Daughters of the Confederacy, Civitan, Elks, Masonic, Rotary and similar groups; James F. Byrnes Foundation, Pickett and Hatcher Educational Fund, Methodist Student Loan Foundation, Knights Templar Educational Foundation, The Agricultural Society of South Carolina, The Garden Club of South Carolina, Clarendon Soil Conservation District, South Carolina Agricultural Teachers Association, Institute of Food Technologists; and various other religious, civic, welfare, and educational agencies.

Industry and Related Foundation Support. Students are often able to finance part of their education by summer employment or by alternating semesters between the University and jobs with establishments near their homes. Some students are eligible for loans or grants which are administered by those corporate and local industries which employ their parents. The finest source of information regarding this type of support has been found to be high school counselors.

Miscellaneous. There are available a number of "deferred tuition" lending plans. Examples of these are Education Funds, Inc., and Tuition Plan.

It should be realized that the University has no affiliation or contractual agreement with any of the agencies sponsoring such plans and can accept no responsibility for the outcome of any individual arrangements entered into with those agencies.

HONORS AND AWARDS

Recipients for the following awards are chosen for their special achievements by selection committees, and are announced at an annual Honors and Awards Day program in the spring or at other appropriate ceremonies during the year.

Air Command and Staff College Award. Presented annually to the Aerospace Studies 400 cadet who is selected as the outstanding AFROTC cadet in the nation. The winner will be selected from cadets who have previously been chosen as recipients of the Legion of Valor Bronze Cross of Achievement Award and/or the Air Force Association Area Award.

Air Force Association Award. The Air Force Association of Washington, D.C., awards this medal annually to the outstanding Aerospace Studies 400 cadet who has shown outstanding aptitude for both academic and military pursuits.

The Alpha Rho Chi Medal. The Alpha Rho Chi fraternity annually awards a gold medal to the graduate of the professional

curriculum in Architecture who has shown the greatest leadership, service to his school, and who gives promise of professional merit.

Alpha Tau Alpha Scholarship Medal. An annual award is given to the senior in Agricultural Education having the highest scholastic record.

Alpha Zeta Award. An annual award is given to a major in the College of Agriculture and Biological Sciences having a high scholastic record and possessing qualities of character and leadership.

Ambrosia Chocolate Award. An engraved watch is given annually by the Ambrosia Chocolate Company to the senior in Dairy Science having the highest grade in Dy Sc 304.

American Association of Textile Chemists and Colorists Award. An annual award is given for the best work done in Textile Chemistry and Dyeing by a member of the graduating class.

American Association of Textile Technologists Award. An annual award is given to the graduate having a high scholastic record and all-round qualification for success in the textile industry.

American Association of University Women Award. The Clemson branch awards an engraved silver bowl annually to the girl graduating with the highest cumulative grade-point ratio.

American Chemical Society Award. An annual award is given to the outstanding senior in Chemistry who is a member of the student affiliate chapter of the American Chemical Society.

American Farm Economic Association Merit Award. This award is presented each year by the Clemson Student Chapter of the American Farm Economic Association to the outstanding student in Agricultural Economics, based on academic attainment and extracurricular activities. The winner's name is inscribed on a plaque.

American Fighter Aces Association Award. Presented annually to the outstanding Aerospace Studies 400 cadet graduating in the pilot category in each of the nine geographical areas based on his performance and achievements as an AFROTC cadet including his performance in the flight instruction program.

South Carolina Chapter, American Institute of Architects Award. The South Carolina Chapter of the American Institute of Architects each year awards a Certificate of Merit to the outstanding fourth-year student of Architecture in the Design Option and the Structural Option.

American Institute of Architects Medal. The National Organization of The American Institute of Architects awards each year a

silver medal and a book to the outstanding graduate in the professional curriculum in Architecture at Clemson. An award is also presented to the runner-up.

American Institute of Chemical Engineers Award. The American Institute of Chemical Engineers sponsors an annual award to the junior majoring in Chemical Engineering who has attained the highest scholastic standing through the sophomore year.

Institute of Electrical and Electronics Engineers Scholastic Award. An annual award is given for outstanding participation in the Student Branch activities of IEEE to a second-semester junior or first-semester senior having high scholastic standing.

American Legion ROTC General Military Excellence Award. The American Legion annually awards a medal to an outstanding junior and senior Army ROTC cadet who has demonstrated outstanding qualities in military leadership, discipline, character and citizenship.

American Legion Scholastic Excellence Award. The American Legion annually awards a medal to an outstanding junior and senior Army ROTC cadet based on scholastic achievement, participation in student activities and demonstrated leadership.

American Society of Agronomy Award. The American Society of Agronomy sponsors an annual award to an outstanding senior in Agronomy.

American Society of Civil Engineers Membership Award. The South Carolina Section of the American Society of Civil Engineers sponsors an annual award to the outstanding graduating senior in Civil Engineering.

The American Society of Mechanical Engineers Award. An annual award is given to a senior in Mechanical Engineering for his outstanding service in the College of Engineering.

Society of American Military Engineers Award. The Society of American Military Engineers awards annually a gold medal with key replica to the twenty outstanding AFROTC cadet juniors and to the twenty outstanding AFROTC cadet seniors enrolled in Aerospace Studies in colleges and universities throughout the nation who are majoring in Engineering.

Society of American Military Engineers Award. The Society of American Military Engineers awards annually a gold medal with key replica to the twenty outstanding Army ROTC cadet juniors

and to the twenty outstanding Army ROTC cadet seniors enrolled in the Army General Military Science ROTC Units in colleges and universities throughout the nation who are majoring in Engineering.

Major Rudolf Anderson, Jr., Trophy. The trophy is presented annually to the Aerospace Studies cadet who has distinguished himself by his performance and dedication to the precepts of the AFROTC Cadet Wing at Clemson University, such actions having been acknowledged to constitute the most outstanding contribution to the promotion and enhancement of the traditions, ideals, and aspirations of the Air Force Reserve Officer's Training Corps.

Architects' Certificates of Merit. The South Carolina Chapter of the American Institute of Architects each year awards a certificate of merit to the outstanding fourth-year student in the design option and structural option of the professional curriculum in Architecture.

The Architectural Faculty Award. The School faculty annually makes an award to the first-year student in Architecture displaying outstanding promise.

Armed Forces Communication and Electronics Association Gold Medal. The Armed Forces Communications and Electronics Association of Washington, D. C., sponsors an annual award to the outstanding senior Army ROTC cadet majoring in Electrical Engineering.

The Armed Forces Communication and Electronics Association Award. An annual award is given to the outstanding AFROTC senior majoring in Electrical Engineering who has demonstrated outstanding qualities of military leadership, character, and definite aptitude for military service.

South Carolina Chapter, Armed Forces Communications and Electronics Association Leadership Award. A \$25 Savings Bond is awarded annually to an outstanding ROTC junior majoring in Electrical, Electronics, or Communications Engineering.

Association of the United States Army Award for Excellence in Military History. The Association of the United States Army annually sponsors an award to the second-year Army ROTC cadet achieving the highest average in Military History.

Association of the United States Army ROTC Award. The Association of the United States Army annually awards a medal to each of four junior ROTC cadets who are in the top 10 per cent in ROTC grades and in the top 25 per cent in general academic grades and who have contributed most, through leadership, to advancing the

standing of the Army ROTC unit and the Military Science Department at Clemson University.

G. H. Aull Essay Award. An award is given annually to the student writing the best essay in Agricultural Economics Seminar. The winner of this award receives \$25 and has his name inscribed on a plaque.

Best Drilled AFROTC Cadet. Awarded annually to the AFROTC cadets in the sophomore and freshman classes, adjudged as the best drilled cadet within their respective class.

Block and Bridle Club Scholarship. A \$50 award to be paid at the beginning of each regular semester is available to a junior in the Block and Bridle Club. Selection is based on scholastic ability, financial need and leadership in the club and other activities.

Arnold R. Boyd English Honor Key. This key is awarded annually to a student in the graduating class who has made an outstanding record in English as an undergraduate at the University.

Chemistry Faculty Award. An annual award is given to the sophomore majoring in Chemistry who maintained the highest scholastic record in Chemistry during his first two semesters of work.

Chicago Tribune Gold Medal Awards. These awards are given annually to the two senior AFROTC cadets who are most outstanding in military training, academic achievement, and demonstrated desire for an Air Force commission.

Chicago Tribune Silver Medal Awards. These awards are given annually to the two junior AFROTC cadets who are most outstanding in military training, academic achievement, and demonstrated desire for an Air Force commission.

Class of 1902 Awards. The members of the Class of 1902 have deposited with the Clemson University Foundation three funds of \$2,000 each, in recognition of the distinguished teaching services of three professors who were on the faculty at that time, and in memory of those of the class who have passed on. The income from these funds is to be awarded annually as follows: *The Williston Wightman Klugh Award*, to a worthy, earnest undergraduate student of good moral code and personality who intends to make teaching his life work; *The Rudolph Edward Lee Award*, to a worthy undergraduate student in Architecture, upon the recommendation of the faculty of that School after consideration of the student's grades, extracurricular activities, and those qualities that

go toward making a successful professional architect; and *The Samuel Maner Martin Award*, to a worthy undergraduate student taking mathematics as a major subject.

Commander Best Drilled Squadron Award. Awarded annually to the commander of the squadron adjudged as the best drilled squadron of the AFROTC Cadet Wing. Each member of this squadron is then awarded the ribbon, Member of the Best Drilled Squadron.

Commander's Saber. Presented annually by the Professor of Military Science to the Army ROTC cadet officer considered to have contributed most to the advancement of the cadet brigade through leadership and devotion to duty.

Howard Carlisle Copeland Memorial Award. The family of Howard Carlisle Copeland, who gave his life during World War II, has set up a permanent memorial fund in his memory. Each year the interest from the fund shall be given to the boy who has made the greatest endeavor financially to stay in college.

The Marvin R. Cross Honor Award of the Textile Veterans Association. A \$50 U. S. Savings Bond and a medallion is awarded to the most outstanding sophomore in the Textile Department of the School of Industrial Management and Textile Science.

Danforth Fellowships. The Danforth Foundation of St. Louis awards two fellowships each year to agricultural students. One of these is given to an outstanding member of the junior class majoring in either Agricultural Economics, Agricultural Education, Animal Science, Dairy Science or Poultry Science, and provides for a 2-week summer short course with Ralston Purina Company, and a 2-week stay at the American Youth Foundation Leadership Training Camp at Shelby, Michigan. The second award provides for a 2-week stay at the Leadership Camp at Shelby, Michigan, and is awarded to an outstanding freshman in the College of Agriculture and Biological Sciences.

Distinguished AFROTC Cadet Badge. Presented by the Professor of Aerospace Studies to the top 20% of Aerospace Studies 400 cadets upon entrance into AS 400, who possess outstanding qualities of leadership, high moral character, and a definite aptitude for Air Force service. A cadet must be designated as a distinguished cadet before he is eligible to apply for a regular Air Force commission.

Distinguished Military Student Badge. An annual award is given by the Department of the Army to those individuals, designated by the Professor of Military Science, who possess outstanding qualities of leadership, high moral character, and definite aptitude for Army service. They must have attained an academic standing in the upper half of their class and demonstrated leadership ability through their achievements while participating in recognized campus activities. Such recognition carries with it the opportunity for commissioning in the Regular Army.

Samuel B. Earle Award. An award established by Clemson Alumni in honor of Dean Samuel B. Earle, who ended 48 years of service to Clemson University in July, 1950, is given annually to an outstanding senior in the College of Engineering.

Dr. R. C. Edwards Award. Awarded annually to the outstanding Clemson University Army ROTC cadet who attained the highest degree of proficiency during the preceding ROTC summer camp.

South Carolina Entomological Society Award. An annual award is given to an undergraduate students majoring in Entomology or a student in the Zoology Option in Biology who has completed nine semester hours in Entomology. Selection will be made on the basis of scholarship and character.

The Faculty Award of the School of Industrial Management and Textile Science. A medallion is awarded annually to the most outstanding graduating senior in the School of Industrial Management and Textile Science.

Faculty Scholarship Award. An annual award is given to the member of the graduating class with the highest academic achievement by the academic faculty. The winner receives a certificate and a gold medal and has his name inscribed upon a plaque which is placed in the main entrance of Tillman Hall. This plaque carries the names of all previous winners of the award.

Forestry Award. The income from a fund donated to the University is presented annually to the senior in Forestry with the highest academic record.

Gamma Sigma Delta Awards. Awarded annually to the student in the sophomore class and in the senior class majoring in Agriculture and having the highest scholastic attainment.

Ben H. Gardener Award. The income from a fund donated to the University by the father and son is given annually to some worthy and needy student in the College of Engineering.

General Dynamics Award. An annual award is given to the most outstanding sophomore student of the basic AFROTC course who is qualified and motivated for an Air Force career.

Industrial Management Merit Award. An award is provided by the Neely and Gibson Coal Sales Company (William J. Neely, '32, and Harry H. Gibson, '32) for an Industrial Management major who has demonstrated through outstanding academic performance and excellent personal characteristics sufficient potential to enable him to assume significant managerial responsibilities in modern industry.

James Lynah Merit Awards. Income for several awards is derived from a fund established by Mr. James Lynah, in memory of distinguished professors who were teaching at Clemson when the Class of 1902 were undergraduates, as follows: *The Charles Manning Furman Prize* in English, *The Mark Bernard Hardin Prize* in Chemistry, *The William Shannon Morrison Prize* in History, *The Charles Carter Newman Prize* in Horticulture, *The Walter Merritt Riggs Prize* in Electrical Engineering and *The Augustus G. Shanklin Prizes* in ROTC, Air and Military Science and Tactics. These awards are made to students having a high scholastic rating and possessing outstanding qualities of character and leadership.

Legion of Valor Bronze Cross of Achievement Award. Presented annually to one Aerospace Studies junior or senior in each of the nine geographical AFROTC areas, based on performance and achievements as an AFROTC cadet through Aerospace Studies 300, including completion of field training.

Clark Lindsay McCaslan Award. A sum of money has been deposited with the University to establish a fund in memory of Clark Lindsay McCaslan, Class of 1908, and a pioneer in Agricultural Engineering. The income from the fund shall be given annually to the student in the Department of Agricultural Engineering who in the opinion of the faculty shall be deemed to be the most deserving.

Colonel S. T. McDowell Award. Awarded annually to the outstanding Army ROTC cadet senior scheduled to be commissioned in a Combat Arm of the United States Army.

Henry T. Malone Gamma Alpha Mu Award. Henry T. Malone, Class of 1937, will present a \$50 award to the undergraduate student who writes the best feature on campus, community, or state history to appear in *The Tiger*.

Marksmanship Awards. Medals are annually presented to those members of the Army ROTC Rifle Team achieving highest position average scores.

Dr. Ralph Mershon Memorial Award. The Secretary of the Army will present annually a \$250 prize to the outstanding Distinguished Military Graduate of a senior division Army ROTC university or college who is commissioned in the Regular Army.

Northern Textile Association Medal. Awarded annually to the outstanding graduate in Textiles.

National Defense Transportation Association Award. The National Defense Transportation Association will award annually the NDTA Medal to the twenty outstanding senior students enrolled in General Military Science Army ROTC units throughout the nation.

Thomas Newcomen Award in Material History. The Newcomen Society in North America gives an annual award for the best research paper presented in the field of Material History.

Norris Medal. The following is from the will of the Hon. D. K. Norris, a life trustee of Clemson, who died in 1905:

"I give \$500.00 face value, Norris Cotton Mill stock . . . on condition the dividend thereon shall be applied annually to the purchase of a gold medal, to be known as the 'Norris Medal', to be awarded to the student of Clemson meriting the same at graduation, under such rules and conditions as may be prescribed by the said Board of Trustees, and which medal shall have engraved on it '*Honor habet onus*' (Honor brings responsibility)."

The winner of the Norris Medal has his name inscribed upon a plaque which is placed in the main entrance of Tillman Hall. This plaque carries the names of all previous winners of the Norris Medal since it was first awarded in 1908.

American Ordnance Association Gold Scholarship Key. The American Ordnance Association, Washington, D. C., sponsors annually an award to the senior Army ROTC cadet with the most ability in the ordnance field to be commissioned to the Ordnance Corps.

Outstanding Cadet Non-Commissioned Officer Award. An annual award of the Department of Military Science presented to the Outstanding Army ROTC Cadet NCO based on exhibited improvement in all aspects of military performance.

Willie N. and Joe Wise Padget Scholarship. The income from a fund donated to the University by members of their family is used annually to aid a deserving student from Saluda County.

Phi Eta Sigma Mathematics Award. An annual award is given to a freshman scoring highest on a competitive examination in mathematics.

Phi Eta Sigma Scholarship Medal. An annual award is given to the senior having the highest scholastic record.

Phi Kappa Phi Award. An annual award is given to the junior having the highest scholastic record.

Phi Psi Award. This award is made annually by the National Honor Council of the Phi Psi Textile Fraternity to the outstanding textile graduate, considering scholastic record, leadership ability, and other qualities.

Pomona Pipe Products Award. A cash award is made to the member of the junior class in Civil Engineering with the most outstanding academic record.

Piedmont Engineers and Architects Award. An annual cash award to the sophomore majoring in Civil Engineering who has the highest scholastic record during his first three semesters of work.

Quartermaster Association Awards. The Quartermaster Association annually awards a medal to the ten outstanding junior students and a scholastic key to the ten outstanding senior students enrolled in the Army General Military Science ROTC program in colleges and universities throughout the nation. Students must be enrolled in courses including as a major item of curriculum at least one educational area of particular interest to the Quartermaster Corps.

Reserve Officers Association Award. Awarded annually to an AFROTC junior, sophomore, and freshman cadet, based on scholastic and Aerospace Studies grades, and leadership qualities.

Reserve Officers Association Medal. The South Carolina Department of the Reserve Officers Association sponsors an annual award to the outstanding Army ROTC Cadet in each of the four academic years.

Sigma Pi Sigma Prize. An annual award is given to the outstanding senior in the Physics Department.

Sigma Tau Epsilon Award. An annual award is given to the senior majoring in the College of Arts and Sciences and having the highest scholastic record.

R. W. Simpson Medal. A medal designated as the "R. W. Simpson Medal" is awarded annually to the best drilled Army ROTC cadet in each of the freshman, sophomore, or junior classes.

The Solite Award. The Southern Lightweight Aggregate Company annually makes a grant of \$1,000 to the Clemson Architectural Foundation, a portion of which is used for prizes for those fifth-year professional theses adjudged to be outstanding.

Sons of the American Revolution Medal. An annual award is given to a freshman AFROTC cadet who is outstanding in academic courses, Aerospace Studies, and leadership characteristics.

The South Carolina Masonry Association Award. The South Carolina Masonry Association annually makes a grant of \$600 to the Clemson Architectural Foundation, a portion of which is used for awards in an intermediate-level architectural design problem.

South Carolina Society of Sons of American Revolution Medal. An annual award is given to an Army ROTC cadet who exhibits a high degree of merit with respect to leadership, soldierly bearing and excellence in theoretical courses of study.

The Southern Brick and Tile Award. The Southern Brick and Tile Association annually makes a grant of \$100 for prizes awarded in an advanced-level architectural design problem.

Algernon Sydney Sullivan Medallion. A valuable and artistic memorial, established by the Southern Society of New York in honor of its first president, is awarded each year by the University to a member of the graduating class and to one other person who has some interest in, association with, or relation to the institution, official or otherwise, of a nature as to make this form of recognition appropriate. The recipients of this award shall be chosen in recognition of their influence for good, their excellence in maintaining high ideals of living, their spiritual qualities, and their generous and disinterested service to others.

Superior Cadet Ribbon Awards. The Department of the Army awards annually Superior Cadet Ribbons to those Army ROTC students in each academic year (class) adjudged the most outstanding in their class.

Third Army Certificate of Meritorious Leadership Achievement. An award is given annually by the Commanding General of Third Army to the outstanding cadet on the basis of leadership development throughout the ROTC career.

Tau Beta Pi Scholastic Award. An annual award is given to the sophomore in Engineering having the highest scholastic record.

The Textile Veterans Association Honor Award. A medallion is awarded to a member of the graduating class who has the potential to make an outstanding contribution to the textile industry in future years.

Trustees' Medal. The Board of Trustees has provided for a gold medal to be awarded annually to the best speaker in the student body.

Virginia Dare Award. An award of \$25 is given annually by the Virginia Dare Extract Company, Incorporated, to the senior majoring in Dairy Science and having the highest grade in Dy Sc 402, Dairy Manufactures.

Wall Street Journal Student Achievement Awards. These annual awards are given to the most outstanding senior with a concentration in Agricultural Economics, College of Agriculture and Biological Sciences, and Economics in the College of Arts and Sciences.

Wyandotte Award. The Wyandotte Chemicals Corporation Trophy is awarded to the senior in Dairy Science having the highest grades in Dy Sc 409 and 410.

GUIDANCE SERVICES

Guidance has an important role at all levels of education and particularly so during times of transition and articulation. To assist students in this period of emotional and academic adjustment, an orientation and counseling program has been established.

At the beginning of his university career, each student is assigned to a faculty adviser selected from his academic school. The faculty advisers provide information on courses of study, approve class schedules, interpret academic regulations, and suggest adjustments in making satisfactory progress toward graduation.

The residence hall program is organized to cope with personal problems and questions regarding procedures and policies of college life. Residence hall counselors and supervisors are primarily concerned with maintaining an environment compatible to serious study and with the educational potential of group living.

COUNSELING SERVICES

Counseling Services are located in Tillman Hall. These services are available free of charge to all registered students and wives of registered students. These services are oriented to early identification of and assistance with academic, vocational, personal, and psychological problems. Testing facilities of a vocational and psychological nature are available. Students are encouraged to take advantage of the individual services of a Counseling Psychologist, a Counselor, and of the Psychometric Services.

PLACEMENT SERVICES

Although the University is glad to assist all who ask for help in securing summer or permanent employment, there is no obligation to secure positions for those who complete any of the courses of study.

The Placement Office coordinates and plans campus interview visits requested by representatives seeking graduates for positions with business, industry, and government. It maintains current files of reported job opportunities and of alumni who wish to learn of available openings.

A Placement Bulletin is prepared periodically for distribution on the campus and mailing to alumni upon request, to announce scheduled campus interviews, and to list specific openings which may be of interest to students and alumni.

BUILDINGS AND GROUNDS

Today, as throughout Clemson's history, the centerpiece of this picturesque campus is the Tillman Hall clock tower, the symbol of scientific education, research and public service in South Carolina. Honoring the memory of colorful Governor "Pitchfork Ben" Tillman, this building houses administrative offices on the two lower floors and classrooms upstairs.

The Clemson campus proper consists of 600 acres and represents an investment approximating 57 million dollars in academic buildings, student housing, service facilities, and equipment. Basically, this is the plantation that Thomas Green Clemson willed to South Carolina for the establishment of the University. Fort Hill, the former home of both Mr. Clemson and his illustrious father-in-law, John C. Calhoun, is preserved in the center of the campus as a national shrine.

Beyond the main campus, stretching into Oconee, Pickens, and Anderson Counties, are another 23,000 acres of farm and agricultural and engineering research lands. Over the State are 6,804 more acres devoted to Agricultural Experiment Station research and 4-H Club work.

Teaching and laboratory facilities of the College of Agriculture and Biological Sciences are housed in the several buildings of the R. F. Poole Agricultural Center. Another grouping serves the College of Engineering. Among these are Olin Hall for Ceramic Engineering and Earle Hall for Chemical Engineering. These two buildings and the excellent equipment they house represent gifts from the Olin Foundation totaling nearly two million dollars.

Sirrine Hall is the home of the School of Industrial Management and Textile Science and within it are located government and industrial cotton fiber testing laboratories. The School of Architecture is located in a modern, well-equipped building and a third grouping of classrooms and laboratories serves the College of Arts and Sciences.

The fifteen dormitories for men and women will accommodate 4,780. Individual units or apartments accommodate 289 married students.

Student activity facilities for the almost 7,000 young men and women on the campus include the Library, Infirmary, YMCA, Laundry, Dining Room, Field House, and Stadium.

The university-owned Clemson House and adjacent Clemson Homes provide excellent community hotel accommodations and permanent housing for staff members.

RESERVE OFFICERS' TRAINING CORPS (ROTC)

The Department of the Air Force and the Department of the Army both maintain Senior Division units of the ROTC at Clemson. The Reserve Officer Training Programs at Clemson University are authorized under the ROTC Vitalization Act of 1964 as promulgated by the 88th Congress and an agreement entered into by the University and the Departments of the Army and Air Force. This legislation entitles students formally enrolled in the Advanced Course to be paid subsistence pay at the rate of \$50 per month. In addition, individuals are paid one (1) summer vacation pay exclusive of dates of summer camp. The student is paid at the rate of \$151.95 per month while attending summer camp, plus travel allowance to and from camp.

The mission of the Reserve Officers' Training Corps is to produce officers having qualities of leadership and attributes essential to their progress and continued development as commissioned officers in either the Army or the Air Force of the United States.

To implement this mission, a four-year program is offered consisting of the basic course for freshmen and sophomores and the advanced course for juniors and seniors.

The basic course, consisting of the first two years of Military Science or Aerospace Studies, is a requirement in every undergraduate curriculum of the University and as such must be taken the same as other required freshman and sophomore courses and completed for graduation. Entering students will be informed by the University Director of Admissions as to which ROTC course they are eligible to enter.

Entrance requirements for the basic ROTC programs are as follows:

Students must be at least 14 years of age, citizens of the United States at the time of entrance; of good moral character; must sign a loyalty certificate; and not be physically disqualified to the extent that drill would further aggravate the physical defect. Furthermore, Air Force candidates will be administered a written Air Force Officer Qualification Test and a physical examination during their freshman or sophomore year to determine eligibility for the Advanced AFROTC course. Foreign students may enroll in the ROTC program provided they sign a statement of intention to become American citizens or receive the approval of their governments.

Since a maximum enrollment restriction is placed on entrance into the Advanced ROTC program, it is difficult for a student to transfer from one Advanced Course of a program into the Advanced Course of another program. Hence, students who feel they may not qualify for commission in one program are encouraged to enroll in the program in which they plan ultimately to receive their commission.

The following students are exempt from the requirement of the basic ROTC course but must complete for graduation the equivalent credit hours of approved electives:

- a. Students not physically qualified for basic ROTC.
- b. Students who have attained age of 21 at time of entrance.
- c. Transfer students entering with 30 or more semester credit hours acceptable toward graduation at Clemson in their respective curriculums. In connection with this, transfer students

and students from Clemson centers desirous of obtaining a commission in the Army or Air Force upon completion of the requirements for their baccalaureate degree may complete the entire basic ROTC course by attending both summer sessions on the main campus during the summer preceding their junior year. They may take additional academic courses concurrently.

- d. Students who are married at time of entrance.
- e. Women students.
- f. Students who are not citizens of the United States.

Students who have had at least four (4) months of active military service are exempt from the basic ROTC course. However, veteran students who intend to apply for advanced ROTC should consult with the Head of the Military Science or Aerospace Studies Department with reference to placement credit for previous service.

Physically qualified students who are exempt from the basic course for other reasons may elect to take the courses offered in Military Science or Aerospace Studies upon approval of the Head of the Military Science or Aerospace Studies Department, respectively.

Students who complete the prescribed ROTC courses and receive a bachelor's degree may be awarded commissions in either Regular or Reserve components of the Army or Air Force. Each student receives one (1) credit hour for each semester of the basic course and three (3) credit hours for each semester of Advanced ROTC successfully completed.

Members of the Advanced Course are required to attend one summer camp before commissioning. Both the Army and Air Force encampments are normally of 4 weeks duration.

Uniforms are provided to ROTC students. The University requires a deposit of \$25 from each basic student. This is refundable when the uniform is turned in, provided there is no damage to the uniform other than normal wear. Each Advanced ROTC student is credited with a uniform allowance, paid by the Government to the University, which is used by the University to purchase officer-type uniforms for use during the junior and senior years. The uniform becomes the property of the student when he is commissioned.

AIR FORCE ROTC

The Air Force ROTC program is designed to provide for selected college students in designated civilian educational institutions an education that will develop skills and attitudes vital to the career

of a professional Air Force officer. It is further designed to qualify for commissions those male college students who desire to serve in the United States Air Force.

The purpose and specific objectives of the program are:

(1) To select and motivate high quality young men toward a career in the United States Air Force in fields specifically required.

(2) To develop in cadets by example and participation the attributes of character, personality and attitudes required of a leader.

(3) To develop in cadets a familiarity with and understanding of the Air Force mission, organization, operations, problems, and its employment in the global concept.

(4) To provide that military education and training necessary to complement and supplement the civilian education resulting in the obtaining by the cadet of a sound foundation on which to build an officer career.

The program consists of the General Military Course (GMC) or basic course and the Professional Officer Course (POC) or advanced course. Both courses are generalized in nature and are designed to give the student a broad picture of the Air Force organization and mission and to stimulate a growing desire on the part of the student to become an Air Force officer. The GMC consists of 2 years with 60 hours of classroom instruction and 30 hours of Corps Training (drill) each year. During the second year of the GMC a cadet may apply for admission into the POC. The POC consists of 120 hours of instruction each year, 90 hours classroom instruction and 30 hours of Corps Training.

If accepted into the POC, the cadet will be placed under contract and after satisfactory course completion and graduation, may be commissioned as a Second Lieutenant in either the Regular or Reserve components of the United States Air Force. Newly commissioned Air Force officers will serve a minimum period of either four (4) years active duty as a non-flying officer or five (5) years as a pilot or navigator after completion of pilot or navigator training. (Pilot training requires approximately 53 weeks and navigator training requires approximately 38 weeks.)

Cadets of the Clemson detachment are permitted to make orientation flights in USAF aircraft. These flights are usually in the local area. Field trips to other Air Force bases are accomplished whenever possible. This enables the cadets to see Air Force bases in all aspects of daily operation.

To be eligible for formal enrollment in the POC a cadet must have met and been recommended for POC membership by a board of Air Force officers in addition to the following: (1) Make application and enroll in the POC; (2) Pass the Air Force Officer's Qualification Test; (3) Pass the Air Force physical examination; (4) Be qualified in accordance with citizenship, age and loyalty requirements; (5) Possess leadership ability and good moral character; (6) Successfully complete two academic years of the GMC or have received credit for its equivalent; (7) Enlist in the Air Force Reserve (Ineligible Reserve Section) AFROTC; (8) Plan to have two academic years remaining (including graduate study) at Clemson University at the time of entrance; (9) Be enrolled as a full-time student; (10) Have attained the academic standards required by the University and the Department of Aerospace Studies.

Cadets accepted for the POC must be enrolled in a college program leading to a baccalaureate degree and will be classified in one of four specific categories:

Category IP—Pilot Training: To be eligible for this category an advanced cadet must meet the required physical standards, measured aptitude and interest qualifications. Category IP cadets will participate in the Flight Instruction Program (FIP) during their senior year. They will receive 36½ hours pilot training conducted by a civilian contract flying school and if all requirements are met, may be awarded a Private Pilot's license upon completion.

Category IN—Navigator Training: To be eligible for this category and advanced cadet must meet the required physical standards, measured aptitude and interest qualifications.

Category II—(Nonflying) Technical Fields: This category consists of cadets enrolled in college programs leading to a baccalaureate degree with majors in prescribed engineering and scientific fields of study.

Category III—(Nonflying) Nontechnical Fields: This category consists of cadets enrolled in college programs leading to a baccalaureate degree, with majors in other than engineering and scientific fields of study.

Air Force ROTC awards financial assistance grants to highly qualified AFROTC cadets. Each grant pays for tuition fees and \$75 per academic year for books, in addition to \$50 per month to the grant recipient. This monthly payment is withheld during the four-week training period when cadets are paid \$136.48. The \$50

per month payment is reinstated upon completion of the training period.

The Air Force provides three outstanding programs whereby an AFROTC graduate may pursue studies leading to graduate degrees. The educational delay program allows an AFROTC graduate to have his call to active duty delayed until after he receives his advanced degree. "Operation Bootstrap" is a program which permits an officer on active duty to be assigned to a college or university of his choice for graduate work provided degree requirements can be met within 12 months or less. Officers receive full pay and allowances while attending college under "Operation Bootstrap." The largest and most comprehensive programs for providing advanced formal education is through the Air Force Institute of Technology (AFIT) which has the mission of providing education and training to meet technological, scientific, and other professional requirements of the Air Force. To accomplish the mission, AFIT offers programs at the undergraduate and graduate level in its fully accredited Resident Schools of Engineering, Logistics, and Civil Engineering at Wright-Patterson AFB, Ohio; at selected civilian colleges and universities, and through its Training-with-Industry programs. All Air Force officers in the grade of Lieutenant Colonel or below are eligible to apply for AFIT training. All undergraduate grades of "C" (2.0) or above are creditable towards evaluation for entrance into the graduate programs. Each individual applicant will be evaluated for eligibility based on his individual record as it applies to the current programs and needs of the Air Force.

AFIT presently supports selected Air Force officers in the bio-environmental engineering master's degree program at Clemson University. Tuition charges and fees for AFIT students attending civilian institutions are assumed by the Air Force. Each student, in addition, receives an annual monetary allowance to help defray the cost of supplies and theses. AFIT students receive their full military pay and allowances while they are attending school for their advanced degree.

Cadets enrolled in the POC will attend a four-week training period at an Air Force base between their junior and senior years. This period is designed to give them an idea of how a typical air base functions, and to provide them with an opportunity to fly in USAF aircraft. In addition to several hours of orientation flying, they will visit and train on the job in such base activities as headquarters sections, maintenance shops, base operations, and

others. Summer training curriculum is designed to provide training and actual experience which will prepare them to assume cadet officer positions in their senior year.

Those cadets who have demonstrated outstanding leadership and academic qualities may be designated as distinguished AFROTC cadets at the beginning of their senior year. These designations are made upon recommendation by a board of Air Force officers and the University Director of Admissions and Registration and are concurred in by the President of the University and head of the Aerospace Studies department. Those distinguished cadets who continue to maintain outstanding progress in their senior year are designated as distinguished graduates. Such cadets officially designated as distinguished AFROTC cadets may apply for a regular Air Force commission up to 10 months, but not later than 7 months prior to commissioning. The cadet is competing with all other distinguished AFROTC cadets, nationwide, for a regular Air Force commission.

ARMY ROTC

The Army ROTC instruction stresses an academic college-level program in content, scope, and intensity. Emphasis is placed on the development of the student's leadership, bearing, discipline, judgment and sportsmanship which will be a distinct asset in any profession that he may choose, military or civilian.

The General Military Science Program is conducted at Clemson (see Part V of this catalog for a description of courses). The program consists of a Basic Course for freshmen and sophomores and the Advanced Program for those participating juniors and seniors. A student who has successfully completed the basic course, who meets the physical requirements, who has earned sufficient academic credits to be designated as an academic junior, and who is recommended by his instructors, may enter the Advanced Course offered during the junior and senior years. Successful completion of the Advanced Program qualifies the student for a regular or reserve commission in any of the arms or services of the United States Army.

Scholarship Program. Scholarships are available to selected ROTC students who are strongly motivated toward a career in the Army. Each scholarship pays for tuition, books and laboratory expenses, and, in addition, pays \$50 a month for the duration of the award, except during the Advanced Course summer training camp at the end of the junior year when the pay is at the rate of \$151.95 per month. Only students who participate in the four-year

program are eligible. For further information concerning the scholarship program, contact the Office of the Professor of Military Science.

The requirements for formal enrollment in the Advanced ROTC Program are as follows:

Junior Year. Must have successfully completed all previous Military Science courses, have acquired a passing grade on a general intelligence test which is administered during the sophomore year, be physically qualified, and must have acquired the minimum grade-point ratio required for designation as an academic junior. The number of credits required for participation in the Advanced Course complements the academic requirements of the university and insures that the cadet receives his commission and his diploma simultaneously.

Senior Year. Must have successfully completed all previous Military Science courses and have attended summer camp, must be an academic senior, and have the cumulative grade-point ratio required for graduation.

Exceptions, where warranted, to the above general rules may be made by the Head of the Military Science Department.

During the fourth year of general military instruction, students will have the opportunity to indicate their preference for assignment to a particular branch. Final assignment authority remains with the Department of the Army and will be dependent upon such factors as the student's major academic course, class standing, qualities of leadership, the requirements and existing vacancies in the various branches of the Army, in addition to the student's choice.

Outstanding Army ROTC cadets who attain grades in the upper half of the class in academic subjects and the upper third in Military Science subjects during their junior year and who possess outstanding qualities of leadership, character and aptitude for military service may, with the approval of the University President, be designated as Distinguished Military Students by the Head of the Military Science Department. Those who maintain this outstanding record during their senior year may be designated Distinguished Military Graduates. A Distinguished Military Student may apply for appointment as a Second Lieutenant in the Regular Army.

Flight Training Program. An Army ROTC student in his fourth year of Military Science, or having completed his fourth year of Military Science, but not completed his academic requirements for graduation, may enroll in the Army ROTC Flight Training Program. If accepted, the student will receive 35 hours of ground school and

36½ hours of flight training at Government expense, after which the student may qualify for his FAA license and be recommended for further flight training upon entry on active duty. To be accepted in the Flight Training Program the candidate must agree that if commissioned at time of graduation, he will volunteer for Army Aviation Flight Training and assignment, and to serve on active duty as a commissioned officer for not less than three consecutive years from the date of completion of the Army Aviation Flight Training Course, in addition to meeting other physical and mental requirements.

ROTC students receiving commissions in the Regular Army or Army Reserve have the opportunity to attend graduate school under the following conditions:

- a. Students commissioned in the Army Reserve may receive a delay for call to active duty to attend graduate school at their expense. They must, however, complete their active duty obligation prior to the sixth anniversary of being commissioned. A student being deferred is also satisfying his reserve obligation and has established an early date of rank for promotion, longevity and retirement purposes.
- b. A student receiving a commission in the Regular Army may apply for excess leave to attend graduate school at his expense. While on an excess-leave status, the officer will receive promotions with his contemporaries, establish an early date of rank for longevity and pay purposes and may utilize all the facilities authorized an officer on active duty.

The student who receives his commission through Army ROTC is appointed in the Army Reserve as a Second Lieutenant and called to active duty for 2 years. Graduates of the program who enter active duty for 2 years will acquire a 6-year military obligation, only 3 of which would be in the Ready Reserve.

A recapitulation of Army service obligation is listed below:

	<i>Reserve Officers</i>	<i>Regular Army</i>	<i>Reserve Flight Training Officers</i>
Active Duty	2 years	3 years	4 years (Approx.)
Ready Reserve	3 years	2 years	1 year
Standby Reserve . . .	1 year	1 year	1 year

HISTORICAL STATEMENT

In 1889 the General Assembly of South Carolina accepted the bequest of Thomas G. Clemson, which set aside the bulk of the Clemson estate for the founding of a scientific and technical college. The institution was also established under the Morrill Land-Grant Act passed by the National Congress in 1862. Clemson University, therefore, is a member of the national system of Land-Grant Colleges and Universities.

In 1964, in recognition of the expanded offerings of the institution not only in the areas of agricultural and mechanical arts but also in the sciences and arts, the name of the institution was changed to Clemson University. This change by the Legislature, effective July 1, 1964, followed an earlier recommendation to that body by the Board of Trustees.

The nature of the institution is outlined in Mr. Clemson's will and its acceptance by the legislature.

The will in part reads:

Feeling a great sympathy for the farmers of this State, and the difficulties with which they have to contend in their efforts to establish the business of agriculture upon a proper basis, and believing that there can be no permanent improvement in agriculture without a knowledge of those sciences which pertain particularly thereto, I have determined to devote the bulk of my property to the establishment of an Agricultural College upon the Fort Hill Place. My purpose is to establish an Agricultural College which will afford useful information to the farmers and mechanics; therefore it should afford thorough instruction in agriculture and the natural sciences connected therewith; it should combine, if practicable, physical with intellectual education; and should be a high seminary of learning in which the graduate of the common schools can commence, pursue and finish a course of studies terminating in thorough theoretic and practical instruction in those sciences and arts which bear directly upon agriculture . . . but to always bear in mind that the benefits herein sought to be bestowed are intended to benefit agriculture and mechanical industries. . . . I trust I do not exaggerate the importance of such an institution for developing the material resources of the State, by affording its youth the advantages of scientific culture.

The desire to establish such a school or college, as I have provided for in my said last will and testament, has existed with me for many years past, and many years ago I determined to devote the bulk of my property to the establishment of an Agricultural School or College. To accomplish this purpose is now the one great desire of my life.

This will gave all that part of the Fort Hill Estate inherited by Mrs. Clemson from her mother and the bulk of Mr. Clemson's other real and personal property. The latter amounted to a sum, which,

considering the purchasing power at the time, probably has been only a few times exceeded in a public benefaction in South Carolina.

A Board of Trustees of seven members was provided for: R. W. Simpson, D. K. Norris, M. L. Donaldson, R. E. Bowen, B. R. Tillman, J. E. Wannamaker, and J. E. Bradley, who with those chosen by the General Assembly, should constitute a governing board in the event the State accepted the bequest; but, who, in the event the State declined the bequest, should alone constitute a governing board for a private institution.

These seven trustees, along with other friends of the movement and the agricultural groups in the State, developed and organized a public opinion favorable to the plan.

In November, 1889, the General Assembly of South Carolina accepted the terms of the will and, following the decision of the United States Supreme Court to uphold the will, the State of South Carolina and the full Board of Trustees proceeded to convert the dream of Thomas G. Clemson into the reality of Clemson College.

The College was formally opened in July, 1893, with an enrollment of 446 students. The first graduating exercises were held in December, 1896, with a graduating class numbering 37—15 in the agricultural courses and 22 in the engineering courses.

LOCATION

The University is located on the Fort Hill homestead of John C. Calhoun, in the foothills of the Blue Ridge Mountains. It has an elevation of 800 feet above sea level and commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5,000 feet.

The University is located at Clemson, S. C., on the main line of the Southern Railway. U. S. Highways numbers 76 and 123 pass through Clemson, and daily bus service at regular intervals is available.

ALUMNI RELATIONS

The office of alumni relations coordinates all functions and services of the alumni office. The director of alumni relations is secretary of the Clemson Alumni Association and the Clemson Foundation through election by the governing boards of these two organizations.

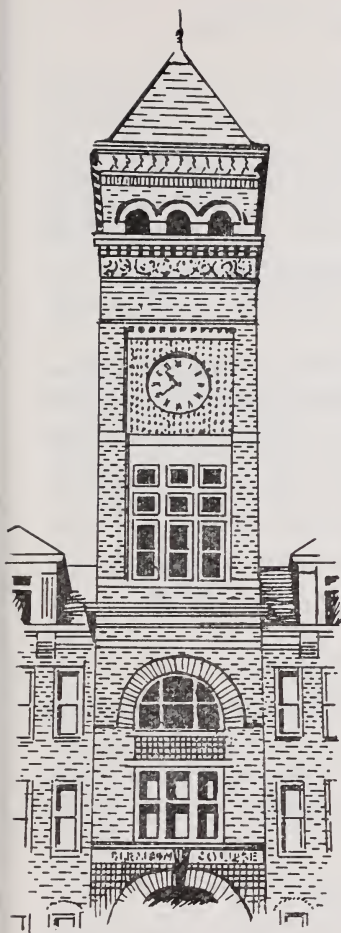
Accurate records of addresses and information concerning alumni are being compiled by this office which also publishes a magazine and newsletter for distribution to the alumni.

The purpose of the Alumni Association is to serve the University and its alumni in every possible way. The Association holds its regular annual meeting at the University each June. Active membership is made up of former Clemson students who participate in the Clemson Alumni Loyalty Fund for the purpose of providing supplementary financial aid to the educational programs of the University.

The Clemson University Foundation was founded by interested members of the Alumni Association to raise an endowment to be used for the benefit of the University, its students, faculty and alumni. Trustees of the Foundation are elected by the Association.

THE J. E. SIRRINE TEXTILE FOUNDATION

Funds in this foundation were contributed by the members of the textile industry in South Carolina and amount to about one million dollars. Income from this fund is administered by the trustees of the J. E. Surrine Textile Foundation. They have used the income to benefit textile teaching and research at Clemson University. Under the present system it is used to (1) supplement university travel funds for faculty members, (2) pay half the salary of two staff members or research or specific assignments, (3) sponsor the school library by paying the salary of the librarian and paying for periodicals and books, (4) provide supplement to the salaries for two major professors, (5) provide four graduate fellowships annually, one of which may be held by a faculty member, (6) sponsor at Clemson annual seminar for South Carolina high school counselors.



STUDENT LIFE AND ACTIVITIES

PART III

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PART III—Student Life and Activities

STUDENT BODY

The students of Clemson University believe that student government is necessary and beneficial and that every student should be represented in this government. All registered undergraduate and graduate students are upon payment of the Student Activities Fee members of the Student Body of Clemson University which in turn is represented by the student government.

Student government is actively sponsored and highly effective at Clemson. The three branches of government are patterned after our federal system; however, there are no political parties within the framework of this student organization. March and April are election months for student-body and class officers except for the freshman class which holds class-officer and Student Senate elections in September. Students interested in self-government are encouraged to participate in this active student organization.

WOMEN'S STUDENT ASSOCIATION

The purpose of the Women's Student Association is to plan and to coordinate activities for women students at Clemson University. They also suggest to the Student Senate of Clemson University the establishment of amendments or repeal of regulations which pertain to women students.

STUDENT PUBLICATIONS

The *Chronicle* is a student variety magazine published four times a year.

The *Taps* is the yearbook published by the students of the University.

The *Tiger* is a weekly paper published by the students of the University.

The *YMCA Handbook* is an annual student handbook published by the YMCA Council.

THE STUDENT CENTER

The student center, located in the large men's dormitory complex, has a student lounge with space for reading and games and two television sets. On the third floor there are meeting rooms and the student chapel. Also in this area are the offices of student publi-

cations, such as *The Tiger*, student newspaper; the *Taps*, annual publication; and Radio Station WSBF. The visitors' lounge and the information center are on the first floor off the loggia. The bookstore, post office, and canteen are located on level below the loggia.

CULTURAL, MUSICAL, THEATRICAL ACTIVITIES

University Concert Series

Each year since 1940 Clemson University has sponsored a concert series. All Clemson students paying full-time student activities fees are admitted to these concerts without charge. Others, including faculty members, may purchase tickets at a modest cost.

The Program of Concerts for 1968-1969 is:

Fiesta Mexicana
Yehudi and Hepzibah Menuhin
Ferrante and Teicher
Detroit Symphony
Janet Baker
Preservation Hall Jazz Band

Architectural Foundation Lectures and Exhibits

The School of Architecture at Clemson is able to present annually an outstanding series of lectures, which are open to all Clemson students, through financial grants from the Clemson Architectural Foundation. The Foundation also presents an annual schedule of at least 12 art exhibits in the Architectural School gallery, which is open to the public weekdays between 9 a. m. and 4:30 p. m.

University Bands

Tiger Band. The Tiger Band and Color Guard, composed of approximately 100 members, participate in football games, pep rallies, functions, and parades throughout the South. This band has appeared in major stadiums in many states, including the Gator, Orange, Sugar, and Bluebonnet Bowls and has performed on national television. The Tiger Band makes several out-of-town trips during the fall season. A smaller "pep band" from its ranks performs at all home basketball games. Members of the Tiger Band report to the campus a few days before registration in the fall for intensive pre-school training.

Concert Band. The Clemson Concert Band is composed of the better musicians on campus. It is formed at the end of the football

season, and gives concerts both on and off the campus, including a tour in the spring. This organization plays music of the great composers in addition to lighter fare.

Army and Air Force ROTC Bands. Talented students, members of the Tiger Band and Concert Band are encouraged to join the ROTC Bands. These bands participate in all major military functions, including ceremonial parades and reviews. Admission is open to all ROTC personnel.

Glee Clubs. There are two choral organizations active on the campus for students interested in formal singing activities. The Clemson Glee Club consists of fifty members and is open to men students. For women students, there is a Women's Glee Club. Throughout the school year, these groups perform for many campus events, including full-length concerts. In the spring, a tour of the state and nearby states is made. Audition is required for membership.

Clemson Players. This is the dramatic club of the University and is open to all students interested in dramatics. Four productions are presented annually.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION

The Young Men's Christian Association at Clemson was organized in 1894, one year after the college was established, and has since then served both the University and the community to promote growth in Christian character through a well-balanced program of religious, social, recreational, and counseling activities. Because the YMCA is not specifically concerned with any particular denominational group, its program cuts across denominational lines and is interested in students of the University regardless of denominational affiliation or if they have no denominational affiliation.

Some of the activities which are promoted by the YMCA are the meditations in the student chapel, meditations on the halls where students live, residence hall forums, participation in the joint sponsorship of the annual campus-wide Religious Emphasis program, deputations to other colleges, universities, and high schools. The YMCA also coordinates the overall religious program of the local church groups.

The YMCA offers space and facilities for such activities as drop-ins, dances, television programs, music concerts, as well as physical activities such as weight lifting, basketball, swimming, table tennis, billiards, and the social and recreational activities involved in the

YMCA's program. A new feature of the YMCA's program is the development of a recreational area across the lake from the campus, comprising twenty-five acres with a nice beach, bathhouse, and a headquarters building for recreation.

The Young Men's Christian Association at the University is under the direction of an Advisory Board composed of members of the faculty, administration, alumni, and members at large. There is a full-time staff of three men and one woman whose efforts are to give direction to the social, recreational, and religious life of students.

The student policy group is the YMCA Cabinet, which meets weekly to evaluate and promote the activities which appeal to students.

RELIGIOUS LIFE

Religious life at Clemson University is coordinated by the University YMCA with the Director of the YMCA serving as coordinator.

The YMCA building provides a meeting place for denominational groups not having a church at Clemson as well as for many inter-denominational groups. The Student Center, which is located in the dormitory, has a chapel which is used by all of the religious groups as scheduled.

The student religious organizations at Clemson offer the student the opportunity to grow spiritually and socially. These organizations are:

- Clemson University Baptist Student Union
- Clemson Canterbury Club (Episcopal)
- Christian Science Organization
- Hillel-Brandeis (Jewish)
- Lutheran Student Association
- Newman Student Association (Catholic)
- Westminster Fellowship (Presbyterian)
- Unitarian Universalist Fellowship
- The Wesley Foundation (Methodist)

CAMPUS LEADERSHIP AND SERVICE

Block "C" Club—The Block "C" Club includes varsity lettermen in baseball, basketball, football, track, cheerleading, swimming, and soccer.

Tiger Brotherhood—A local honorary service fraternity composed of men students from the upper three classes who have demonstrated ability, character and loyalty to Clemson University.

Circle "K" International—International Service Club for college men sponsored by Kiwanis International.

Central Dance Association—The C.D.A. staff is responsible for planning and coordinating major dance weekends at which time name entertainment is brought to the campus.

WSBF—WSBF is an educational radio station managed, maintained and operated by a student staff for the enjoyment of the Clemson student body and the surrounding academic community. The station broadcasts 24 hours a day on both open circuit FM and closed circuit AM from a modern studio in the University Student Center.

NATIONAL HONOR SOCIETIES

Clemson University has chapters of the following members of the Association of College Honor Societies:

Delta Sigma Rho—Tau Kappa Alpha (Forensics)
Phi Eta Sigma (Scholarship—Freshman Men)
Phi Kappa Phi (Scholarship—Senior Men
and Women)
Tau Beta Pi (Engineering—Men)
Tau Sigma Delta (Architecture and Allied Arts—
Men and Women)

Other Honor Societies:

Sigma Xi (Scientific Research—Men and Women)
Xi Sigma Pi (Forestry—Men)

NATIONAL RECOGNITION SOCIETIES

The following national recognition societies have chapters established at Clemson:

Alpha Phi Omega (Campus Service—Men)
Alpha Zeta (Agriculture)
Angel Flight (Air Force—Women)
Arnold Air Society (Air Force—Men)

Blue Key (Scholarship, Leadership, Service—Men)
Iota Lambda Sigma (Industrial Education)
National Block and Bridle (Animal Science)
Pershing Rifles—Company C-4 (Military)
Pershing Rifles—4th Regimental Headquarters
Scabbard and Blade (Military)

DEPARTMENT AND PROFESSIONAL ORGANIZATIONS

Agricultural and Biological Science Council
Agricultural Economics Association
Agricultural Education Club
Alpha Tau Alpha (Agricultural Education)
American Association of Textile Chemists
and Colorists
American Association of Textile Technology
American Ceramic Society
American Chemical Society
American Dairy Science Association
American Institute of Architects
American Institute of Chemical Engineers
American Institute of Industrial Engineers
American Institute of Physics
American Society of Agricultural Engineers
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Metals
Association for Computing Machinery
Calhoun Forensic Society
Calhoun Literary Society
Clemson Counter Guerrilla Platoon
Economics Club
Food Science Club
Clemson Forestry Club
Clemson Pre-Law Society
Delta Sigma Nu (Pre-Med)
Gamma Alpha Mu (English)
Horticulture Club
Institute of Electronic and Electrical Engineers
Iota Mu Sigma (Industrial Management)
Kappa Alpha Sigma (Agronomy)
Keramos (Ceramics)
Light Brigade (Army—Women)

McConnell Society (German)
Mu Beta Psi (Music)
Newtonian Society (Mathematics)
Phi Psi (Textile Arts)
Poultry Science Club
Pre-Veterinary Club
Recreation and Park Administration Club
Sigma Tau Epsilon (Arts and Sciences)
Society for Advancement of Management
Society for American Military Engineers
Young Philosophers' Club

GENERAL ORGANIZATIONS

Amateur Radio Club
Campus Crusade for Christ
Clemson Aero Club
Clemson Bowling Club
Clemson Rifle Club
Clemson Sailing Club
Clemson Scuba Diving Club
Clemson Commuting Coeds Club
Clemson University 4-H Club
Cow College Cloggers
Dixie Sport Parachute Club
Fellowship of Christian Athletes
Fencing Club
Gamma Beta Phi (Beta Club Members)
Greater Luv (Band)
Rockin' Folk (Music)
Sentimental Jazzmen (Music)
Tae Kwon Do Club (Karate)
Weightlifting Club
Young Democrats Club
YMCA Cabinet
YMCA Freshman Council
YMCA Sophomore Council
YMCA Junior Council
YMCA Senior Council
Young Republicans Club

SOCIAL FRATERNITIES AND SORORITIES

Clemson University does not have national fraternities. There are, however, nine local fraternities and three local sororities on the campus. The Interfraternity Council is made up of the president and one representative from each fraternity and serves as the coordinating and governing body of Clemson's social fraternities. The Intersorority Council coordinates the activities of the sororities.

The following local fraternities are represented on the campus:

Alpha Gamma	Numeral Society
Delta Kappa Alpha	Phi Kappa Delta
Delta Phi Kappa	Sigma Alpha Zeta
Kappa Delta Chi	Sigma Kappa Epsilon
Kappa Sigma Nu	

The following local sororities are represented on the campus:

Delta Theta Chi
Omicron Zeta Tau
Sigma Beta Chi

REGIONAL CLUBS

The regional clubs of Clemson University are composed of international clubs, out-of-state clubs and clubs representing the various counties in the state. The regional clubs are made up of students who wish to unite with other students from their own home areas. These clubs include:

Beta Sigma Chi (Charleston County)
Beta Tau Sigma (Horry County)
Chester County Clemson Club
International Student Association
Kappa Delta Kappa (Dillon County)
Colleton County Club
Union County Clemson Club
York County Clemson Club

INTRAMURAL SPORTS

The intramural sports program, financed and directed by the Athletic Department, offers male students the opportunity for competition in four team sports, softball and touch football during the fall semester, basketball and volleyball during the winter-spring semester.

Well advertised meetings are held to organize and detail plans for the upcoming sports season. Equipment is available through a student-attended room on the west side of Tillman Hall.

ATHLETICS

It is the policy of the University to sanction and encourage athletics so long as participation does not interfere with studies and other duties. Football, baseball, basketball, and track are the most popular sports.

Clemson is a member of the Atlantic Coast Conference. In order to participate in intercollegiate athletics, the student must meet the requirements of the Atlantic Coast Conference as well as the requirements of the University.

Upon payment of the student activity fee, a portion of which is allocated to the Athletic Department, a non-transferable card is issued which entitles the student to admittance to all home athletic contests.

No member of an athletic team is eligible for a managerial position in any other branch of sport.

No team is allowed to leave the campus to participate in any match game unless accompanied by the authorized coach or other member of the faculty, who shall be responsible for the conduct of the players while away.

No student who is away without proper authority or without having complied with all the rules or orders issued by the President regarding such matters is eligible to participate in an intercollegiate contest.

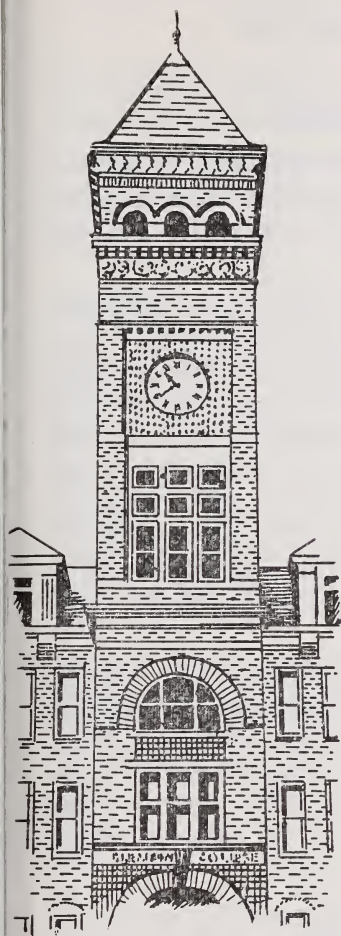
AUTOMOBILE PRIVILEGES AND PARKING REGULATIONS

All motor vehicles owned and operated on the campus by students, faculty, and staff members must be registered with the designated authorities. On registering, each student, faculty, or staff member will be offered a copy of the parking and traffic regulations and will be issued a decal which will indicate the areas in which the car may be parked.

A student's academic work is often adversely affected by his having and using an automobile. Accordingly, the University has adopted a policy that all students classified as freshmen, regardless of the number of years they have attended college, shall not be

permitted to possess or to operate any motor vehicle within a five-mile radius of the center of the campus except on special occasions as designated from time to time by the administration. The penalty for violating the freshman rule is severe. Upon petition by the student to the Vice-President for Student Affairs, exceptions may be made for commuting students living at home and for students physically handicapped.

All upperclassmen and their parents are urged to give serious consideration to whether the student should bring an automobile to the campus, especially if residence is in a dormitory. Academic sophomores must have a grade-point ratio required for their class to graduate in order to possess or to operate an automobile on campus except on special occasions as announced from time to time by the Administration.



SCHOLASTIC REGULATIONS

PART IV

PART IV—Scholastic Regulations

SCHOLASTIC REGULATIONS

Academic Standards. Proper discharge of all duties is required at Clemson University, and a student's first duty is his scholastic work. All students should be thoroughly acquainted with and cognizant of these basic requirements.

The Credit System. The semester hour is the basis of all credits. Generally, one recitation hour or 3 laboratory or shop hours a week for a semester constitute a semester hour. Thus, in Engl 101, English Composition, 3 cr. (3,0), as you will find this subject listed in the Degrees and Curriculums, the student takes 3 semester hours. When he completes this course satisfactorily, he is granted 3 semester credit hours on his record. The notation "3 cr. (3,0)" means that the course carries 3 credits, has 3 clock hours of theory or recitation per week, and no laboratory hours. Ch 101, General Chemistry, 4 cr. (3,3), carries 4 semester hours, has 3 hours of theory, and a 3-hour laboratory period.

The amount of work required for each credit will vary with the student's capabilities. In general, it is anticipated that each semester hour credit will require 3 hours work per week for average students. Thus, a 1(1,0) course would have 1 hour of lecture per week and require 2 hours of outside preparation. A 1(0,3) course would require 3 hours of laboratory work and no time for outside preparation.

Semester Grades. The standing of a student in his work at the end of a semester is based upon daily class work, tests or other work, and the final examinations. Faculty members may excuse from the final examinations all students having the grade of A on the work of the course prior to the final examination, but for all other students written examinations are required in all subjects at the end of each semester, except in certain laboratory or practical courses in which final examinations are not deemed necessary by the department faculty.

Scholastic reports are mailed to parents four times each year, including a preliminary statement of progress near the middle of each semester, and a final report at the end of each semester.

The Grading System. The grading system is as follows:

A—*Excellent.* Indicates that the student is doing work of a very high character. The highest grade given.

B—Good. Indicates work that is definitely above average, though not of the highest quality.

C—Fair. Indicates work of average or medium character.

D—Pass. Indicates work below average and unsatisfactory. The lowest passing grade.

F—Failed. Indicates that a student knows so little of the subject that it must be repeated in order that credit may be received.

I—Incomplete Work. Indicates that a relatively small part of the semester's work remains undone. Grade I is not given a student who has made a grade F on his daily work. Students are allowed 30 days after the beginning of the next semester in which the student is enrolled to remove the incomplete grade unless (1) an extension of time is approved by the instructor concerned and the Director of Admissions and Registration, or (2) within one year of residence after receiving such a grade, a student repeats the conditioned course satisfactorily at Clemson, in which case no credit hours taken shall be recorded for the grade of I. A student who elects to repeat an incomplete course is responsible for notifying the Office of Admissions and Registration of his election during the semester in which the course is taken. This regulation applies only to the first time that a course is repeated.

In order to make up incomplete work, the student must first obtain a permit card from the Office of Admissions and Registration. This card serves as the authority for the removal of the I and also as a form for reporting the final grade.

WP—Withdrew Passing. This grade indicates that the student withdrew from the course while doing satisfactory work. No credit hours taken are recorded for the grade of WP provided that the course is dropped prior to the last three weeks of classes in the semester. Only semester grades shall be given and recorded for courses dropped during the last three weeks.

WF—Withdrew Failing. Indicates that the student withdrew from the course while doing unsatisfactory work. The credit hours of a subject on which the grade of WF is received are counted as credits taken in computing the student's grade-point ratio.

Dropping Class Work. A subject dropped after the first four weeks of class work is recorded as "Withdrew Passing" or "Withdrew Failing" depending upon the student's grade in the course at the time the subject was dropped.

Upon the recommendation of the instructor and the dean concerned, a student's standing will be investigated and he may be

required to drop a subject because of neglect, or lack of application or preparation. No student will be dropped under this rule without approval of the President.

Removal of Failures. A student who has failed (made a grade F) in a subject cannot receive credit for that subject until it has been satisfactorily repeated hour for hour in class, except that in the case of correlated laboratory work, the number of hours to be taken shall be determined by the instructor. Where separate grades for class and laboratory work are given, that part of the subject shall be repeated in which the failure occurs.

Rescheduling Courses Failed. A student who wishes to reschedule a course he has failed must do so within his next year of residence, or, if the course is not offered during this year of residence, he must reschedule the course the first time it is offered thereafter during his attendance at Clemson.

Rescheduling Courses Passed. A student may repeat a course he has passed with a grade lower than B provided he does so within three semesters of residence after the completion of his original enrollment in the course.

Scheduling Remedial Mathematics. Any student who has passed a course in freshman mathematics is ineligible to enroll in Remedial Mathematics.

Withdrawal from the University. A student may withdraw from the University any time before the last three weeks of classes in the semester without having grades recorded. A student enrolled the last three weeks of classes shall have final semester grades recorded.

A student withdrawing from college after preliminary reports are due must be passing a minimum of 12 semester credit hours at the time of withdrawal to qualify for re-enrollment the following semester.

After the first withdrawal from college the student is eligible to continue his enrollment the following semester, provided he meets other applicable regulations. For each succeeding withdrawal, however, the student shall be ineligible to continue his enrollment the following semester unless there are extenuating circumstances approved by the Committee on Admissions.

Grade Points. Four grade points are assigned for each credit hour on which the student receives the grade of A, 3 grade points for each credit hour of grade B, 2 grade points for each credit hour

of grade C, and 1 grade point for each credit hour of grade D. No grade points are assigned for grades F, I, WP, or WF.

Grade-Point Ratio. In calculating a student's grade-point ratio, the total number of grade points accumulated by the student is divided by the total number of credit hours taken by the student at Clemson during the semester, session, or other period for which the ratio is calculated.

Minimum Requirements for Continuing Enrollment. At the end of the academic year in May, all student records are inspected for quality. At that time in order to be able to continue his enrollment, a student who has taken a total of:

- (a) 24 to 59 credit hours at Clemson must have a cumulative grade-point ratio of 1.30 or above.
- (b) 60 to 89 credit hours at Clemson must have a cumulative grade-point ratio of 1.50 or above.
- (c) 90 or more credit hours at Clemson must have a cumulative grade-point ratio of 1.70 or above.

A student completing a regular session has the privilege of continuing his enrollment through the immediately following summer session at Clemson or in Clemson parallel programs in an effort to meet the above requirements.

A student who has taken fewer than 90 credit hours at Clemson and who fails to meet the required grade-point ratio, as indicated in the table above, may apply for readmission after a minimum of one semester has elapsed. A student who has taken 90 or more credit hours and fails to meet the required grade-point ratio is permanently ineligible for readmission. Any exceptions to these minimum requirements for continuing enrollment and readmission must be approved by the Admissions Committee of the University.

Advanced Placement by Examination. In addition to earning credit by the usual method involving classroom attendance, students may receive credit toward their degree by completing a course successfully by examination only. Freshmen interested in exempting some of the elementary courses in this manner should participate in the College Board Advanced Placement Examination program, and have the results of these tests sent to Clemson.

Credit by Examination. Credit may be earned by means of a special examination without the necessity of class attendance subject to the following requirements:

- (1) The applicant must present evidence which would indicate that he has received training or taken work which is approximately

equivalent to that given in the course at Clemson for which an examination is requested and that an examination is warranted.

(2) The applicant must not have previously failed or audited the course at Clemson.

(3) The applicant must apply in writing for the examination and the request must be approved by the Instructor, Head of the Department in which the course is taught, Dean of the College or School in which the course is taught, and the Director of Admissions and Registration.

(4) A grade of not less than C on the examination is necessary in order for the examinee to receive credit on the course. An examinee receiving credit under this provision receives credit for "hours taken," "hours earned," and grade points as well as the course grade.

(5) The time of the examination will be arranged by the student with the instructor concerned, but must be taken within one month after the date of final approval or it will be necessary for the student to initiate another request.

Work Taken at Another Institution. Clemson students may receive credit for work taken at another institution; however, approval of the work should be obtained by the student prior to scheduling the work. Information and forms relative to this approval may be obtained in the Office of Admissions and Registration. By obtaining advance approval the student is assured of receiving proper credit at Clemson provided he passes the work with a grade one letter grade higher than the lowest passing grade.

Classification. All new students are classified as freshmen unless they have attended another college prior to entrance. For those students who have completed college work elsewhere, classification will be based on semester hours accepted at Clemson rather than the amount of work presented.

To be classified as a sophomore, a student must have completed at least 30 semester hours.

To be classified as a junior, a student must have completed at least 60 semester hours.

To be classified as a senior, a student must have completed at least 95 semester hours.

Regular Advancement in Classification. All students are urged to meet the requirements for sophomore classification by the beginning of the second year, for junior classification by the beginning of the third year, and for senior classification by the beginning of

the fourth year. Failure to meet these requirements can jeopardize a student's academic standing with the University as well as jeopardize his deferment under the Selective Service even though he may be otherwise eligible for the deferment.

Course Prerequisites. Prerequisites for individual courses are enumerated under the course listings in the Description of Courses. In addition to these requirements, colleges, schools, and departments may also establish other standards as conditions for enrollment. In the College of Engineering a grade-point ratio of 1.80 or higher is required for registration in all Engineering courses numbered 300 or higher.

Credit Load. Except for an entering freshman, who is restricted to the curriculum requirements of his major course, the credit load for an undergraduate must be approved by his class adviser. The class adviser will approve a credit load deemed in the best interest of the student based on such factors as course requirements, grade-point ratio, participation in other activities, and expected date of graduation.

Since grades are an important factor in determining credit loads, the student should be guided by the following table in presenting his schedule to his class adviser for approval:

<i>Grade-Point Ratio (Semester or Cumulative, Whichever is Higher)</i>	<i>Recommended Maximum Number of Semester Hours to Be Scheduled</i>
0.00 to 0.99.....	14 to 16
1.00 to 1.99.....	16 to 18
2.00 to 2.99.....	18 to 20
3.00 to 4.00.....	20 to 22

When any full-time student reduces his credit load below 12 hours, but is still carrying 9 or more, he may be suspended for at least the remainder of the semester upon recommendation of the Vice-President for Student Affairs and approval of the President. When a student reduces his credit load below 9 hours he shall be suspended for at least the remainder of the semester.

Auditing Policies. Qualified students may audit courses upon the written approval of the professor, head of the department and the dean of the college or school concerned, and registration with the Director of Admissions and Registration. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the in-

structor. A student who has previously audited a course is ineligible for credit by examination.

A full-time undergraduate student with approval may audit courses at no additional charge as long as the student's credit load, including the course audited, is approved by his class adviser.

A graduate student regularly enrolled for a minimum of six semester hours may with approval audit one additional course without charge.

Members of the University teaching staff and the professional staff in research and agricultural extension may with approval audit courses without charge. Other full-time University employees may audit without charge with the additional approval of the employee's immediate supervisor and the Comptroller.

Residence Requirement for Graduation. In order to qualify for an undergraduate degree, a student must spend at least the last year of residence at Clemson and complete at Clemson a minimum of 30 of the last 36 credits presented for the degree.

Honors Program. The Honors Program at Clemson University provides for the fuller development of our most able students. They meet in small classes with outstanding professors and explore the subject matter of a course in greater depth than other students are able to do. The identification and selection of Honor Students begins with their freshman year, and Honors courses are provided at all four levels of undergraduate instruction. To remain in the Honors Program a student must maintain a cumulative grade-point ratio of 3.00.

An Honors Council composed of faculty members from each College and School is responsible for planning and supervising the Honors Program. *The Honors Program: A Student Handbook* is available for those who are interested.

Honors and Awards Day. Each spring an Honors and Awards Day is held for students who qualify for the honor list and for special awards. A cumulative grade-point ratio of 3.00 to 3.49 is required for listing with honor, 3.50 to 3.79 for high honor, and 3.80 or above for inclusion with highest honor.

Honor Graduates. Students who graduate in the Honors Program will have this fact indicated on their diplomas. Other graduates who meet the required qualifications are designated as having graduated with honor. A grade-point ratio of 3.00 to 3.49 is required for graduation with honor, 3.50 to 3.79 for high honor, and 3.80 or above for graduation with highest honor.

Examination on F Received in Last Semester. A candidate for a degree who in the semester immediately prior to graduation fails to graduate because of an F on one course taken in that semester may stand a special examination on the course provided:

(1) That the candidate can furnish evidence of having done satisfactory study for the examination.

(2) That the examination is not given until after the regular degree date.

(3) That the candidate has fulfilled, prior to the due date for candidates' grades, all other requirements for his degree except those which can be fulfilled by passing the examination.

(4) That the candidate by removing the F by examination will finish all requirements for his degree which will be awarded on the next regular date for award of degrees.

Make-ups of I's Received in Last Semester. A candidate for a degree who in the semester immediately prior to graduation receives one or more grades of I shall have an opportunity of removing the unsatisfactory grades provided the final grades are received in the Office of Admissions and Registration by the time grades for candidates for graduation are due.

A candidate who qualifies for graduation under this regulation will be awarded his degree on the regular date for the award of degrees.

Special Graduation Requirements. Beginning in 1968 a cumulative grade-point ratio of 2.00 will be required for graduation. Candidates for degrees are required to apply for their degrees within four weeks following the opening of the final semester or within two weeks following the opening of the summer session prior to the date the degrees are to be awarded. These applications should be filled out in the Office of Admissions and Registration on the regular blanks provided.

All work for a degree must be completed, all financial settlements made, and all government property and library books returned by 5 p.m. on the Tuesday preceding graduation.

A student in line for graduation at the end of this semester who fails to graduate because of an F on one course taken this semester may stand a special examination under certain conditions on the course *after the regular degree date*. A senior who qualifies for graduation under this provision will be awarded his degree *on the next regular date* for the award of degrees. For further information see paragraph Examination on F Received in Last Semester.

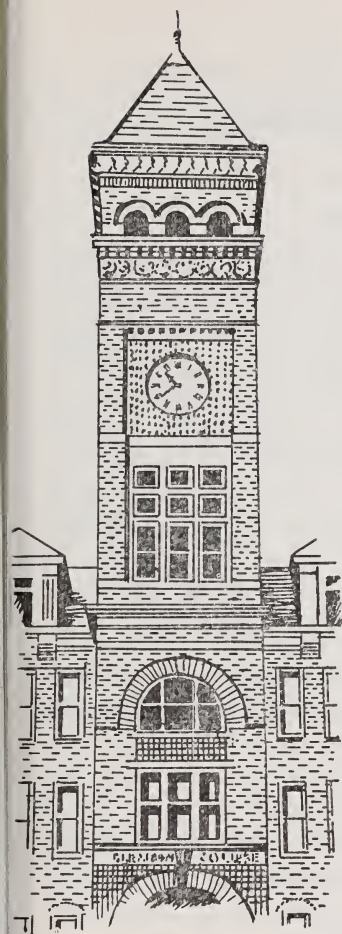
A student in line for graduation at the end of a semester or summer term who meets all requirements for graduation except for a deficiency in his grade-point ratio resulting from a deficiency of not more than six grade points shall have the privilege of making up his deficiency by standing special re-examinations under certain conditions.

The examinations shall be taken after the regular degree date and in courses totaling not more than 6 semester credit hours which were passed during the last year of residence, and only one such examination may be taken on an individual course. When such examinations are taken under the above provision, the credit hours of the course or courses will not be counted as additional credit hours taken. Only the grade points over and above the grade points previously earned in the course may count toward raising the grade-point ratio.

A student who qualifies for graduation under this provision will be awarded his degree on the next regular date for the award of degrees.

If all work toward a degree is not completed within five years after entrance, the student may be required to take additional courses.

DEGREES AND CURRICULUMS



PART V

PART V—Degrees and Curriculums

BACHELORS' DEGREES

The degree of Bachelor of Science is awarded to those students who satisfactorily complete one of the four-year curriculums offered under the Colleges of Agriculture and Biological Sciences and Engineering, and the School of Industrial Management and Textile Science. In the College of Arts and Sciences, the Bachelor of Science degree is awarded to those students completing the requirements in Chemistry, Geology, Mathematics, Medical Technology, Physics, and Pre-Medicine (Pre-Dentistry). The degree of Bachelor of Arts is awarded to those students who satisfactorily complete the curriculum in Arts and Sciences with a major concentration in Chemistry, English, Geology, History, Mathematics, Modern Languages, Physics, Political Science, Psychology, or Sociology.

In the School of Education the Bachelor of Arts degree in Secondary Education is awarded to those completing the requirements for a teaching major in Economics, English, History, Mathematics, Modern Languages, Natural Sciences, Psychology, or Sociology. Students completing the program in Elementary Education receive a Bachelor of Arts Degree in Elementary Education. The Bachelor of Science degree is granted to those who complete the requirements in Agricultural Education, Industrial Education, Recreation and Park Administration, and Science Teaching.

One hundred and forty-four semester credit hours are required for graduates in each of the four-year curriculums with the following exceptions:

—In Forestry, a forestry summer camp is required in addition to the 144-hour requirement.

—In the College of Agriculture and Biological Sciences 134 hours are required to graduate in Biology.

—In the College of Arts and Sciences and the School of Education, requirements for a Bachelor of Arts degree vary from 128 to 135 semester hours depending on the major and minor concentrations, and Bachelor of Science degree requirements vary from 128 to 141 semester hours depending on the major course.

—In the School of Industrial Management and Textile Science requirements for the Bachelor of Arts degree in Economics are 128 to 135 semester hours depending upon the minor concentration.

The School of Architecture offers a six-year professional program embracing two degrees and leading to the professional degree, Master of Architecture. The degree of Bachelor of Arts in Pre-Architecture requiring 135 credit hours is awarded at the end of four years and the first professional degree. Master of Architecture, includes 68 additional units for a total of 203.

The Bachelor of Science in Building Construction is a four-year program requiring 143 credit hours.

In the College of Engineering a Fifth-Year Professional Program is also offered in Civil Engineering. Graduates of this program receive the degree of Bachelor of Civil Engineering. To enter this program one must already hold the Bachelor of Science degree.

In addition to the courses prescribed in the various curriculums, each student must complete the elective credits as listed in the curriculums. Students selected for advanced ROTC may substitute courses in aerospace studies or military science for six semester credits of these electives.

ASSOCIATE DEGREE

The College of Arts and Sciences offers an Associate in Arts degree in Nursing. This normally requires 2 years plus a full semester, with a minimum of 71 semester credit hours.

GRADUATE DEGREES

The degrees of Doctor of Philosophy, Master of Arts, Master of Science, Master of Agricultural Education, Master of Architecture, Master of Education, and Master of Industrial Education are awarded to those students who satisfactorily complete prescribed graduate programs.

For further information concerning advanced degrees see *The Graduate Bulletin*, which may be obtained from the Offices of Admissions and Registration or the Dean of the Graduate School.

UNDERGRADUATE CURRICULUMS

Thirty-eight undergraduate curriculums are offered under the Colleges of Agriculture and Biological Sciences, Arts and Sciences, Engineering, and the Schools of Architecture, Education, and In-

dustrial Management and Textile Science. The curriculums under each college and school are listed below:

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES	Physics
Agricultural Economics	Pre-Medicine or Pre-Dentistry
†Agricultural Education	Pre-Pharmacy
*Agricultural Engineering	SCHOOL OF EDUCATION
Agronomy	†Agricultural Education
Animal Science	Elementary Education
Biology	Industrial Education
Dairy Science	Recreation and Park Administration
Entomology	Science Teaching
Food Science	Secondary Education
Forestry	
Horticulture	
Poultry Science	COLLEGE OF ENGINEERING
Pre-Veterinary	*Agricultural Engineering
	Ceramic Engineering
SCHOOL OF ARCHITECTURE	Chemical Engineering
Building Construction	Civil Engineering
Pre-Architecture	Electrical Engineering
	Mechanical Engineering
COLLEGE OF ARTS AND SCIENCES	
Arts and Sciences	SCHOOL OF INDUSTRIAL MANAGE- MENT AND TEXTILE SCIENCE
Chemistry	Economics
Geology	Industrial Management
Mathematics	Textile Chemistry
Medical Technology	Textiles
Nursing	

In the curriculums which follow are given the official title and number of the course, the descriptive title, the number of semester hours credit, and in parentheses the number of hours per week in class and laboratory, respectively.

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

Modern agriculture is the science, business, and art of producing, processing, and distributing plant and animal products, including those aspects of economics and human relations connected with

* Jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

† Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.

these activities. Agriculture is a unique area in education because it applies the basic sciences to biological material for economic implications.

Today's agriculture includes much more than farm production. About 6 million people provide supplies and services for farmers and 10 million process and distribute farm products. These two segments together with farm production, which employs 6 million workers, provide jobs somewhere in agriculture for 22 million Americans—approximately one-third of all jobs.

Thousands of agricultural graduates are needed each year in this basic industry. Our land-grant colleges and universities are now graduating about 6,000 students in agricultural majors each year—less than one-half of the total number needed to fill jobs available each year—jobs important to every person, jobs with futures, jobs with challenge, jobs with personal and financial rewards.

Biology is the science of life—both plant and animal, including man. It is one of the most dynamic areas of human knowledge—a science with a future. The National Science Foundation has estimated that we will need 65,000 biological scientists in 1970, an increase of 73 per cent over the number employed in 1959. Most of the jobs are in educational institutions, federal, state and local governments and private industries.

The College of Agriculture and Biological Sciences is composed of three main divisions: Resident Instruction, Research (Agricultural Experiment Station), and Extension (Agricultural Extension Service). Organized under the Division of Resident Instruction are curriculums in Agricultural Economics, Agricultural Education,† Agricultural Engineering,* Agronomy, Animal Science, Biology, Dairy Science, Entomology, Food Science, Forestry, Horticulture, Poultry Science, and Pre-Veterinary Medicine.

The College of Agriculture and Biological Sciences continuously modernizes its curriculums. In this connection, students in many of the curriculums now have the opportunity to specialize by choosing an option in *Science*, *Business*, or *Production Technology*.

Science Option—This option emphasizes the basic sciences that prepare students to contribute to the advancement of knowledge in their respective fields. It is designed for students whose anticipated field of work requires considerable scientific training, usually including graduate studies. Employment opportunities include research with State Agricultural Experiment Stations, the United

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† Jointly administered by the School of Education and the College of Agricultural and Biological Sciences.

States Department of Agriculture, and industrial and commercial organizations; and teaching in colleges of agriculture, and other educational work with Federal, State and industrial organizations.

Business Option—This option emphasizes principles and practices of business management as applied to businesses and industries associated with agriculture. It is designed for students who plan to work with one of the many businesses and industries that provide supplies and services for the farmer, and process and distribute farm products. Employment opportunities include work related to meat and poultry processing, sales and service of farm machinery, manufacturing and sales of fertilizers and pesticides, dairy and food processing, grain and seed processing, feed manufacturing, banking and credit, insurance, farm management, land appraising, and the marketing of agricultural commodities.

Production Technology Option—This option emphasizes the application of scientific principles to agricultural production. It is designed for students whose anticipated field of work requires broad general training in scientific and practical agriculture. Employment opportunities include general and specialized farming; agricultural extension services; teaching vocational agriculture; conservation of natural resources; agricultural communication; and agricultural services of the United States Department of Agriculture, State Departments of Agriculture, and private enterprises.

To illustrate further the types of work in which graduates engage, a few of the many occupations of agricultural graduates are listed under each curriculum.

BASIC CURRICULUM

Required of all students planning to major in Agricultural Economics, Agricultural Education,† Agronomy, Animal Science, Dairy Science, Entomology, Horticulture or Poultry Science

First Semester		FRESHMAN YEAR	Second Semester ‡	
AgBio 101 Intro. to Agric. and Biol. Sci.	1 (1,0)		Agron 102 Crop Science	3 (2,3)
Bot 101 Gen. Botany	4 (3,3)		An Sc 102 Animal Science ^o ..	2 (2,0)
Ch 101 Gen. Chemistry	4 (3,3)		An Sc 104 Animal Science Lab. ^o	1 (0,3)
Engl 101 English Composition ...	3 (3,0)		Ch 102 Gen. Chemistry	4 (3,3)
Math 103 College Algebra	2 (3,0)		Engl 102 English Composition ...	3 (3,0)
Math 104 Trigonometry	2 (3,0)		Zool 101 Gen. Zoology	3 (3,0)
AS or MS—Basic	1 (2,1)		Zool 103 Gen. Zoology Lab.	1 (0,3)
			AS or MS—Basic	1 (2,1)
	17			18

^o Students planning to major in Ornamental Horticulture may substitute EG 101 for An Sc 102 and 104.

† Students planning to choose the Science Option should schedule Math 106 in the second semester of the freshman year.

‡ Jointly administered by the College of Agriculture and Biological Sciences and the School of Education.

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Currently the curriculum in Agricultural Economics and Rural Sociology provides for two options—*Science* and *Business*. In general the *Business* option is the equivalent of a major in Agricultural Business Administration with a strong background in agricultural and biological science. Those who select this option would not normally expect to pursue their formal training much beyond the bachelor's degree. The *Science* option on the other hand has been designed primarily for those who expect to become professional agricultural economists or rural sociologists and whose plans for education would likely include some work at the graduate level.

Employment opportunities open to graduates with degrees in Agricultural Economics are many. They include research and teaching in institutions of higher learning; sales and promotional work for a variety of businesses; management positions in the farm loan departments of private banks or with cooperative farm credit agencies; public relations activities for various firms; market managers and directors; county agents; representatives of government agencies serving agriculture; and operators of numerous enterprises.

AGRICULTURAL ECONOMICS CURRICULUM

SCIENCE OPTION

(See page 128 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Acct 201 Prin. of Accounting . . .	3 (3,0)	Ag Ec 202 Agric. Economics . . .	3 (3,0)
Agron 202 Soils	3 (2,3)	Econ 202 Principles of Econ. . .	3 (3,0)
Econ 201 Principles of Econ. . .	3 (3,0)	Engl 204 Survey of Engl. and	
Engl 203 Survey of Engl. Lit. . .	3 (3,0)	Amer. Lit.	3 (3,0)
Math 106 Anal. Geom., Cal. I . .	4 (4,0)	Math 205 Anal. Geom., Cal. II .	4 (4,0)
AS or MS—Basic.	1 (2,1)	Phys 201 Gen. Physics	3 (3,0)
		Phys 203 Gen. Physics Lab. . .	1 (0,3)
		AS or MS—Basic.	1 (2,1)

17

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JUNIOR YEAR

Ag Ec 309 Introd. to Marketing . .	3 (3,0)	Ag Ec 352 Public Finance	3 (3,0)
Ag Ec 460 Agric. Finance	2 (2,0)	Hist 301 U. S. Since 1865	3 (3,0)
Econ 302 Money and Banking . .	3 (3,0)	RS 301 Rural Sociology	3 (3,0)
Econ 314 Intermed. Econ. Theory	3 (3,0)	Economics Elective†	3
Pol Sc 301 Am. Gov. and		Approved Electives*	7
Pol. Par.	3 (3,0)		
Psych 201 Gen. Psychology	3 (3,0)		

17

19

SENIOR YEAR

Ag Ec 405 Seminar	1 (1,0)	Ag Ec 406 Seminar	1 (1,0)
Engl 304 Advanced Comp.	3 (3,0)	Ag Ec 452 Agric. Policy	3 (3,0)
Ex St 401 Introd. Statistics . . .	3 (2,3)	Ag Ec 456 Prices	3 (3,0)
Gen 302 Genetics	3 (2,3)	Engl 301 Public Speaking . . .	3 (3,0)
Economics Elective†	3	Ex St 462 Stat. Appl. to Econ. .	3 (3,0)
Approved Electives*	6	Approved Electives*	6

19

19

* Of the 19 hours of approved electives a minimum of 9 hours must be taken in other departments in the College of Agriculture and Biological Sciences.

† To be selected from the following courses: Econ 403, Econ 404, Econ 407, Econ 412, Econ 416, For 304, Hist 306, IM 404.

BUSINESS OPTION

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Agron 202 Soils	3 (2,3)	Acct 201 Prin. of Accounting	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Ag Ec 202 Agric. Economics	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
IM 201 Intro. to Ind. Mgt.	3 (3,0)	Pol Sc 301 Am. Gov. and Pol. Par. .	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Phys 201 Gen. Physics	3 (3,0)
AS or MS—Basic	1 (2,1)	Phys 203 Gen. Physics Lab.	1 (0,3)
	17	AS or MS—Basic	1 (2,1)
			17

JUNIOR YEAR

Ag Ec 309 Intro. to Marketing	3 (3,0)	Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Ag Ec 351 Advertising and Merch. . .	3 (3,0)	Ag Ec 352 Public Finance	3 (3,0)
Econ 314 Intermed. Econ. Theory . .	3 (3,0)	RS 301 Rural Sociology	3 (3,0)
Hist 301 U. S. Since 1865	3 (3,0)	Business Elective†	3
Psych 201 Gen. Psychology	3 (3,0)	Approved Electives†	7
Approved Electives†	4		
	19		19

SENIOR YEAR

Ag Ec 405 Seminar	1 (1,0)	Ag Ec 406 Seminar	1 (1,0)
Ag Ec 451 Agric. Cooperation	2 (2,0)	Ag Ec 452 Agric. Policy	3 (3,0)
Engl 304 Advanced Comp.	3 (3,0)	Ag Ec 456 Prices	3 (3,0)
Ex St 401 Intro. Statistics	3 (2,3)	Ag Ec 460 Agric. Finance	2 (2,0)
Gen 302 Genetics	3 (2,3)	Engl 301 Public Speaking	3 (3,0)
Business Elective†	3	Ex St 462 Stat. Appl. to Econ. . . .	3 (3,0)
Approved Electives†	3	Approved Electives†	4
	18		19

† Of the 18 hours of approved electives a minimum of 9 hours must be taken in other departments in the College of Agriculture and Biological Sciences.

† To be selected from the following courses: Acct 202, Econ 301, Econ 302, IM 312, Acct 303, IM 304, IM 307, IM 402, IM 415.

AGRICULTURAL EDUCATION ‡

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations and agricultural extension; farming, soil conservation and other governmental work; business and industry.

The curriculum provides for a broad training in agriculture as well as general and professional education including student teaching.

AGRICULTURAL EDUCATION CURRICULUM

(See page 128 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ag Ed 201 Intro. to Ag. Ed.	3 (2,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Agron 202 Soils	3 (2,3)	AgE 205 Farm Shop	3 (2,3)
Econ 201 Principles of Econ.	3 (3,0)	AgE 206 Agric. Mechanization . . .	3 (2,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Hort 201 Gen. Horticulture	3 (2,3)
Phys 203 Gen. Physics Lab.	1 (0,3)	PS 201 Intro. to Poultry Sc.	3 (2,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		19

‡ Jointly administered by the College of Agriculture and Biological Sciences and the School of Education.

JUNIOR YEAR

First Semester

AgE 301 Soil and Water Conser.	3 (2,3)
Dy Sc 201 Introd. Dairying	3 (2,3)
Engl 301 Public Speaking	3 (3,0)
Hort 464 Food Preservation*	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Elective	3

18

Second Semester

Ag Ec 452 Agric. Policy	3 (3,0)
An Sc 301 Feeds and Feeding	3 (3,0)
Ed 302 Educ. Psychology	3 (3,0)
For 307 Elem. of Forestry	3 (2,3)
RS 301 Rural Sociology	3 (3,0)
Approved Elective	3

18

SENIOR YEAR

Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Agron 301 Fertilizers	3 (3,0)
Bot 401 Plant Pathology	3 (2,3)
Ent 301 Elem. and Econ. Ent.	3 (2,3)
Hort 407 Landscape Design	3 (2,3)
Approved Elective	4

19

Ag Ed 401 Methods in Ag. Educ.	3 (2,3)
Ag Ed 406 Directed Teaching	6 (0,18)
Ag Ed 422 Introd. to Adult Educ.	3 (2,3)
Ed 458 Health Educ.†	3 (3,0)
Mus 310 Music Appreciation†	3 (3,0)

18

* Hort 302 or 305 or 352 or 451 or 456 may be substituted upon approval of the class adviser.

† Students electing Advanced AS or MS must schedule Ed 458 or Mus 310 prior to the second semester of the senior year.

AGRONOMY

The curriculum in Agronomy deals with plant and soil science. Trained agronomists may choose their life work from many different fields that relate to soils and plants. The work they choose may range from the highly applied (farming) to the highly abstract (basic research). Between these extremes are the college and high school teaching, the extension service, and soil conservation work. Fertilizer companies and manufacturers of weed control chemicals conduct research, create sales, and perform technical services that employ agronomists. Large seed companies are looking for plant breeders and other men trained in agronomy to direct their production programs. Recently, opportunities have intensified for soil scientists to make land appraisals for tax commissions and others. Agronomists hold many important administrative positions. Some are doing technical work with Foundations in Asia and South America.

Options may be chosen in either *Science*, *Business* or *Production Technology*.

AGRONOMY CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

First Semester

Ch 223 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

16

Second Semester

Agron 202 Soils	3 (2,3)
Ch 224 Org. Chem.	3 (3,0)
Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)
Phys 202 Gen. Physics	3 (3,0)
Phys 204 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

19

JUNIOR YEAR

First Semester

Bact 301 Gen. Bacteriology	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Gen 302 Genetics	3 (2,3)
Math 206 Anal. Geom., Cal. III.	4 (4,0)
Social Science Elective*	3

17

Second Semester

Bot 352 Plant Physiology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Approved Electives†	12

19

SENIOR YEAR

Agron 455 Seminar	1 (1,0)
Bot 401 Plant Pathology	3 (2,3)
Ex St 401 Introd. Statistics	3 (2,3)
Approved Electives†	12

19

Agron 405 Plant Breeding	3 (2,3)
or Bact 410 Soil Microbiology	3 (2,3)
Agron 456 Seminar	1 (1,0)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Electives†	12

19

* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

† At least nine credits must be taken from the following courses: Agron 301, Agron 308, Agron 310, Agron 312, Agron 403, Agron 407, Agron 410, Agron 411, Agron 412, Agron 452.

BUSINESS OPTION

SOPHOMORE YEAR

First Semester

Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
IM 201 Introd. to Ind. Mgt.	3 (3,0)
Hort Elective	3
AS or MS—Basic	1 (2,1)

17

Second Semester

Acct 201 Prin. of Accounting	3 (3,0)
Ag Ec 202 Agric. Economics	3 (3,0)
Agron 202 Soils	3 (2,3)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

17

JUNIOR YEAR

Agron 301 Fertilizers	3 (3,0)
Agron 410 Cotton and Other Fiber Crops	2 (2,0)
or Agron 411 Grain Crops	2 (2,0)
Bact 301 Gen. Bacteriology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Gen 302 Genetics	3 (2,3)
Hort Elective†	3
Social Science Elective*	3

21

Ag Ec 309 Introd. to Mktg.	3 (3,0)
Agron 308 Soil and Plant Anal.	3 (1,6)
Agron 310 Forage & Pasture Crops	3 (3,0)
Agron 312 Forage Crops Lab.	1 (0,3)
Agron 412 Tobacco and Spec. Use Crops	2 (2,0)
Bot 352 Plant Physiology	4 (3,3)
Approved Electives†	3

19

SENIOR YEAR

Agron 403 Soil Classification	2 (1,3)
Agron 407 Prin. of Weed Control	3 (2,3)
Agron 411 Grain Crops	2 (2,0)
or Agron 410 Cotton and Other Fiber Crops	2 (2,0)
Agron 455 Seminar	1 (1,0)
Bot 401 Plant Pathology	3 (2,3)
Approved Elective†	6

17

Agron 405 Plant Breeding	3 (2,3)
Agron 452 Soil Fert. and Mgt.	2 (2,0)
Agron 456 Seminar	1 (1,0)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Electives†	9

18

* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

† To be selected from the following: Hort 303, Hort 412, Hort 456.

† At least three of the following courses must be completed: Ag Ec 351, Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR

First Semester		Second Semester	
Ch 220 Elem. Org. Chem.	4 (3,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	AgE 206 Agric. Mechanization ...	3 (2,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Agron 202 Soils	3 (2,3)
Phys 201 Gen. Physics	3 (3,0)	Engl 204 Survey of Engl. and	
Phys 203 Gen. Physics Lab.	1 (0,3)	Amer. Lit.	3 (3,0)
AS or MS—Basic	1 (2,1)	Ent 301 Elem. and Econ. Ent. ...	3 (2,3)
Approved Elective	3	AS or MS—Basic	1 (2,1)
	18	Approved Elective	3
			19

JUNIOR YEAR

Ag Ec 302 Agric. Firm Mgt.	3 (2,3)	Agron 308 Soil and Plant Anal. ...	3 (1,6)
AgE 301 Soil Conservation	3 (2,3)	Agron 310 Forage & Pasture Crops	3 (3,0)
Agron 301 Fertilizers	3 (3,0)	Agron 312 Forage Crop Lab. ...	1 (0,3)
Agron 410 Cotton and		Agron 412 Tobacco and	
Other Fiber Crops	2 (2,0)	Spec. Use Crops	2 (2,0)
or Agron 411 Grain Crops	2 (2,0)	Engl 301 Public Speaking	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)	Gen 302 Genetics	3 (2,3)
Approved Elective	3	Hort Elective†	3
Social Science Elective*	3		18
	21		

SENIOR YEAR

Agron 403 Soil Classification	2 (1,3)	Agron 405 Plant Breeding	3 (2,3)
Agron 407 Prin. of Weed Control	3 (2,3)	Agron 452 Soil Fert. and Mgt. ...	2 (2,0)
Agron 411 Grain Crops	2 (2,0)	Agron 456 Seminar	1 (1,0)
or Agron 410 Cotton and		Pol Sc 301 Am. Gov. and	
Other Fiber Crops	2 (2,0)	Pol. Par.	3 (3,0)
Agron 455 Seminar	1 (1,0)	Approved Electives	6
Bot 352 Plant Physiology	4 (3,3)		15
Bot 401 Plant Pathology	3 (2,3)		
Approved Electives	3		
	18		

* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

† To be selected from the following: Hort 303, Hort 412, Hort 456.

ANIMAL SCIENCE

The Animal Science Department emphasizes subject matter dealing with the application of scientific principles to livestock production and processing.

Occupations for Animal Science graduates include livestock farming; cattle, swine and sheep breeding; extension livestock specialists; feed specialists; county agents; teaching and research in animal industry; positions with meat packing companies; feed dealers; freezer locker operators; livestock dealers; and livestock commission brokers.

The Animal Science Department offers options in *Science*, *Business* and *Production Technology*.

ANIMAL SCIENCE CURRICULUM(See page 128 for *Freshman Year*)**SCIENCE OPTION****SOPHOMORE YEAR**

<i>First Semester</i>		<i>Second Semester</i>	
Ch 223 Org. Chem.	3 (3,0)	Agron 202 Soils	3 (2,3)
Ch 227 Org. Chem. Lab.	1 (0,3)	Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and	
Math 106 Anal. Geom., Cal. I	4 (4,0)	Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Phys 202 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
		Chemistry Elective*	4 or 5
	16		18 or 19

JUNIOR YEAR

An Sc 301 Feeds and Feeding	3 (3,0)	An Sc 303 Feeds & Feeding Lab.	1 (0,3)
An Sc 353 Meats	2 (2,0)	An Sc 306 Livestock Sel. & Eval.	2 (1,3)
An Sc 355 Meats Lab.	1 (0,3)	Bact 301 Gen. Bacteriology	4 (3,3)
Zool 307 Animal Anat. and Phys.	3 (2,3)	Engl 301 Public Speaking	3 (3,0)
Social Science Elective†	3	Gen 302 Genetics	3 (2,3)
Approved Electives†	7	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
	19	Approved Elective†	3
			19

SENIOR YEAR

Dy Sc 403 Animal Nutrition	3 (3,0)	An Sc 406 Seminar	2 (2,0)
Ex St 401 Introd. Statistics	3 (2,3)	An Sc 452 Animal Breeding	3 (3,0)
Approved Electives†	13	Approved Elective†	13 or 12
	19		18 or 17

* Ch 310, Ch 313 and Ch 317, or Ch 224 and Ch 228.

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

‡ Two of the following courses must be completed: An Sc 401, 407, or 408. One of the following lab courses must also be completed: An Sc 403, 409, or 410. The lab taken must correspond to one of the theory courses selected.

BUSINESS OPTION**SOPHOMORE YEAR**

<i>First Semester</i>		<i>Second Semester</i>	
Agron 202 Soils	3 (2,3)	Acct 201 Prin. of Accounting	3 (3,0)
Ch 220 Elem. Org. Chem.	4 (3,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Engl 204 Survey of Engl. and	
Engl 203 Survey of Engl. Lit.	3 (3,0)	Amer. Lit.	3 (3,0)
IM 201 Introd. to Ind. Mgt.	3 (3,0)	Phys 201 Gen. Physics	3 (3,0)
AS or MS—Basic	1 (2,1)	Phys 203 Gen. Physics Lab.	1 (0,3)
	17	AS or MS—Basic	1 (2,1)
		Approved Electives*	4
			18

JUNIOR YEAR

An Sc 301 Feeds and Feeding	3 (3,0)	Ag Ec 309 Introd. to Marketing	3 (3,0)
An Sc 353 Meats	2 (2,0)	An Sc 303 Feeds and Feeding Lab.	1 (0,3)
An Sc 355 Meats Lab.	1 (0,3)	An Sc 306 Livestock Sel. & Eval.	2 (1,3)
Engl 301 Public Speaking	3 (3,0)	Bact 301 Gen. Bacteriology	4 (3,3)
Gen 302 Genetics	3 (2,3)	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Electives*	7	Social Science Elective†	3 (3,0)
	19	Approved Elective*	3
			19

* Two of the following courses must be completed: An Sc 401, 407, or 408. The lab courses corresponding to the theory courses must also be completed.

At least three of the following courses must be completed: Ag Ec 351, Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 302, IM 307, IM 312.

At least three of the following courses must be completed: Agron 301, Agron 310, An Sc 305, Bact 401, Dy Sc 305, Dy Sc 452, Hort 464, PS 451, PS 355, PS 458.

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

First Semester		SENIOR YEAR	Second Semester	
Dy Sc 403 Animal Nutrition	3 (3,0)		An Sc 406 Seminar	2 (2,0)
Approved Electives*	15		An Sc 452 Animal Breeding	3 (3,0)
	18		Approved Electives*	13
				18

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR			
Ch 220 Elem. Org. Chem.	4 (3,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Agron 202 Soils	3 (2,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Zool 307 Animal Anat. & Phys.	3 (2,3)	Phys 201 Gen. Physics	3 (3,0)
AS or MS—Basic	1 (2,1)	Phys 203 Gen. Physics Lab.	1 (0,3)
Approved Elective	3	AS or MS—Basic	1 (2,1)
	17	Approved Elective	3
			17

JUNIOR YEAR			
Agron 301 Fertilizers	3 (3,0)	Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
or Agron 310 Forage and Pasture Crops	3 (3,0)	An Sc 303 Feeds and Feeding Lab.	1 (0,3)
An Sc 301 Feeds and Feeding	3 (3,0)	An Sc 306 Livestock Sel. & Eval.	2 (1,3)
An Sc 353 Meats	2 (2,0)	Bact 301 Gen. Bacteriology	4 (3,3)
An Sc 355 Meats Lab.	1 (0,3)	Engl 301 Public Speaking	3 (3,0)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)	Gen 302 Genetics	3 (2,3)
Social Science Elective*	3	Approved Elective	3
Approved Elective	4		19
	19		

SENIOR YEAR			
An Sc 401 Beef Production	3 (3,0)	An Sc 406 Seminar	2 (2,0)
An Sc 403 Beef Production Lab.	1 (0,3)	An Sc 408 Pork Production	3 (3,0)
An Sc 407 Horse & Sheep Prod.	2 (2,0)	An Sc 410 Pork Production Lab.	1 (0,3)
An Sc 409 Horse & Sheep Prod. Lab.	1 (0,3)	An Sc 452 Animal Breeding	3 (3,0)
Dy Sc 403 Animal Nutrition	3 (3,0)	Approved Electives	9
Dy Sc 453 Animal Reprod.	3 (3,0)		18
Ent 301 Elem. and Econ. Ent.	3 (2,3)		
Approved Elective	3		
	19		

* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

DAIRY SCIENCE

Selected studies of fundamental and technical nature, superimposed upon the required basic science core of the Dairy Science curriculum, enable students to acquire the perspective, understanding, and proficiency necessary to enter a demanding, rewarding, and respected industry. The production and processing areas in the Dairy Science curriculum emphasize understanding based on scientific principles, explaining why the tenets are true. Somewhat less emphasis is given to phases of technology concerned with how to do things, but these areas are given good coverage.

Required and suggested studies in Arts and Sciences plus courses selected by the student in areas of personal interest complete the educational program designed to fit the graduate for his total lifework.

Occupational opportunities for dairy science graduates include management of production and processing facilities, teaching research, and extension work, quality control work for processing units and production organizations, public health service, industrial promotion and public relations work in both production and processing fields, dairy and food products engineering, special services, and educational work in non-institutional fields. Special service opportunities are available in areas of state and national breed association work, breeding organizations, industrial supplies, production and processing equipment and supplies. Opportunities in educational activities not connected with schools and colleges include positions with industrial associations, state and federal services, and federal programs with foreign assignments.

The Dairy Science curriculum has three self-contained options—*Science, Business, and Production Technology.*

DAIRY SCIENCE CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 223 Org. Chem.	3 (3,0)	Agron 202 Soils	3 (2,3)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 224 Org. Chem.	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Dy Sc 201 Introd. Dairying	3 (2,3)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Engl 204 Survey of Engl. and	
Phys 201 Gen. Physics	3 (3,0)	Amer. Lit.	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 202 Gen. Physics	3 (3,0)
AS or MS—Basic.	1 (2,1)	Phys 204 Gen. Physics Lab.	1 (0,3)
	19	AS or MS—Basic.	1 (2,1)
			18

JUNIOR YEAR

Bact 301 Gen. Bacteriology.	4 (3,3)	An Sc 301 Feeds and Feeding ...	3 (3,0)
Dy Sc 305 Dairy Tech. & Engr.	3 (2,3)	Ch 310 Elem. Biochemistry	4 (3,3)
Dy Sc 307 Market Milk	3 (2,3)	Dy Sc 304 Sensory Eval. Tech. ...	2 (1,3)
Engl 301 Public Speaking	3 (3,0)	or Dy Sc 310 D. Cattle Selection	1 (0,3)
Social Science Elective†	3 (3,0)	Dy Sc 306 Ch. & Phys. Nat. of Milk	3 (2,3)
Approved Elective	3	Gen 302 Genetics	3 (2,3)
	19	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
			18 or 17

SENIOR YEAR

Dy Sc 403 Animal Nutrition	3 (3,0)	An Sc 452 Animal Breeding	3 (3,0)
Dy Sc 409 Dairy Seminar	2 (2,0)	or Dy Sc 404 Dairy Plant Mgt.	3 (2,3)
Dy Sc 453 Animal Reprod.†	3 (3,0)	Bact 402 Dairy Bacteriology	3 (2,3)
Dy Sc 455 Animal Reprod. Lab.†	1 (0,3)	Dy Sc 410 Dairy Seminar	2 (2,0)
Zool 307 Animal Anat. & Phys. ...	3 (2,3)	Dy Sc 452 Dairy Cattle Feed.	
Approved Elective	6	& Mgt.	3 (2,3)
	18	Ex St 401 Introd. Statistics	3 (2,3)
		Approved Electives	3 — 4
			17 — 18

† Dy Sc 402 may be substituted for Dy Sc 453 and 455.

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

BUSINESS OPTION

SOPHOMORE YEAR

First Semester

Acct 201 Prin. of Accounting	3 (3,0)
Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

18

Second Semester

Ag Ec 202 Agric. Economics	3 (3,0)
Agron 202 Soils	3 (2,3)
Dy Sc 201 Introd. Dairying	3 (2,3)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
IM 201 Introd. to Indust. Mgt. . . .	3 (3,0)
AS or MS—Basic.	1 (2,1)
Approved Electives§	3

19

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)
Dy Sc 305 Dairy Tech. & Engr. . . .	3 (2,3)
Dy Sc 307 Market Milk	3 (2,3)
Engl 301 Public Speaking	3 (3,0)
Social Science Elective†	3
Approved Electives§	3

19

Ag Ec 309 Introd. to Marketing . .	3 (3,0)
An Sc 301 Feeds and Feeding . . .	3 (3,0)
Dy Sc 304 Sensory Eval. Tech. . . .	2 (1,3)
or Dy Sc 310 D. Cattle Selection . .	1 (0,3)
Dy Sc 306 Ch. & Phys. Nat. of Milk .	3 (2,3)
Gen 302 Genetics	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par. .	3 (3,0)

17 or 16

SENIOR YEAR

Dy Sc 403 Animal Nutrition	3 (3,0)
Dy Sc 409 Dairy Seminar	2 (2,0)
Dy Sc 453 Animal Reprod.†	3 (3,0)
Dy Sc 455 Animal Reprod. Lab.† . .	1 (0,3)
Approved Electives§	9

18

An Sc 452 Animal Breeding	3 (3,0)
or Dy Sc 404 Dairy Plant Mgt. . . .	3 (2,3)
Bact 402 Dairy Bacteriology	3 (2,3)
Dy Sc 410 Dairy Seminar	2 (2,0)
Dy Sc 452 Dairy Cattle Feeding and Management	3 (2,3)
Approved Electives§	7 — 8

18 or 19

† Dy Sc 402 may be substituted for Dy Sc 453 and 455.

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

§ At least three of the following courses must be completed: Ag Ec 351, Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR

First Semester

Ch 220 Elem. Org. Chem.	4 (3,3)
Dy Sc 201 Introd. Dairying	3 (2,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

18

Second Semester

Ag Ec 202 Agric. Economics	3 (3,0)
Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Agron 202 Soils	3 (2,3)
Agron 310 Forage & Pasture Crops .	3 (3,0)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
AS or MS—Basic.	1 (2,1)
Approved Elective	3

19

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)
Dy Sc 305 Dairy Tech. & Engr. . . .	3 (2,3)
Dy Sc 307 Market Milk	3 (2,3)
Engl 301 Public Speaking	3 (3,0)
Social Science Elective†	3
Approved Elective	3

19

An Sc 301 Feeds and Feeding	3 (3,0)
An Sc 303 Feeds and Feeding Lab. .	1 (0,3)
Dy Sc 306 Ch. & Phys. Nat. of Milk .	3 (2,3)
Dy Sc 310 Dairy Cattle Selection . .	1 (0,3)
Gen 302 Genetics	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par. .	3 (3,0)
Approved Elective	3

17

SENIOR YEAR

Dy Sc 403 Animal Nutrition	3 (3,0)
Dy Sc 409 Dairy Seminar	2 (2,0)
Dy Sc 453 Animal Reprod.†	3 (3,0)
Dy Sc 455 Animal Reprod. Lab.† . .	1 (0,3)
Zool 307 Animal Anat. & Phys. . . .	3 (2,3)
Approved Elective	6

18

An Sc 452 Animal Breeding	3 (3,0)
or Dy Sc 404 Dairy Plant Mgt. . . .	3 (2,3)
Bact 402 Dairy Bacteriology	3 (2,3)
Dy Sc 410 Dairy Seminar	2 (2,0)
Dy Sc 452 Dairy Cattle Feed. & Mgt.	3 (2,3)
Ent 301 Elem. and Econ. Ent. . . .	3 (2,3)
Approved Elective	4

18

† Dy Sc 402 may be substituted for Dy Sc 453 and 455.

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

ENTOMOLOGY

Entomology is that branch of science that deals with the study of insects. In many ways insects are the most important group of animals that affect man. At the present time insects are costing the American public approximately four billion dollars annually. There will always be a need for qualified entomologists and the financial rewards to members of this profession are comparable to those enjoyed by most other scientists.

Two options are available in the Entomology curriculum—*Science* and *Business*. Depending on training, ability, and interest, entomologists find employment in such areas as the following: (1) research entomologists with several federal agencies, the state experiment stations, or private research foundations; (2) teaching entomology and/or zoology at the college or university level; (3) industrial research and the development of more efficient insecticides; (4) quarantine and regulatory work at both state and federal levels; (5) sales and management for agricultural chemical or the pest control industries; (6) the federal and state extension services; (7) many other specialized areas where a knowledge of insects is essential, such as beekeeping or disease transmission.

ENTOMOLOGY CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 223 Org. Chem.	3 (3,0)	Ch 224 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Econ 201 Principles of Econ.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Ent 301 Elem. and Econ. Ent.	3 (2,3)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 202 Gen. Physics	3 (3,0)
AS or MS—Basic.	1 (2,1)	Phys 204 Gen. Physics Lab.	1 (0,3)
	16	AS or MS—Basic.	1 (2,1)

18

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Bot 352 Plant Physiology	4 (3,3)
Ch 313 Quan. Anal.	3 (3,0)	Ent 306 Econ. Entomology	3 (2,3)
Ch 317 Quan. Anal. Lab.	1 (0,3)	Gen 302 Genetics	3 (2,3)
Ent 305 Econ. Entomology	3 (2,3)	Approved Electives	9
Zool 307 Animal Anat. & Physiol.	3 (2,3)		19
Approved Electives	5		

19

SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)	Ent 408 Gen. & Tax. Ent.	5 (3,6)
Engl 301 Public Speaking	3 (3,0)	Ent 462 Seminar	1 (1,0)
Ent 405 Insect Morph.	4 (3,3)	Ent 468 Introd. to Research	2 (1,3)
Ent 461 Seminar	1 (1,0)	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Ex St 401 Introd. Statistics	3 (2,3)	Social Science Elective†	3 (3,0)
Approved Electives	4	Approved Electives	5

18

19

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

BUSINESS OPTION

SOPHOMORE YEAR

First Semester

Agron 202 Soils	3 (2,3)
Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
IM 201 Introd. to Ind. Mgt.	3 (3,0)
AS or MS—Basic.	1 (2,1)
	<hr/>
	17

Second Semester

Acct 201 Prin. of Accounting	3 (3,0)
Ag Ec 202 Agric. Economics	3 (3,0)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Ent 301 Elem. and Econ. Ent.	3 (2,3)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)
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JUNIOR YEAR

Ag Ec 309 Introd. to Marketing	3 (3,0)
Ag Ec 351 Advertising and Merch.	3 (3,0)
Ent 305 Econ. Entomology	3 (2,3)
Gen 302 Genetics	3 (2,3)
Zool 307 Animal Anat. & Physiol.	3 (2,3)
Approved Electives§	4
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Bact 301 Gen. Bacteriology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Ent 306 Econ. Entomology	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Electives§	6
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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)
Ent 405 Insect Morph.	4 (3,3)
Ent 461 Seminar	1 (1,0)
IM 312 Commercial Law	3 (3,0)
Approved Electives§	8
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Ent 408 Gen. & Tax. Ent.	5 (3,6)
Ent 462 Seminar	1 (1,0)
Ent 468 Introd. to Research	2 (1,3)
IM 307 Personnel Management	3 (3,0)
Social Science Elective†	3 (3,0)
Approved Electives§	4
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† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

§ At least three of the following courses must be completed: Ag Ec 351, Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

HORTICULTURE (Fruit and Vegetable)

This curriculum provides the student with a basic education in science and the humanities, and the application of both in the scientific, technical, and business phases of the fruit and vegetable industry.

Opportunities in this field of study include vegetable and fruit farm management; inspection of fresh fruit, vegetable and other food products as well as nursery stock. There are many other opportunities as in plant breeding, agricultural extension service work, horticultural research, horticultural teaching and writing, and fruit and vegetable processing. Other occupations include sales and field work with seedsmen and nurserymen, and manufacturers of food fertilizer, and pesticide products.

Students majoring in the fruit and vegetable phase of Horticulture may choose from the *Science*, *Business*, or *Production Technology* options.

HORTICULTURE (FRUIT AND VEGETABLE) CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Agron 202 Soils	3 (2,3)	Ch 313 Quan. Anal.	3 (3,0)
Ch 223 Org. Chem.	3 (3,0)	and Ch 317 Quan. Anal. Lab.	1 (0,3)
Ch 227 Org. Chem. Lab.	1 (0,3)	or Ch 224 Org. Chem.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	and Ch 228 Org. Chem. Lab.	1 (0,3)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Econ 201 Principles of Econ.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Engl 204 Survey of Engl. and	
Phys 203 Gen. Physics Lab.	1 (0,3)	Amer. Lit.	3 (3,0)
AS or MS—Basic	1 (2,1)	Hort 201 Gen. Horticulture	3 (2,3)
	19	Phys 202 Gen. Physics	3 (3,0)
		Phys 204 Gen. Physics Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Bot 352 Plant Physiology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)	Ent 301 Elem. and Econ. Ent.	3 (2,3)
Hort 302 Prin. Veg. Prod.	3 (2,3)	Gen 302 Genetics	3 (2,3)
Hort 305 Plant Propagation	3 (2,3)	Pol Sc 301 Am. Gov. and	
Hort 352 Commercial Pomology	3 (2,3)	Pol. Par.	3 (3,0)
Approved Elective	3	Social Science Elective*	3
	19	Approved Elective	2

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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)	Agron 405 Plant Breeding	3 (2,3)
Ex St 401 Introd. Statistics	3 (2,3)	Hort 410 Seminar	1 (1,0)
Hort 405 Nut Tree Culture	2 (2,0)	Hort 451 Small Fruit Culture	3 (2,3)
Hort 407 Landscape Design	3 (2,3)	Hort 456 Truck Crops	3 (3,0)
Hort 409 Seminar	1 (1,0)	Hort 468 Introd. to Research	2 (1,3)
Hort 464 Food Preservation	3 (2,3)	Approved Elective	5
Approved Elective	3		

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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

BUSINESS OPTION

SOPHOMORE YEAR

Agron 202 Soils	3 (2,3)	Acct 201 Prin. of Accounting	3 (3,0)
Ch 220 Elem. Org. Chem.	4 (3,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Engl 204 Survey of Engl. and	
Engl 203 Survey of Engl. Lit.	3 (3,0)	Amer. Lit.	3 (3,0)
IM 201 Introd. to Ind. Mgt.	3 (3,0)	Hort 201 Gen. Horticulture	3 (2,3)
AS or MS—Basic	1 (2,1)	Phys 201 Gen. Physics	3 (3,0)
	17	Phys 203 Gen. Physics Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Ag Ec 351 Advertising and Merch.	3 (3,0)	Ag Ec 309 Introd. to Marketing	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)	Bot 352 Plant Physiology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)	Gen 302 Genetics	3 (2,3)
Hort 302 Prin. Veg. Prod.	3 (2,3)	Pol Sc 301 Am. Gov. and	
Hort 305 Plant Propagation	3 (2,3)	Pol. Par.	3 (3,0)
Hort 352 Commercial Pomology	3 (2,3)	Ent 301 Elem. and Econ. Ent.	3 (2,3)
	19	Social Science Elective*	3

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SENIOR YEAR

Hort 405 Nut Tree Culture	2 (2,0)	Bot 401 Plant Pathology	3 (2,3)
Hort 407 Landscape Design	3 (2,3)	Hort 410 Seminar	1 (1,0)
Hort 409 Seminar	1 (1,0)	Hort 451 Small Fruit Culture	3 (2,3)
Hort 464 Food Preservation	3 (2,3)	Hort 456 Truck Crops	3 (3,0)
Approved Electives†	9	Approved Electives†	9

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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

† At least two of the following courses must be selected: Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR

First Semester

Agron 202 Soils	3 (2,3)
Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
Hort 201 Gen. Horticulture	3 (2,3)
AS or MS—Basic	1 (2,1)
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Second Semester

Ag Ec 202 Agric. Economics	3 (3,0)
AgE 206 Agric. Mechanization	3 (2,3)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Ent 301 Elem. and Econ. Ent.	3 (2,3)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)
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JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Hort 302 Prin. Veg. Prod.	3 (2,3)
Hort 303 Plant Materials I	3 (2,3)
Hort 305 Plant Propagation	3 (2,3)
Hort 352 Commercial Pomology	3 (2,3)
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Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Bot 352 Plant Physiology	4 (3,3)
Gen 302 Genetics	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Social Science Elective*	3
Approved Elective	3
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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)
Hort 405 Nut Tree Culture	2 (2,0)
Hort 409 Seminar	1 (1,0)
Hort 464 Food Preservation	3 (2,3)
Approved Electives	9
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Agron 405 Plant Breeding	3 (2,3)
Hort 308 Landscape Design	3 (2,3)
Hort 410 Seminar	1 (1,0)
Hort 451 Small Fruit Culture	3 (2,3)
Hort 456 Truck Crops	3 (3,0)
Approved Electives	6
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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

HORTICULTURE (Ornamental)

This curriculum is designed to give students a scientific background and technical facilities in the field of Ornamental Horticulture. Subject matter covers plant materials culture, uses, and planning of ground spaces.

Graduates find careers in nursery work, floriculture, landscape designing, landscape contracting, turf management, and park supervision. Other occupations are as research personnel, teachers, extension workers, and as representatives of fertilizer, machinery, and chemical companies.

Students desiring to major in Ornamental Horticulture may choose from the *Science*, *Business*, or *Production Technology* options.

HORTICULTURE (ORNAMENTAL) CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

First Semester

Agron 202 Soils	3 (2,3)
Ch 223 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

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Second Semester

Ch 313 Quan. Anal.	3 (3,0)
and Ch 317 Quan. Anal. Lab.	1 (0,3)
or Ch 224 Org. Chem.	3 (3,0)
and Ch 228 Org. Chem. Lab.	1 (0,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Hort 201 Gen. Horticulture	3 (2,3)
Phys 202 Gen. Phys.	3 (3,0)
Phys 204 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)
Gen 302 Genetics	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Hort 302 Prin. Veg. Prod.	3 (2,3)
Hort 303 Plant Materials I	3 (2,3)
Hort 305 Plant Propagation	3 (2,3)

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Bot 352 Plant Physiology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Ent 301 Elem. and Econ. Ent.	3 (2,3)
Hort 304 Plant Materials II	3 (2,3)
Hort 308 Landscape Design	3 (2,3)
Hort 310 Floriculture	3 (2,3)

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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)
Hort 408 Floral Des. & Retail Mktg.	3 (2,3)
Hort 409 Seminar	1 (1,0)
Hort 460 Adv. Landscape Design	5 (3,6)
Approved Electives	7

19

Bot 356 Taxonomy	3 (1,6)
Ex St 401 Introd. Statistics	3 (2,3)
Hort 410 Seminar	1 (1,0)
Hort 451 Small Fruit Culture	3 (2,3)
Hort 468 Introd. to Research	2 (1,3)
Social Science Elective*	3

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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

BUSINESS OPTION

SOPHOMORE YEAR

Agron 202 Soils	3 (2,3)
Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
IM 201 Introd. to Ind. Mgt.	3 (3,0)
AS or MS—Basic	1 (2,1)

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Acct 201 Prin. of Accounting	3 (3,0)
Ag Ec 202 Agric. Economics	3 (3,0)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Hort 201 Gen. Horticulture	3 (2,3)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Ag Ec 351 Advertising and Merch.	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Gen 302 Genetics	3 (2,3)
Hort 303 Plant Materials I	3 (2,3)
Hort 305 Plant Propagation	3 (2,3)

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Ag Ec 309 Introd. to Marketing	3 (3,0)
Bot 352 Plant Physiology	4 (3,3)
Hort 304 Plant Materials II	3 (2,3)
Hort 308 Landscape Design	3 (2,3)
Hort 310 Floriculture	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)

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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)
Hort 302 Prin. Veg. Prod.	3 (2,3)
Hort 408 Floral Des. & Retail Mktg.	3 (2,3)
Hort 409 Seminar	1 (1,0)
Hort 460 Adv. Landscape Design	5 (3,6)
Approved Electives†	3

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Hort 406 Nursery Technology	3 (2,3)
Hort 410 Seminar	1 (1,0)
Hort 451 Small Fruit Culture	3 (2,3)
Social Science Elective*	3
Approved Electives†	9

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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

† At least two of the following courses must be selected: Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR

*First Semester**Second Semester*

Ch 220 Elem. Org. Chem.	4 (3,3)	Ag Ec 202 Agric. Economics	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	AgE 206 Agric. Mechanization	3 (2,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Agron 202 Soils	3 (2,3)
Ent 301 Elem. and Econ. Ent.	3 (2,3)	Engl 204 Survey of Engl. and	
Hort 201 Gen. Horticulture	3 (2,3)	Amer. Lit.	3 (3,0)
AS or MS—Basic.	1 (2,1)	Phys 201 Gen. Physics	3 (3,0)
		Phys 203 Gen. Physics Lab.	1 (0,3)
		AS or MS—Basic.	1 (2,1)

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JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Gen 302 Genetics	3 (2,3)	Bot 352 Plant Physiology	4 (3,3)
Hort 302 Prin. Veg. Prod.	3 (2,3)	Engl 301 Public Speaking	3 (3,0)
Hort 303 Plant Materials I	3 (2,3)	Hort 304 Plant Materials II	3 (2,3)
Hort 305 Plant Propagation	3 (2,3)	Hort 308 Landscape Design	3 (2,3)
Pol Sc 301 Am. Gov. and		Hort 310 Floriculture	3 (2,3)
Pol. Par.	3 (3,0)		

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SENIOR YEAR

Bot 401 Plant Pathology	3 (2,3)	Agron 405 Plant Breeding	3 (2,3)
Hort 408 Floral Des. & Retail Mktg.	3 (2,3)	Hort 406 Nursery Technology	3 (2,3)
Hort 409 Seminar	1 (1,0)	Hort 410 Seminar	1 (1,0)
Hort 412 Turf Management	3 (2,3)	Hort 451 Small Fruit Culture	3 (2,3)
Hort 460 Adv. Landscape Design	5 (3,6)	Social Science Elective*	3
Approved Electives	4	Approved Electives	5

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* To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

POULTRY SCIENCE

The Poultry Science curriculum is designed to provide sound training in the basic disciplines within which the poultry industry operates. Technical poultry courses emphasize the application of chemistry, physics, nutrition, physiology, economics, microbiology, engineering, and food technology to production, processing and marketing of poultry products.

Required courses in other departments and schools plus electives selected in areas of the student's personal interest provide a broad educational program designed to equip the graduate for his total lifework.

Graduates of the Poultry Science curriculum find employment in the production or marketing of poultry products or in education and research activities related to the poultry industry. In the area of production there are opportunities as hatchery managers, feed mill operators, servicemen, broiler or egg production supervisors, turkey production supervisors or owners and operators of poultry farms. Opportunities in marketing include operating meat or egg processing plants, or selling a variety of products to or from the poultry industry. Teaching and research activities include extension work, college teaching, and investigations for universities,

feed companies, pharmaceutical houses, chemical manufacturers and government laboratories. Many research and technical positions require training at the graduate level.

A student may elect the *Science, Business or Production Technology* option.

POULTRY SCIENCE CURRICULUM

(See page 128 for *Freshman Year*)

SCIENCE OPTION

SOPHOMORE YEAR

First Semester		Second Semester	
Ch 223 Org. Chem.	3 (3,0)	Ch 224 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Econ 201 Principles of Econ.	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Gen 302 Genetics	3 (2,3)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 202 Gen. Physics	3 (3,0)
PS 201 Introd. to Poultry Sc.	3 (2,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)	AS or MS—Basic.	1 (2,1)
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JUNIOR YEAR

An Sc 301 Feeds and Feeding	3 (3,0)	Engl 301 Public Speaking	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Ch 313 Quan. Anal.	3 (3,0)	PS 354 Poultry Breeding	3 (2,3)
and Ch 317 Quan. Anal. Lab.	1 (0,3)	PS 356 Incub. & Brooding	3 (2,3)
or Math 205 Anal. Geom., Cal. II . .	4 (4,0)	Social Science Elective†	3
PS 355 Poult. Prod. Grad. & Tech. .	3 (2,3)	Modern Language§	3
Zool 307 Animal Anat. & Physiol. .	3 (2,3)		<hr/> 18
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SENIOR YEAR

Bact 401 Adv. Bacteriology	4 (2,6)	Ex St 401 Introd. Statistics	3 (2,3)
or Ent 301 Elem. and Econ. Ent. . .	3 (2,3)	Hort 468 Introd. to Research . . .	2 (1,3)
or Ent 455 Med. & Vet. Ent.	3 (2,3)	PS 458 Avian Microbio. & Parasit. .	4 (3,3)
or Zool 301 Compar. Vert. Anat. . .	3 (2,3)	PS 460 Seminar	2 (2,0)
or Zool 405 Animal Histology . . .	3 (2,3)	Approved Electives	7 or 8
Dy Sc 403 Animal Nutrition	3 (3,0)		<hr/> 18 or 19
PS 401 Animal Environ. Tech. . . .	3 (2,3)		
PS 451 Poultry Nutrition	2 (2,0)		
Modern Language§	3		
Approved Elective	4		
	<hr/> 19 or 18		

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

§ Two semesters of same language selected from French, German, Russian, or Spanish.

BUSINESS OPTION

SOPHOMORE YEAR

First Semester

Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
IM 201 Introd. to Indus. Mgt.	3 (3,0)
PS 201 Introd. to Poultry Sci.	3 (2,3)
AS or MS—Basic.	1 (2,1)

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Second Semester

Acct 201 Prin. of Accounting	3 (3,0)
Ag Ec 202 Agric. Economics	3 (3,0)
Agron 202 Soils	3 (2,3)
An Sc 301 Feeds and Feeding	3 (3,0)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

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JUNIOR YEAR

Ag Ec 309 Introd. to Marketing. .	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)
Dy Sc 201 Introd. Dairying.	3 (2,3)
Engl 301 Public Speaking	3 (3,0)
Gen 302 Genetics	3 (2,3)
PS 355 Poult. Prod. Grad. & Tech.	3 (2,3)

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Ag Ec 352 Public Finance	3 (3,0)
or Ag Ec 460 Agric. Finance. .	2 (2,0)
or Econ 302 Money & Banking	3 (3,0)
IM 312 Commercial Law	3 (3,0)
or IM 415 Mgr. Decis. Making	3 (3,0)
or IM 307 Personnel Mgt.	3 (3,0)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
PS 354 Poultry Breeding	3 (2,3)
PS 356 Incub. & Brooding	3 (2,3)
Social Science Elective†	3

18 or 17

SENIOR YEAR

Ag Ec 351 Advertising and Merch.	3 (3,0)
PS 401 Animal Environ. Tech. .	3 (2,3)
PS 401 Poultry Nutrition	2 (2,0)
Approved Electives	9 or 10

17 or 18

PS 458 Avian Microbio. & Parasit.	4 (3,3)
PS 460 Seminar	2 (2,0)
Approved Electives	12

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† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

PRODUCTION TECHNOLOGY OPTION

SOPHOMORE YEAR

First Semester

Agron 202 Soils	3 (2,3)
Ch 220 Elem. Org. Chem.	4 (3,3)
Econ 201 Principles of Econ.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)
PS 201 Introd. to Poultry Sci.	3 (2,3)
AS or MS—Basic.	1 (2,1)

17

Second Semester

Ag Ec 202 Agric. Economics	3 (3,0)
AgE 206 Agric. Mechanization .	3 (2,3)
Dy Sc 201 Introd. Dairying	3 (2,3)
Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

17

JUNIOR YEAR

An Sc 301 Feeds and Feeding	3 (3,0)
Bact 301 Gen. Bacteriology	4 (3,3)
Engl 301 Public Speaking	3 (3,0)
Gen 302 Genetics	3 (2,3)
PS 355 Poult. Prod. Grad. & Tech.	3 (2,3)
Zool 307 Animal Anat. & Physiol.	3 (2,3)

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Ag Ec 302 Agric. Firm Mgt.	3 (2,3)
Ent 301 Elem. and Econ. Ent. .	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
PS 354 Poultry Breeding	3 (2,3)
PS 356 Incub. & Brooding	3 (2,3)
Social Science Elective†	3

18

SENIOR YEAR

PS 401 Animal Environ. Tech. .	3 (2,3)
PS 451 Poultry Nutrition	2 (2,0)
Approved Electives	15

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PS 458 Avian Microbio. & Parasit.	4 (3,3)
PS 460 Seminar	2 (2,0)
Approved Electives	12

18

† To be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

AGRICULTURAL ENGINEERING

The Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

Agricultural Engineering deals fundamentally with the application of the engineering sciences to progress in agriculture. Agricultural engineers provide engineering services in the areas of power and machinery, soil and water conservation engineering, farm electrification, agricultural structures, and processing engineering.

The curriculum of Agricultural Engineering leads to the degree of Bachelor of Science in Agricultural Engineering. It is based on the study of fundamentals of mathematics, physics, chemistry, and biology. The engineering sciences of mechanics, fluids, thermodynamics, and electrical theory, together with the basic agricultural sciences of soils, plants and animals, provide the foundation for the Agricultural Engineering design and analysis. Courses in the humanities are included to provide the student with a well-rounded educational program. Graduate courses are offered leading to advanced degrees.

Opportunities in Agricultural Engineering include employment with industry as design engineers, research engineers, production engineers, and in sales and service; with state and federal agencies as teachers, research engineers, and extension engineers; as field engineers with soil conservation service, bureau of reclamation, etc.; with agricultural enterprises as managers, contractors, equipment retailers and consulting engineers. The Agricultural Engineering curriculum is accredited by the Engineers' Council for Professional Development.

AGRICULTURAL ENGINEERING CURRICULUM

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	AgBio 101 Introd. Agr. & Biol. Sci. 1	(1,0)
Engr 101 Engineering Systems . . .	0 (1,0)	Ch 102 General Chemistry	4 (3,3)
EG 109 Engr. Com. & Design . . .	3 (1,6)	Engr 102 English Composition . . .	3 (3,0)
or Hist 104 Western Civilization . .	3 (3,0)	Hist 104 Western Civilization . . .	3 (3,0)
Engr 101 English Composition . . .	3 (3,0)	or EG 109 Engr. Com. & Design . .	3 (1,6)
Math 106 Anal. Geom., Cal. I . . .	4 (4,0)	Math 205 Anal. Geom., Cal. II . . .	4 (4,0)
AS or MS—Basic	1 (2,1)	Phys 102 Mech. & Wave Pheno. . .	3 (3,0)
	15	AS or MS—Basic	1 (2,1)
			19
SOPHOMORE YEAR			
AgE 209 Ag. Engr. Technology . . .	2 (1,3)	AgE 299 Digital Computation . . .	1 (0,3)
Agron 202 Soils	3 (2,3)	Bot 101 General Botany	4 (3,3)
EM 201 Statics	3 (3,0)	EM 202 Dynamics	3 (3,0)
Engr 203 Surv. of Engr. Lit. . . .	3 (3,0)	Engr 204 Surv. of Engr. & Am. Lit. .	3 (3,0)
Math 206 Anal. Geom., Cal. III . .	4 (4,0)	Math 208 Engr. Math. I	4 (4,0)
Phys 221 Ther. & Elec. Phen. . . .	3 (3,0)	Phys 222 Opt. & Mod. Phys. . . .	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	20		20

JUNIOR YEAR

First Semester

AgE 355 Engr. Anal. & Creat.	3 (2,3)
EE 307 Basic Elec. Engr.	3 (3,0)
EM 304 Mechanics of Materials	3 (3,0)
Math 309 Engr. Math. II	3 (3,0)
or Math 313 Stat. Theory and Meth.	3 (3,0)
ME 311 Engr. Thermo. I	3 (3,0)
Zool 101 General Zoology	3 (3,0)
Zool 103 General Zoology Lab.	1 (0,3)

19

Second Semester

AgE 362 Energy Conv. in Ag. Sys. . . .	3 (2,3)
AgE 465 Engr. Prop. of Biol. Mat. . .	3 (2,3)
Bot 352 Plant Physiology	4 (3,3)
or Zool 307 An. Anat. & Physio. . . .	3 (2,3)
or Bact 301 Gen. Bacteriology	4 (3,3)
CE 201 Terrestrial Meas. I	3 (2,3)
EE 308 Basic Elec. Engr.	3 (3,0)

16 or 15

SENIOR YEAR

AgE 431 Ag. Struct. Design	3 (2,3)
AgE 471 Undergrad. Research	1 (0,3)
Econ 201 Prin. of Economics	3 (3,0)
EM 320 Fluid Mechanics	3 (3,0)
EM 322 Fluid Mech. Lab.	1 (0,3)
ME 304 Heat Transfer I	3 (3,0)
Approved Elective	3

17

AgE 416 Agric. Machinery	4 (3,3)
AgE 422 Soil & Water Con. Engr. . . .	4 (3,3)
AgE 442 Agric. Proc. Engr.	4 (3,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Approved Elective	3 or 4

18 or 19

BIOLOGY

The Biology curriculum is designed to give the student fundamental training in the Biological Sciences. It is arranged to give him a broad background in the biological, physical, and social sciences and then in the junior and senior years to permit him to select an option for further study either in Botany or Zoology. Under the Botany option, a student may, by the proper selection of approved electives, specialize either in Botany or Microbiology. The number of available elective credits is sufficient to permit a student to take work in related fields of basic science or in the various areas of applied Biology.

The Biology curriculum is designed to train students for employment as applied biologists in sales, service, or research in industry or government service. It is also suitable as a base for those students who desire to take further work at the graduate level and thus prepare themselves to teach or conduct independent research in the basic or applied biological sciences.

BIOLOGY CURRICULUM

FRESHMAN YEAR

First Semester

Bot 101 Gen. Botany	4 (3,3)
Ch 101 General Chemistry	4 (3,3)
EG 101 Freehand Sketching	1 (0,3)
Engl 101 English Composition	3 (3,0)
Math 103 College Algebra	2 (3,0)
Math 104 Trigonometry	2 (3,0)
AS or MS—Basic.	1 (2,1)

17

Second Semester

AgBio 101 Introd. Agr. & Biol. Sci. . .	1 (1,0)
Ch 102 General Chemistry	4 (3,3)
Engl 102 English Composition	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Zool 101 Gen. Zoology	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

17

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Econ 201 Principles of Econ.	3 (3,0)	Bot 202 Surv. of Pl. Kingdom....	4 (3,3)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Engl 204 Surv. Engl. & Amer. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Phys 202 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
or Chemistry Elective*	4	or Chemistry Elective*	4
Zool 201 Invertebrate Zool.	4 (3,3)	Social Science Elective†	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
		Approved Elective†	3
	15		18

BOTANY OPTION

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Gen 302 Genetics	3 (2,3)
Bot 352 Plant Physiology	4 (3,3)	Chemistry Elective*	4
Engl 301 Public Speaking	3 (3,0)	or Phys 202 Gen. Physics	3 (3,0)
Chemistry Elective*	4	Phys 204 Gen. Physics Lab.	1 (0,3)
or Phys 201 Gen. Physics	3 (3,0)	Approved Elective†	9
Phys 203 Gen. Physics Lab.	1 (0,3)		
Approved Electives†	3		16
	18		

SENIOR YEAR

Social Science Elective†	3	Social Science Elective†	3
Approved Electives†	14	Approved Elective†	13
	17		16

ZOOLOGY OPTION

JUNIOR YEAR

Chemistry Elective*	4	Bact 301 Gen. Bacteriology	4 (3,3)
or Phys 201 Gen. Physics	3 (3,0)	Chemistry Elective*	4
Phys 203 Gen. Physics Lab.	1 (0,3)	or Phys 202 Gen. Physics	3 (3,0)
Ent 301 Elem. and Econ. Ent.	3 (2,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
Zool 301 Comp. Vert. Anat.	3 (2,3)	Zool 302 Vert. Embryology	3 (2,3)
Social Science Elective†	3 (3,0)	Social Science Elective†	3 (3,0)
Approved Elective†	3	Approved Elective†	3
	16		17

SENIOR YEAR

Engl 301 Public Speaking	3 (3,0)	Gen 302 Genetics	3 (2,3)
Zool 304 Ecology	3 (2,3)	Zool 460 Gen. Physiology	3 (2,3)
Approved Electives†	11	Approved Electives†	11
	17		17

* To be selected from the following courses: Ch 220, Ch 310, Ch 313 and 317, Ch 223 and 227, Ch 224 and 228. Either Ch 220 or Ch 223 and 227 must be included.

† To be selected from the following courses: Ag Ec 202, Econ 202, Hist 101, Hist 102, Hist 104, Hist 203, Hist 204, Hist 301, Geog 301, Geog 302, Psych 201, Phil 301, Phil 302, Pol Sc 201, Pol Sc 202, Pol Sc 301, Pol Sc 302, RS 301, Soc 201, Rel 301, Rel 302.

‡ Students enrolled in the Botany option must select a minimum of 12 credits from the following courses: Bot 356, Bot 401, Bot 402, Bot 404, Bot 405, Bot 406, Bot 451, Bot 452, Bot 455, Bot 456, Bot 457, Bot 458, Bact 312, Bact 401, Bact 402, Bact 406, Bact 410, Bact 411, Gen 451, Zool 403, Zool 458.

Students enrolled in the Zoology option must select a minimum of 6 credits from the following courses: Bot 404, Ent 405, Ent 408, Ent 455, Ent 461, Ent 462, Ent 468, Zool 312, Zool 403, Zool 404, Zool 405, Zool 410, Zool 456, Zool 458, Zool 461.

FOOD SCIENCE

The food processing industry is the nation's largest industry. Since it is also a growing industry which requires scientists in increasing numbers, many excellent opportunities are available to food scientists.

The curriculum in Food Science provides an excellent education designed to prepare graduates for occupations in the food industry, research positions in government organizations and state experiment stations, food inspection and grading work with state and federal agencies, teaching, extension and consulting opportunities.

The student may choose either the *Science* or the *Business* option. The *Science* option provides an excellent basis for graduate study as well as employment in technical positions in the food industry. The *Business* option will be of particular interest to the student who wishes to combine technical and business courses with a view toward management positions in the food industry.

FOOD SCIENCE CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Bot 101 Gen. Botany	4 (3,3)	Ag Bio 101 Introd. Agr. & Biol. Sci.	1 (1,0)
Ch 101 Gen. Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Engl 101 English Composition	3 (3,0)	Engl 102 English Composition	3 (3,0)
Math 103 College Algebra	2 (3,0)	Math 106 Anal. Geom., Cal. I	4 (4,0)
Math 104 Trigonometry	2 (3,0)	Zool 101 Gen. Zoology	3 (3,0)
AS or MS—Basic	1 (2,1)	Zool 103 Gen. Zoology Lab.	1 (0,3)
	16	AS or MS—Basic	1 (2,1)
			17

SCIENCE OPTION

SOPHOMORE YEAR

Ch 223 Org. Chem.	3 (3,0)	Ch 224 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)	Math 206 Anal. Geom., Cal. III	4 (4,0)
Phys 201 Gen. Phys.	3 (3,0)	Phys 202 Gen. Phys.	3 (3,0)
Phys 203 Gen. Phys. Lab.	1 (0,3)	Phys 204 Gen. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	16		16

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Bact 312 Food Microbiology	3 (2,3)
Econ 201 Principles of Econ.	3 (3,0)	Ch 310 Elem. Biochem.	4 (3,3)
Fd Sc 301 Raw Materials for Food Processing	3 (2,3)	Ch 313 Quantitative Analysis	3 (3,0)
Fd Sc 303 Elem. of Fd. Sci.	3 (3,0)	Ch 317 Quantitative Anal. Lab.	1 (0,3)
Approved Electives†	7	Fd Sc 304 Food Processing	3 (1,6)
	20	Approved Electives†	5
			19

SENIOR YEAR

Ex St 401 Introd. Statistics	3 (2,3)	Bioch 406 Physio. Chem.	4 (3,3)
Fd Sc 401 Elem. of Fd. Sc.	3 (3,0)	Engl 301 Public Speaking	3 (3,0)
Fd Sc 403 Biochem. of Foods	3 (2,3)	Fd Sc 404 Food Processing	3 (1,6)
Approved Electives†	11	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
	20	Approved Electives†	7
			20

† At least three elective credits must be selected from the following courses: Hist 301, Psch 201, RS 301, Soc 201.

BUSINESS OPTION

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 220 Elem. Org. Chem.	4 (3,3)	Acct 201 Prin. of Accounting	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	Ag Ec 202 Agric. Economics	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Phys 201 Gen. Phys.	3 (3,0)	IM 201 Introd. to Ind. Mgt.	3 (3,0)
Phys 203 Gen. Phys. Lab.	1 (0,3)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)	Approved Electives†	4
Approved Electives†	3		
	18		17

JUNIOR YEAR

Bact 301 Gen. Bacteriology	4 (3,3)	Ag Ec 309 Introd. to Marketing ..	3 (3,0)
Ag Ec 351 Advertising & Mds.	3 (3,0)	Bact 312 Food Microbiology	3 (2,3)
Dy Sc 305 Dairy Tech. & Engr.	3 (2,3)	Ch 310 Elem. Biochemistry	4 (3,3)
Fd Sc 301 Raw Mat. for Fd. Proc.	3 (2,3)	Ch 313 Quantitative Analysis	3 (3,0)
Fd Sc 303 Elem. of Fd. Sci.	3 (3,0)	Ch 317 Quantitative Anal. Lab.	1 (0,3)
Approved Electives†	4	Fd Sc 304 Food Processing	3 (1,6)
	20	Approved Electives†	2
			19

SENIOR YEAR

Engl 301 Public Speaking	3 (3,0)	Bioc 406 Physio. Chem.	4 (3,3)
Ex St 401 Introd. Statistics	3 (2,3)	Fd Sc 404 Food Processing	3 (1,6)
Fd Sc 401 Elem. of Fd. Sci.	3 (3,0)	Pol Sc 301 Am. Gov. and	
Fd Sc 403 Biochem. of Foods	3 (2,3)	Pol. Par.	3 (3,0)
Approved Electives†	7	Approved Electives†	8
	19		18

† At least three elective credits must be selected from the following courses: Hist 301, Psych 201, RS 301, Soc 201.

Two of the following courses must be completed: Ag Ec 352, Ag Ec 456, Ag Ec 460, Econ 302, IM 307, IM 312, IM 415.

FORESTRY

The Clemson Forestry curriculum includes the fundamental and applied sciences needed in the scientific management of multiple-use forests. Foresters of professional standing are employed in various capacities by private concerns and by federal, state, and other public agencies. They may be engaged as managers and administrators of forest lands, technical specialists in extension, fire protection, recreation, or in other activities presupposing professional forestry knowledge. Foresters earning advanced degrees find employment in academic work and in research conducted both by public and private agencies.

FORESTRY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Bot 101 Gen. Botany	4 (3,3)	AgBio 101 Introd. Agr. & Biol. Sci.	1 (1,0)
Ch 101 Gen. Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Engl 101 English Composition	3 (3,0)	EG 105 Engr. Graphics	2 (0,6)
Math 103 College Algebra	2 (3,0)	Engl 102 English Composition	3 (3,0)
Math 104 Trigonometry	2 (3,0)	Math 106 Anal. Geom., Cal. I	4 (4,0)
AS or MS—Basic	1 (2,1)	Zool 101 Gen. Zoology	3 (3,0)
	16	Zool 103 Gen. Zoology Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)

SOPHOMORE YEAR

Agron 202 Soils	3 (2,3)	Bot 356 Taxonomy	3 (1,6)
Engl 203 Survey of Engl. Lit.	3 (3,0)	CE 201 Terrestrial Meas. I	3 (2,3)
For 205 Dendrology	4 (3,3)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)	For 204 Introd. to For.	1 (1,0)
Phys 201 Gen. Physics	3 (3,0)	For 206 Silvics	2 (2,0)
Phys 203 Gen. Physics Lab.	1 (0,3)	Geol 201 Physical Geol.	3 (3,0)
AS or MS—Basic	1 (2,1)	Phys 202 Gen. Physics	3 (3,0)
	19	Phys 204 Gen. Physics Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)

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FORESTRY SUMMER CAMP

For 251S Silvics	2 cr.
For 252S Forest Engineering	2 cr.
For 253S Dendrometry	4 cr.
For 254S Forest Products	1 cr.

JUNIOR YEAR

Bot 352 Plant Physiology	4 (3,3)	For 302 Dendrometry	3 (2,3)
Econ 201 Principles of Econ.	3 (3,0)	For 304 Forest Economics	3 (3,0)
Ent 307 Forest Entomology	3 (2,3)	For 306 Ident. of Wood and Wood Fibers	1 (0,3)
Ex St 401 Introd. Statistics	3 (2,3)	For 308 Aerial Photos in For.	3 (2,3)
Zool 312 Wildlife Management	3 (2,3)	For 310 Silviculture	4 (3,3)
Approved Elective*	3	Approved Elective*	3
	19		17

SENIOR YEAR

Bot 405 Forest Pathology	3 (2,3)	Engl 301 Public Speaking	3 (3,0)
For 401 Logging and Milling	4 (2,6)	For 404 Management Plans	1 (0,3)
For 407 Forest Regulation	4 (3,3)	For 406 For. Policy & Admin.	2 (2,0)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)	For 408 Forest Valuation	3 (3,0)
Approved Elective*	3	For 410 Forest Prod.	3 (2,3)
	17	For 412 Forest Protection	2 (2,0)
		Approved Elective*	3

17

* At least three credits must be selected from the following courses: Geog 301, Geog 302, Hist 301, Psych 201, RS 301, Soc 201.

PRE-VETERINARY MEDICINE

The curriculum in Pre-Veterinary Medicine is designed to meet the general requirements for admission to certain schools of veterinary medicine. Since the requirements for entrance to these schools are not uniform, the student in planning his program should consider the specific requirements of the school he expects to attend. Under the Southern Regional Educational Plan, ten qualified students from South Carolina may enter the School of Veterinary Medicine at the University of Georgia each year. The courses listed below are minimum requirements for all students applying under the Regional Education Board Contract. Only the exceptional student can expect to complete the minimum requirements in four semesters. Students in the entering classes in Schools of Veterinary Medicine now average in excess of three years of Pre-Veterinary training.

PRE-VETERINARY MEDICINE CURRICULUM

AgBio 101 Introd. to Agric. and Biol. Sci.	1 (1,0)	Phys 201 Gen. Physics	3 (3,0)
An Sc 102 Animal Science	2 (2,0)	Phys 202 Gen. Physics	3 (3,0)
An Sc 104 Animal Science Lab.	1 (0,3)	Phys 203 Gen. Physics Lab.	1 (0,3)
Bot 101 Gen. Botany	4 (8,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
Ch 101 Gen. Chemistry	4 (8,3)	PS 201 Introd. to Poul. Sci.	3 (2,3)
Ch 102 Gen. Chemistry	4 (8,3)	An Sc 301 Feeds and Feeding	3 (3,0)
Engl 101 English Composition	3 (8,0)	Ch 223 Org. Chemistry	3 (3,0)
Engl 102 English Composition	3 (8,0)	Ch 224 Org. Chemistry	3 (3,0)
Math 103 College Algebra	2 (3,0)	Ch 227 Org. Chemistry Lab.	1 (0,3)
Math 104 Trigonometry	2 (3,0)	Ch 228 Org. Chemistry Lab.	1 (0,3)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Gen 302 Genetics	3 (2,3)
Zool 101 Gen. Zoology	3 (3,0)	Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)	Zool 301 Comp. Vert. Anat.	3 (2,3)
Dy Sc 201 Introd. Dairying	3 (2,3)	AS or MS—Basic	4 (8,4)
Econ 201 Principles of Econ.	3 (3,0)		
Engl 203 Surv. of Engl. Lit.	3 (3,0)		

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SCHOOL OF ARCHITECTURE

The Clemson University School of Architecture provides coordinated pre-professional and professional degree programs at undergraduate and graduate levels in preparation for careers in: Architecture, City Planning and Building Construction. These curriculums are not offered elsewhere in the state. The pre-professional offerings of the School also provide an excellent basis for subsequent graduate studies in Landscape Architecture, Art and Architectural History, Painting and Sculpture.

In addition to the courses and curriculums structured for the professional students of the School, cultural offerings in both lecture and studio courses are available to the general student population and required in certain other schools and colleges.

A rich annual series of exhibitions in the Rudolph Lee Gallery of the School and lectures by figures of international importance in the environmental arts and sciences are presented by the Clemson Architectural Foundation and open to the public. An unusual bond has existed between the architects of the state and region and the School since the first offering of architectural courses to a few students in 1914. The South Carolina Chapter of the American Institute of Architects in 1955 asked that a strong school be established and pledged its continuing unified support of school programs as the prime project of the organization. Sweeping administrative and curricular changes brought a five-year curriculum and full accreditation that year. Following three years of rapid development the School was made an autonomous professional school by action of the Board of Trustees in 1958.

During the decade just ending, the School has sought to select its students with increasing care and to broaden and strengthen its offerings and its faculty. As might be expected, the curriculums and objectives are under continuing study.

To better prepare professional students a two-degree six-year program is required for those majoring in architecture beginning with the entering class of the academic year 1967-1968.

The School enjoys contracts for creative research in several areas, and receives an annual support budget from the Clemson Architectural Foundation to enrich its program. It is a member of the Association of Collegiate Schools of Architecture, the Associated Schools of Construction, collaborates with the South Carolina Chapter of the American Institute of Planners, and is accredited by the National Architectural Accrediting Board.

The Architectural Foundation is a nonprofit corporation established in January 1956 under the Laws of the State of South Carolina and under the sponsorship of the South Carolina Chapter of the American Institute of Architects. It was established to facilitate the continuous improvement of architectural education and of the art and technology of building in South Carolina by providing financial and other assistance to the School of Architecture at Clemson University. By this means students in the School of Architecture at Clemson have been able to enjoy instruction, facilities, and conditions equal to those normally found at the nation's best universities.

The advantages to the student evolving from the Clemson Architectural Foundation are many. Among them are the programs of celebrated guest critics and lecturers, excellent exhibits of many types—paintings, sculpture, architecture, construction, furniture, ceramics, textiles and other allied arts and crafts—traveling expenses for student field trips and professional activities, and student loans and grants. Visual-aid facilities and gifts to the library are examples of permanent assets provided through Foundation support.

Intangible but important is the sense of unity and of high purpose resulting from the activities of the Clemson Architectural Foundation which now permeates the entire architectural scene in South Carolina: the architects, their friends in the building industry and the faculty of the School.

The School of Architecture is housed in a modern building constructed for its program in 1958. Space nevertheless is limited and enrollment restricted to students with capacity and motivation. A major addition to the building is projected for early construction. At present the requisite functions are provided on two levels arranged around a central landscaped court. Design studios and the library occupy the entire second level. The first level accommodates the auditorium, classrooms, graduate studios, two art studios, the

Exhibition Gallery, and administrative and faculty offices. A ground floor houses shops, photo laboratory, and sculpture studio, jury room and gallery preparations and storage. All areas are air-conditioned.

ENTRANCE REQUIREMENTS

To maintain a program of high level and properly utilize to maximum advantage the staff and facilities of the School, admission is on a selective basis. Annual enrollment quotas are established consistent with space available and selection considerations include the Architectural Aptitude Tests and positive evidence of talent and motivation in addition to the normal University requirements.

Applications for the Aptitude Examination may be obtained from the Educational Testing Service, Princeton, New Jersey 20933. This test is administered at Clemson and other regional testing centers in October, January, and March.

Students wishing admission are advised to make application to the University early in the fall or winter of their senior year in high school and to make arrangements for a personal interview with the Dean of the School as soon as possible. The admissions council of the school will further interview all entering students during freshman matriculation week of each academic year.

THE PROGRAMS OF STUDY

ARCHITECTURE

The architect as a practicing professional has the creative responsibility of designing the buildings which shape our physical environment. To understand the humanistic, economic and technological nature of environmental problems, he must have a sound general education. This professional education must prepare him for a life of continuing change, in which problems to be solved will be large and small, for every sort of function, in every type of climate and for every condition of budget.

The curriculum in architecture is six years in length embracing a four-year Bachelor of Arts in Pre-Architecture sequence with a balance of general education and professional study followed by two intensive years of graduate work leading to the first professional degree, Master of Architecture.

BUILDING CONSTRUCTION

The nation's leading industry in terms of annual dollar volume is Building Construction. Building contracting is a dynamic field and although organizations vary considerably in type, size and

complexity, those in leadership positions must invariably have capability (education) in management, construction science, relevant technical disciplines, and the humanities. The curriculum in Building Construction has been structured to provide young people with the unique balance of studies needed to equip them for key roles in the industry. There is a tremendous demand for graduates of the curriculum. The course is four years in length and leads to the Bachelor of Science degree in Building Construction.

CITY PLANNING

The City Planner is a member of an essential and complex profession concerned with the programming and guiding of urban and regional development. Our expanding society presents unusual opportunities for Planning graduates in private firms and on public agency staffs. When asked what made a good planner, a leading British professional replied, "A sensitive, creative leader who has lived a bit." He must be able to integrate recommendations of a wide range of specialists. The sociologist, economist, traffic engineer and ecologist, plays significant roles in urban growth and change, but the city planner and urban designer must bring the city to physical form with balance and imagination.

Students admitted as candidates for the Master of City Planning degree must have the following qualifications:

- (a) Meet the admissions requirements for the University Graduate School.
- (b) Have a baccalaureate degree approved by the school in such fields as: architecture, civil engineering, economics, landscape architecture, law, political science, or sociology.

Candidates entering the curriculum from a non-design discipline will be required to take a special parallel course designed for their needs, and accordingly may be excused from courses in which they have achieved proficiency.

ARCHITECTURE CURRICULUM

BACHELOR OF ARTS IN PRE-ARCHITECTURE

FIRST YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Arch 101 Introd. Art and Arch. . .	3 (1,6)	Arch 102 Introd. Art and Arch. . .	3 (1,6)
Engl 101 English Composition . . .	3 (3,0)	Engl 102 English Composition . . .	3 (3,0)
Hist 203 History of Civilization . .	3 (3,0)	Hist 204 History of Civilization . .	3 (3,0)
Math 106 Anal. Geom., Cal. I . . .	4 (4,0)	Math 205 Anal. Geom., Cal. II . . .	4 (4,0)
Modern Language (Elementary) . .	3 (3,1)	Modern Language (Elementary) . .	3 (3,1)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
<hr/>		<hr/>	
17		17	

156 Degrees and Curriculums

SECOND YEAR			
First Semester		Second Semester	
Arch 253 Basic Design I	4 (1,9)	Arch 254 Arch. Design II	4 (1,9)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Suvr. Engl. & Am. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)	Modern Language (Intermediate)	3 (3,0)
Modern Language (Intermediate)	3 (3,1)	Phil 425 Philos. of Sci.	3 (3,0)
Visual Studies I ^a	2 (0,6)	Visual Studies I ^a	2 (0,6)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
17		16	
THIRD YEAR			
Arch 315 Arch. History I	3 (3,0)	Arch 316 Arch. History II	3 (3,0)
Arch 353 Arch. Design III	5(1,12)	Arch 354 Arch. Design IV	5(1,12)
EM 201 Statics	3 (3,0)	EM 304 Mechanics of Materials	3 (3,0)
Elective Group I	6	Elective Group II	6
17		17	
FOURTH YEAR			
Arch 415 Arch. History III	3 (3,0)	Arch 416 Arch. History IV	3 (3,0)
Arch 453 Arch. Design V	5(1,12)	Arch 454 Arch. Design VI	5(1,12)
CE 308 Structural Analysis	4 (3,2)	CE 416 Structural Design	4 (3,2)
Engl 301 Public Speaking	3 (3,0)	Elective Group III	3
Visual Studies II†	2 (0,6)	Visual Studies II†	2 (0,6)
17		17	

^a Visual Studies I—Two courses of the following are required: Vis 205, 207, 209, 211, 213, 215.

† Visual Studies II—Two courses of the following are required: Vis 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316.

Elective Group I—At least six credits must be selected from the following courses: Econ 201, Econ 202, Econ 301, Econ 302.

Elective Group II—At least six credits must be selected from the following courses: Phil 201, Phil 302, Phil 303, Pol Sc 201, Pol Sc 202, Pol Sc 301, Soc 201, Soc 202, Soc 331.

Elective Group III—At least three credits must be selected from the following courses: Hist 310, Hist 402, Hist 411, Hist 412.

BUILDING CONSTRUCTION CURRICULUM

FIRST YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Arch Const 141 Elem. and Bldg. I	4 (2,6)	Arch Const 142 Elem. of Bldg. II	4 (2,6)
Arch 101 Intro. to Art and Arch.	3 (1,6)	Arch 102 Intro. to Art & Arch.	3 (1,6)
Engl 101 Engl. Composition	3 (3,0)	Econ 201 Prin. of Economics	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Engl 102 Engl. Composition	3 (3,0)
AS or MS—Basic	1 (2,1)	Math 205 Anal. Geom., Cal. II	4 (4,0)
<hr/>		AS or MS—Basic	1 (2,1)
15		<hr/>	
		18	
SECOND YEAR			
Arch Const 241 Elem. of Bldg. III	4 (2,6)	Arch Const 242 Elem. of Bldg. IV	4 (2,6)
CE 201 Terrest. Measurements	3 (2,3)	CE 299 Digital Computation	1 (0,3)
Econ 202 Prin. of Economics	3 (3,0)	EM 201 Statics	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)	Phil 425 Philos. of Sci.	3 (3,0)
AS or MS—Basic	1 (2,1)	IM 201 Intro. to Ind. Mgt.	3 (3,0)
<hr/>		AS or MS—Basic	1 (2,1)
18		<hr/>	
		18	
THIRD YEAR			
Acct 201 Prin. of Accounting	3 (3,0)	Acct 202 Prin. of Accounting	3 (3,0)
Arch Const 341 Bldg Const. I	4 (2,6)	Arch Const 342 Bldg. Const. II	4 (2,6)
Arch 315 Arch. History I	3 (3,0)	Arch 316 Arch. History II	3 (3,0)
EM 304 Mech. of Materials	3 (3,0)	CE 308 Structural Analysis	4 (3,2)
IM 312 Commercial Law	3 (3,0)	CE 320 Conc. & Bitum. Materials	2 (1,3)
Soc 201 Intro. to Sociology	3 (3,0)	Elective	3
<hr/>		<hr/>	
19		19	
FOURTH YEAR			
Arch Const 441 Bldg Const. III	4 (2,6)	Acct 303 Cost Accounting	3 (3,0)
Arch 415 Arch. History III	3 (3,0)	Arch Const 442 Bldg. Const. IV	4 (2,6)
Arch 575 Mechanical Plant	2 (2,0)	Arch 416 Arch. History IV	3 (3,0)
CE 416 Structural Design	4 (3,2)	Arch 576 Mechanical Plant	2 (2,0)
Engl 301 Public Speaking	3 (3,0)	Arch Const 432 Conc. Form Work	2 (2,0)
Soc 351 Indust. Sociology	3 (3,0)	Elective	3
<hr/>		<hr/>	
19		17	

COLLEGE OF ARTS AND SCIENCES

In addition to acting as a service school to all other colleges and schools of the University by furnishing nearly all of the instruction in the humanities, the physical sciences, and the social sciences, the College of Arts and Sciences offers seven major curriculums leading to the Bachelor of Arts, a curriculum in Arts and Sciences leading to the Bachelor of Arts, and a Nursing curriculum leading to the Associate of Arts in Nursing degree.

Major curriculums leading to the Bachelor of Science degree are Chemistry, Geology, Mathematics, Medical Technology, Physics and Pre-Medicine (Pre-Dentistry).

Major concentrations in the curriculum in Arts and Sciences leading to the Bachelor of Arts degree may be taken in the following areas: Chemistry, English, Geology, History, Mathematics, Modern Languages, Physics, Political Science, Psychology, or Sociology.

Furthermore, the College of Arts and Sciences offers programs leading to graduate degrees in most of these fields.

BACHELOR OF ARTS CURRICULUM

The curriculum leading to the Bachelor of Arts degree is designed to meet the needs of those students who desire a broad general education as a preparation for intelligent citizenship and for those who desire to teach in the secondary schools. The first two years are spent in introductory work in various areas, in order to give the student breadth of view and to enable him to take a more intelligent part in his own education. During the last two years the student concentrates in selected fields. This curriculum provides an excellent background for pre-law students, business, and journalism.

The work required in the Bachelor of Arts curriculum for the freshman year is as shown below, with the few exceptions noted depending on major or minor concentrations during the later years.

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Engl 101 Engl. Composition	3 (3,0)	Engl 102 Engl. Composition	3 (3,0)
Hist 203 Hist. of Civilization	3 (3,0)	Hist 204 Hist. of Civilization	3 (3,0)
Math 101 Math. Analysis*	3 (3,0)	Math 102 Math. Analysis*	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
Natural Science†	4	Natural Science†	4
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
<hr/>		<hr/>	
17		17	

* Those students planning to concentrate in Chemistry, Mathematics, or Physics, schedule Math 106, 205 instead of Math 101, 102. Those planning to concentrate in Geology, schedule Math 103, 104 and 106 instead of Math 101, 102.

† Election of a two semester sequence of the same Science is required which for chemistry or physics majors must be Ch 101, 102.

Preferably on entrance, and not later than the end of his sophomore year, each student in the Bachelor of Arts curriculum must select a primary and secondary (major and minor) field of concentration from the following:

<i>Major</i>	<i>Minor</i>
Chemistry	Biology
English	Chemistry
Geology	Economics
History	English
Mathematics	Fine Arts
Modern Languages	Geology
Physics	History
Political Science	Mathematics
Psychology	Modern Languages
Sociology	Political Science
	Physics
	Psychology
	Sociology

The major concentration requires 24 semester hours and the minor 15 semester hours above the sophomore level unless otherwise indicated.

These fit into the basic curriculum for the three upper-class years with minor variations depending on the specific major or minor selected.

Students who plan to take the Bachelor of Arts curriculum and expect to go into secondary school teaching, especially with major concentrations in English, History, or Mathematics, may elect Education courses required for teaching certificates as specified by the South Carolina Department of Education, such courses to be approved by their adviser in the subject-matter field.

The total number of hours required for the Bachelor of Arts curriculum varies from 128 to 132 depending on the major and minor concentrations.

SOPHOMORE YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
AS or MS—Basic.	1 (2,1)	AS or MS—Basic.	1 (2,1)
Approved Electives	10	Approved Electives	10
	<hr/> 17		<hr/> 17

JUNIOR YEAR

First Semester		Second Semester	
^{MUSIC} Humanities ^o	3	^{ENGLISH} Humanities ^o	3
Major	6	Major	6
Minor	3✓	Minor	3✓
Approved Elective	3	Approved Elective	3
<hr/> 15		<hr/> 15	

SENIOR YEAR

Major	6	Major	6
Minor	6✓	Minor	3✓
Social Sciences†	3✓	Social Sciences†	3
<hr/> 15		Approved Elective	3✓
		<hr/> 15	

^o Humanities include Art, English, Foreign Languages, Music, Philosophy or Religion.

† Social Sciences include Economics, History, Political Science, Psychology and Sociology.

Detailed information concerning the various combinations of majors and minors is as follows:

Biology (Secondary Field of Concentration Only). The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus 15 semester hours from the field of the biological sciences in addition to Bot 101 and Zool 101, 103. The courses selected must be approved by the student's adviser.

This secondary field of concentration is particularly recommended for those students majoring in geology.

BACHELOR OF ARTS CURRICULUM

CHEMISTRY

Both major and minor concentrations in chemistry are allowed for students in the Bachelor of Arts program. As a major field of concentration, the complete four-year curriculum is as shown below.

(See page 157 for *Freshman Year*)

SOPHOMORE YEAR

First Semester		Second Semester	
Ch 223 Org. Chem. ^o	3 (3,0)	Ch 224 Org. Chem. ^o	3 (3,0)
Ch 227 Org. Chem. Lab. ^o	1 (0,3)	Ch 228 Org. Chem. Lab. ^o	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III ..	4 (4,0)	Phys 202 General Physics	3 (3,0)
Phys 201 General Physics	3 (3,0)	Modern Language	3 (3,0)
Modern Language	3 (3,1)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)	Approved Elective	3
<hr/> 18		<hr/> 17	

JUNIOR YEAR

Chemistry Major	2	Chemistry Major	2
Minor	3	Minor	3
Elective	10	Elective	10
<hr/> 15		<hr/> 15	

SENIOR YEAR

Chemistry Major	6	Chemistry Major	6
Minor	3	Minor	3
Elective	6	Elective	6
<hr/> 15		<hr/> 15	

A minimum of 131 semester hours required for graduation.

^o The organic chemistry will count toward the 24 hours of the chemistry major.

Economics (As a Secondary Field of Concentration). The recommended program of study consists of Econ 201, 202 and 15 semester hours selected from the following (including 314 and 407): Econ 301, 302, 305, 306, 308, 309, 314, 403, 404, 407, 410, 412, 416, 420, 422, Ex St 462, IM 311, 404, 405, 406, Ag Ec 456.

English. For a *major* concentration, the recommended program of study consists of the required courses of the basic Bachelor of Arts curriculum and 24 semester hours of English numbered above 400, including the following:

Engl 402, 405 or 406, 423 or 424.

Three courses from the following are required:

Engl 409, 425, 427, 431, 436, 437, 443.

One course from the following is required:

Engl 415, 416, 435, 438, 439, 440, 441, 442.

One additional English course numbered higher than 400 will be added to meet the total semester hours required for the major.

Engl 304, Advanced Composition, or departmental certification of proficiency in composition is required.

The third year of a foreign language or the second year of two foreign languages is required, as well as Hist 308 and 309.

For a *minor* concentration in English, the recommended program of study consists of the required courses of the basic Bachelor of Arts curriculum and 15 semester hours of English numbered above 400, including:

Engl 405 or 406, 423 or 424.

One course from the following is required:

Engl 409, 425, 427, 431, 436, 443.

Additional electives from English courses numbered above 400 will be added as needed to meet the minimum of 15 semester hours required for the minor. Engl 304, Advanced Composition, or departmental certification of proficiency in composition is required.

Fine Arts (Secondary Field of Concentration Only). The recommended program of study consists of 15 semester hours of course work from the following courses: Arch 315, 316, 403, 415, 416, 511, 512; Engl 305, 311, 331, 332, 333; Mus 310, 315, 316, 362, 363, 364, 405, 406, 411; Phil 305; Vis 203, 205, 207, 209, 211, 213, 215, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416.

Geology. The recommended program in Geology consists of the required courses in the basic Bachelor of Arts curriculum with the

additional requirement that students majoring in Geology must take Math 103, 104 and 106 instead of Math 101 and 102 in the freshman year and Math 205 and 206. The latter two courses will be taken in place of electives in the sophomore year.

Twenty-four semester hours must be completed to fulfill the requirements for the primary field of concentration and 15 semester hours to fulfill the requirements for the secondary field of concentration. Courses for concentration are as follows:

Geol 201, 203, 204, 205, 306, 307, 309, 311, 402, 403, 404, 411, 412.

Additional approved electives will be added as needed to meet the minimum of 132 semester hours required for graduation.

History. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Hist 101, 102, Econ 201, Phil 201 or Phil 312, and the completion of the third year of a modern foreign language. History minors must take Hist 101, 102.

A major in history consists of 24 semester hours (including Hist 499, effective for those to be graduated after December 1968), and a minor of 15 hours. To fulfill the requirements students in the major must take a minimum of six hours and students in the minor a minimum of three hours from each of the following groups (effective for those to be graduated after August 1968):

Group A: Hist 306, 313, 314, 321, 410, 411, 412, 413.

Group B: Hist 308, 309, 310, 312, 402, 404, 408.

Group C: Hist 331, 332, 341, 342.

History majors will become eligible to take Hist 499 after they have completed 96 semester hours and a minimum of five courses in history at the 300-400 level (excluding Hist 301).

Mathematics. For a major concentration, the recommended program of study consists of the required courses of the basic Bachelor of Arts curriculum with the additional requirement that students majoring or minoring in Mathematics must take Math 106 and 205 instead of Math 101 and 102 in the freshman year. Math 206 and 305 must be taken in place of electives in the sophomore year.

Twenty-four semester hours of mathematics above the sophomore level must be completed to fill the requirements for the primary field of concentration, including the following:

Math 402, 411, 453 or 463, 454 or 464.

At least two courses from the following:

Math 306, 313, 412, Comp Sc 310, and any 400-level course.

Fifteen semester hours must be completed to fill the requirements for the secondary field of concentration including the following:§
Math 205, 206.

At least two courses from the following:

Math 305, 306 (or 208), 313, Comp Sc 310, and any 400-level course.

For a minor in a physical science:

Twenty-three semester hours must be completed in one of the sciences. (This includes the basic requirement in a physical science.) Or,

Fifteen hours in another physical science other than that offered to fill the basic requirement.

The minimum number of semester hours for graduation with a major concentration in mathematics will be 129 hours.

Modern Languages. The recommended program in Modern Languages consists of the required courses of the basic Bachelor of Arts curriculum and 24 semester hours in one language or 18 semester hours in one language and 12 semester hours in a second language to fulfill the requirements for the primary field of concentration. Completion of 15 semester hours in one language is required to fulfill the requirements for the secondary field of concentration. Only courses numbered 301 and above may be used in fulfilling these requirements. Courses for concentration shall be chosen from the following, all of which are 3 cr. (3,0):

Fr 303,* 304,* 305,* 306,* 403, 404, 405, 406, 407, 408.

Ger 303,† 304,† 305,† 306,† 403, 404, 406.

Span 303,‡ 304,‡ 305,‡ 306,‡ 401, 402, 405, 406.

Additional approved electives will be added as needed to meet the minimum of 128 semester hours required for graduation.

* Required of students with the primary field of concentration in French.

† Required of students with the primary field of concentration in German.

‡ Required of students with the primary field of concentration in Spanish.

§ Students who have taken Math 101, 102, 103 should consult the Department of Mathematics about a minor in mathematics.

Physics. Major and minor concentrations in Physics are offered in the Bachelor of Arts program. The first two years of the curriculum for a major in Physics are shown below. The last two years are of the same form as the general Bachelor of Arts curriculum.

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Engl 101 English Comp.	3 (3,0)	Engl 102 English Composition . . .	3 (3,0)
Hist 203 Hist. of Civilization	3 (3,0)	Hist 204 Hist. of Civilization . . .	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Math 205 Anal. Geom., Cal. II . .	4 (4,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
Phys 101 Current Physics	0 (0,2)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		

SOPHOMORE YEAR

First Semester

Engl 203 Survey of Engl. Lit. . . .	3 (3,0)
Phys 122 Mech. & Wave Phen. . . .	3 (3,0)
Math 206 Anal. Geom., Cal. III. . . .	4 (4,0)
Modern Language	3 (3,1)
Approved Electives	3
AS or MS—Basic	1 (2,1)
	<hr/> 17

Second Semester

Engl 204 Surv. of Engl. & Am. Lit. . .	3 (3,0)
Phys 221 Thermal & Elect. Phen. . .	3 (3,0)
Phys 223 Engr. Physics Lab.	1 (0,3)
Math 306 Diff. Equations	3 (3,0)
Modern Language	3 (3,0)
Approved Electives	3
AS or MS—Basic	1 (2,1)
	<hr/> 17

For a major in Physics, 24 semester hours are required which must be chosen from Phys 222, 224, or any numbered 300 or above. However, Phys 321, 322, 341 and 455 must be included. A total of 130 credit hours is required for a major in Physics.

For a minor in Physics, 15 semester hours are required including Phys 221 and 222.

Political Science. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Pol Sc 201, 202. A major consists of 24 semester hours in courses drawn from a minimum of four of these fields of Political Science:

1. American Government—Pol Sc 302
2. Public Administration—Pol Sc 321
3. Constitutional Law—Pol Sc 331, 432
4. Political Behavior—Pol Sc 341, 442, 443.
5. Political Thought—Pol Sc 351, 352
6. International Relations—Pol Sc 361, 462, 463
7. Comparative Governments—Pol Sc 371, 372

A minor consists of 15 semester hours beyond Pol Sc 201, 202 in courses drawn from at least three of the above fields.

Psychology. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Psych 201, 202, and Math 203. A major consists of 24 semester hours drawn from the following courses (including Psych 363) Psych 302, 321, 331, 341, 351, 361, 363, 401, 402, 403. A minor in psychology consists of 15 semester hours drawn from the above courses (including Psych 363) and Ed 302, 335, if taken during or before 1967-1968.

Sociology. The recommended program of study consists of the required courses in the Bachelor of Arts curriculum plus Soc 201, 202, Econ 201, 202, Phil 201, 302, Pol Sci 301, and Math 203. Sociology minors must take Soc 201, 202.

A major in sociology consists of 24 and a minor, 15 semester hours beyond Soc 201, 202. Courses should be selected from the following (including Soc 411, 421 for majors): Pol Sc 341, Soc 311, 321, 331, 341, 351, 411, 421, 431, 451, RS 359.

Additional approved electives will be added as needed to meet the minimum of 128 semester hours required for graduation.

BACHELOR OF SCIENCE CURRICULUMS

CHEMISTRY

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the science-oriented community are open to the student whose education is built around the principles of this discipline.

The curriculum in chemistry provides, through its advanced chemistry courses and large number of elective hours, a program that may be suited to a student's specific needs, whether he be interested in graduate work; industrial chemistry, sales or supervision; or related professional fields. Significant features of the program are the student's extensive participation in experimental laboratory work and his association with teachers who also pursue research activities. Because the undergraduate and graduate studies are closely connected, an undergraduate may elect to take part in a research investigation during his junior and senior years.

CHEMISTRY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Ch 102 Gen. Chemistry	4 (3,3)
Engl 101 Engl. Composition	3 (3,0)	Engl 102 Engl. Composition	3 (3,0)
Ger 101 Elementary German	3 (3,1)	Ger 102 Elementary German	3 (3,1)
Hist 203 History of Civil.	3 (3,0)	Math 205 Anal. Geom., Cal. II	4 (4,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Phys 122 Mech. & Wave Phen.	3 (3,0)
AS or MS—Basic.	1 (2,1)	AS or MS—Basic.	1 (2,1)
18		18	

SOPHOMORE YEAR

Ch 223 Org. Chem.	3 (3,0)	Ch 219 Chemical Principles	2 (2,0)
Ch 225 Org. Chem. Lab.	2 (0,6)	Ch 224 Org. Chem.	3 (3,0)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Ch 226 Org. Chem. Lab.	2 (0,6)
Math 206 Anal. Geom., Cal. III	4 (4,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Phys 221 Thermal & Elect. Phen.	3 (3,0)	Phys 222 Optics & Mod. Phys.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)	Elective*	3
17		AS or MS—Basic.	1 (2,1)
		18	

JUNIOR YEAR

Ch 313 Quan. Analysis	3 (3,0)	Ch 332 Phys. Chemistry	3 (3,0)
Ch 315 Quan. Anal. Lab.	2 (0,6)	Ch 334 Phys. Chemistry Lab.	2 (0,6)
Ch 331 Phys. Chemistry	3 (3,0)	Electives*	12
Ch 333 Phys. Chemistry Lab.	2 (0,6)	17	
Ch 442 Chem. Lit.	1 (1,0)		
Math 306 Ord. Diff. Equations.	3 (3,0)		
Elective*	3		
17			

SENIOR YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 402 Inorg. Chem.	3 (3,0)	Ch 411 Instr. Analysis	4 (2,6)
Electives ^o	15	Electives ^o	13
<hr/>		<hr/>	
18		17	

A minimum of 140 semester hours required for graduation.

^o Electives:

For the degree of B.S. in Chemistry, a student must elect at least 18 hours in English, Languages, History, Political Science, Economics, Sociology, Psychology, etc.

GEOLOGY

Geology is a relatively young science. The word itself is only about 200 years old. It means the science of the earth. Such a science must be involved with the physics and chemistry of materials which comprise the earth, but equally important it must consider the development of life on earth. Fundamentally then the chemical, physical, and biological responses to various environments on and in the earth must be thoroughly understood so that the historical development of the earth may be deduced, predictions of the future inferred, and natural resources intelligently developed.

Industry in our modern civilization is dependent on minerals and rocks. Metals have their origin in them as do our chief power sources, coal, petroleum, and radio-active minerals. The power and wealth of nations depend largely on their exploration, control and development of mineral wealth.

Geologists today are entering upon a new era. Widening horizons are indicated by employment not only in mineral producing industries but by railroads, municipalities, engineering firms, and water authorities. For this reason, it is important that the geologists' education rest on a broad yet rigorous base.

This curriculum provides the student with the fundamentals in the geological sciences and excellent support in the other basic sciences. On successful completion of the Bachelor of Science program the student should be adequately prepared for employment or for graduate study in any field of geology.

GEOLOGY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Engl 101 English Composition ..	3 (3,0)	Engl 102 English Composition ...	3 (3,0)
Hist 101 American History	3 (3,0)	Hist 102 American History	3 (3,0)
Math 106 Anal. Geom., Cal. I ...	4 (4,0)	Math 205 Anal. Geom., Cal. II ...	4 (4,0)
Modern Language ^o	3 (3,1)	Modern Language	3 (3,1)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
<hr/>		<hr/>	
18		18	

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Engl 203 Survey of Engl. Lit. . . .	3 (3,0)	Bot 101 General Botany	4 (3,3)
Geol 201 Physical Geology	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. .	3 (3,0)
Geol 203 Phys. Geol. Lab.	1 (0,3)	Geol 204 Historical Geology	3 (3,0)
Math 206 Anal. Geom., Cal. III. . .	4 (4,0)	Geol 205 Historical Geol. Lab. . . .	1 (0,3)
Modern Language	3 (3,1)	Phys 122 Mech. & Wave Phen. . . .	3 (3,0)
Zool 101 Gen. Zoology	3 (3,0)	Modern Language	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
<hr/>		<hr/>	
19		18	

JUNIOR YEAR

Geol 306 Mineralogy	3 (2,3)	Ex St 401 Introd. Statistics	3 (2,3)
Phys 221 Thermal & Elect. Phen. .	3 (3,0)	Geol 309 Petrology	3 (2,3)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Geol 311 Strat. and Sed.	3 (3,0)
Electives†	9	Phys 222 Optics & Mod. Phys. . . .	3 (3,0)
<hr/>		Phys 224 Engr. Phys. Lab.	1 (0,3)
16		Electives†	2

Summer Geology Field Camp,† 6 semester hours

15

SENIOR YEAR

Geol 402 Structural Geology	3 (2,2)	Geol 307 Optical Mineralogy	3 (2,2)
Geol 403 Invert. Paleontology . . .	3 (2,3)	Geol 404 Economic Geology	3 (3,0)
Approved Electives†	9	Approved Electives†	9
<hr/>		<hr/>	
15		15	

A minimum of 140 semester hours is required for graduation.

* German or French is recommended. Two years in the same language is required.

† At least 12 hours must be elected from the humanities and/or social sciences.

† Clemson University does not conduct a field camp in geology, but attendance at a camp approved by the geology staff is required.

MATHEMATICS

The mathematics curriculum is designed to give basic training to those students whose ultimate goal is the creation of mathematical concepts and methods that are of basic and general applicability to the desired subject whether it be physics, computer science, communication theory, data processing, statistics, operations research, economics, or any branch of the physical sciences in which a strong mathematical background is a prerequisite. In addition to containing basic mathematics courses which are needed to prepare the student for the present day mathematical world, the curriculum allows the student in his junior year, to select one of five optional sets of courses which will provide an introduction to an area where mathematics is applied. These options are physics operations research, computer science, managerial science and communications.

This curriculum provides an adequate background for the student who plans to pursue graduate study in mathematics and at the same time adequately prepares the student to fill many interesting positions in space research, computer development, business, or government research.

MATHEMATICS CURRICULUM

FRESHMAN YEAR			
First Semester		Second Semester	
Ch 101 General Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Engl 101 English Composition	3 (3,0)	Engl 102 English Composition	3 (3,0)
Fr 101 Elem. French	3 (3,1)	Fr 102 Elem. French	3 (3,1)
or Ger 101 Elem. German	3 (3,1)	or Ger 102 Elem. German	3 (3,1)
Math 106 Anal. Geom., Cal. I	4 (4,0)	Math 205 Anal. Geom., Cal. II	4 (4,0)
AS or MS—Basic	1 (2,1)	Phys 122 Mech. and Wave Phen.	3 (3,0)
	15	AS or MS—Basic	1 (2,1)
			18
SOPHOMORE YEAR			
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Fr 201 Inter. French	3 (3,1)	Fr 202 Inter. French	3 (3,0)
or Ger 201 Inter. German	3 (3,1)	or Ger 202 Inter. German	3 (3,0)
Hist 204 Hist. of Civil.	3 (3,0)	Math 305 Found. of Analysis	3 (3,0)
Math 208 Anal. Geom., Cal. III	4 (4,0)	Math 306 Diff. Equations	3 (3,0)
Phys 221 Therm. & Elec. Phen.	3 (3,0)	Phys 222 Optics & Mod. Phys.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	18		17
JUNIOR YEAR			
Comp Sc 310 Introd. to Algorith. Processes	3 (2,3)	Math 454 Adv. Cal. II	3 (3,0)
Econ 201 Principles of Econ.	3 (3,0)	or Math 464 Math. Anal. II¶	3 (3,0)
Engl 301 Public Speaking	3 (3,0)	Math Elective*	3 (3,0)
Math 411 Linear Algebra	3 (3,0)	Option†	3 (3,0)
Math 453 Advanced Calculus I	3 (3,0)	Elective‡	6 (6,0)
or Math 463 Math. Analysis I¶	3 (3,0)		15
	15		
SENIOR YEAR			
Math 402 Theory of Probability	3 (3,0)	Math 403 Statistical Inference	3 (3,0)
Math 412 Introd. to Mod. Alg.	3 (3,0)	or Math 404 Stochastic Processes	3 (3,0)
Option†	3	or Math 405 Stat. Th. & Meth. II	3 (3,0)
Elective‡	6	Option†	3
	15	Elective‡	3
		Math. Elective§	6
			15

A minimum of 128 credit hours required for graduation.

* The elective mathematics courses are as follows: Math 313, 403, 404, 405, 407, 408, 413, 415, 429, 451, 452, 455, 457, 458, Comp Sc 311, 409, 427, 428, and approved mathematics courses in the 800 series.

† The options are as follows:

Physics: Phys 321, 341, and one of Phys 351, 322, 441.

Operations Research: IE 404, 411, Math 429, 452, ME 481.

Managerial Science: Econ 202, IM 404, ME 481, and one of Econ 314, Mgt Sc 311.

Communications: EE 307, 308, 320, 324, 410, and recommended but not required: EE 327, 328.

Computer Science: Math 429, 452, Comp Sc 311, 409, and one of Comp Sc 427, 428.

‡ The electives may be taken from those courses which the catalog lists as approved courses in the College of Arts and Sciences.

§ Those who expect to go to graduate school should select Math 413 and 415 for these credits.

¶ Those who do not expect to go to graduate school will in general prefer to take Math 453, 454 instead of Math 463, 464.

MEDICAL TECHNOLOGY

Medical technologists are individuals who are qualified to perform a wide variety of chemical, microscopical, and bacteriological tests to aid physicians in the detection, diagnosis, and treatment of disease. They are usually responsible to a medical doctor, generally a pathologist (one who specializes in the nature and causes of disease). Some technologists work under the supervision of a medical scientist who specializes in a particular branch of clinical science.

The largest group of medical technologists work in hospital laboratories and the demand exceeds the supply at the present time.

In cooperation with the Anderson Memorial Hospital, the Greenville General Hospital, and the Spartanburg General Hospital, Clemson offers a four-year curriculum leading to the Bachelor of Science in Medical Technology. The first three years of this program are spent in class work at Clemson. For the fourth year the student resides in Anderson, Greenville, or Spartanburg, where he will take specified courses under instructors on the staffs of one of the hospitals listed according to his choice and previous agreement with the hospital.

Upon satisfactory completion of the prescribed courses, the student will be awarded the Bachelor of Science degree in Medical Technology.

During the final year of work both room and board are furnished by the hospital.

MEDICAL TECHNOLOGY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Bot 101 General Botany	4 (3,3)
Engl 101 Engl. Composition	3 (3,0)	Ch 102 General Chemistry	4 (3,3)
Hist 101 American History	3 (3,0)	Engl 102 Engl. Composition	3 (3,0)
Math 101 Mathematical Analysis	3 (3,0)	Math 102 Mathematical Analysis	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
<hr/>		<hr/>	
17		18	

SOPHOMORE YEAR

Ch 223 Org. Chem.	3 (3,0)	Ch 224 Org. Chemistry	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 228 Org. Chemistry Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Econ 201 Prin. of Economics	3 (3,0)
Hist 102 American History	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Zool 101 Gen. Zoology	3 (3,0)	Phys 201 Gen. Physics	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)	Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
<hr/>		<hr/>	
18		18	

JUNIOR YEAR

Ch 313 Quan. Analysis	3 (3,0)	Bact 301 Gen. Bacteriology	4 (3,3)
Ch 315 Quan. Anal. Lab.	2 (0,6)	Hist 204 Hist. of Civilization	3 (3,0)
Econ 202 Prin. of Economics	3 (3,0)	Psych 201 Gen. Psychology	3 (3,0)
Hist 203 Hist. of Civilization	3 (3,0)	Zool 302 Vertebrate Embryology	3 (2,3)
Phys 202 Gen. Physics	3 (3,0)	Electives	3
Phys 204 Gen. Physics Lab.	1 (0,3)	<hr/>	
Zool 301 Comp. Vert. Anat.	3 (2,3)	16	
<hr/>		<hr/>	
18			

The minimum number of credit hours required for graduation in this curriculum is 141.

SENIOR YEAR
(52 Weeks)

Med Tech 401	Serology and Immunology	4 (21,10, 49)*
Med Tech 402	Microbiology	7 (56, 6,470)
Med Tech 403	Hematology	5 (12,32,276)
Med Tech 404	Blood Bank	3 (8,20,132)
Med Tech 405	Cytology	1 (2,12, 26)
Med Tech 406	Histology	3 (20,30,190)
Med Tech 407	Urinalysis	2 (10, 8,102)
Med Tech 408	Chemistry	10 (40,50,470)
Med Tech 409	Radioisotopes	1 (2, 0, 7)

36

PHYSICS

The curriculum in Physics is intended to give a thorough knowledge of the fundamental principles of physics. This course combines sound theoretical training and extensive laboratory practices in the various branches of physics with considerable work in the field of Mathematics. On completing this curriculum the student should be prepared to enter research in an industrial or government laboratory; the curriculum also provides an excellent background for advanced work in applied science, or for graduate work in Physics.

PHYSICS CURRICULUM

FRESHMAN YEAR

First Semester

Ch 101 General Chemistry	4 (3,3)
Engl 101 English Comp.	3 (3,0)
Fr 101 Elem. French	3 (3,1)
or Ger 101 Elem. German*	3 (3,1)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Phys 101 Current Physics	0 (0,2)
AS or MS—Basic	1 (2,1)

15

Second Semester

Ch 102 General Chemistry	4 (3,3)
Engl 102 English Composition	3 (3,0)
Fr 102 Elem. French	3 (3,1)
or Ger 102 Elem. German*	3 (3,1)
Math 205 Anal. Geom., Cal. II	4 (4,0)
Phys 132 General Physics I	3 (3,0)
AS or MS—Basic	1 (2,1)

18

SOPHOMORE YEAR

Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)	Math 306 Diff. Equations	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
Phys 231 Gen. Phys. II	3 (3,0)	Phys 232 Gen. Physics III	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
Approved Elective	3	Approved Electives	6

15

17

JUNIOR YEAR

Hist 204 History of Civilization	3 (3,0)	Phys 322 Mechanics II	3 (3,0)
Math (as approved)†	3 (3,0)	Phys 326 Exp. Physics II	4 (2,6)
Phys 321 Mechanics I	3 (3,0)	Phys 341 Elect. & Magnetism	3 (3,0)
Phys 325 Exp. Phys. I	4 (2,6)	Approved Electives	6
Approved Elective	3		

16

16

SENIOR YEAR

Phys 441 Elect. and Magn.	3 (3,0)	Physics (as approved)	3 (3,0)
Phys 455 Quantum Phys. I	3 (3,0)	Phys 432 Phys. Optics	3 (3,0)
Phys 465 Thermo and Stat. Mech.	3 (3,0)	Approved Electives	9
Approved Electives‡	6		

15

15

* First figure represents lecture hours, second figure represents seminar hours, and third figure represents clinical practice hours.

A minimum of 127 semester hours is required for graduation.

* Russ 101, 102 may be substituted.

† Recommend Math 411.

‡ Recommend Math 453, 454.

PRE-MEDICINE AND PRE-DENTISTRY

The curriculum in Pre-Medicine and Pre-Dentistry is designed to meet the general entrance requirements of standard medical and dental colleges. Since, however, requirements for entrance to various medical and dental schools are not uniform, the student before choosing his electives should consult the specific requirements of the college of his preference.

Those preparing for the study of medicine are advised to complete four years of undergraduate work before entering a medical school, although some medical colleges will accept a student after three years of Pre-Medicine, and most dental colleges will accept good students after three years.

PRE-MEDICINE AND PRE-DENTISTRY CURRICULUM

FRESHMAN YEAR			
First Semester		Second Semester	
Ch 101 General Chemistry	4 (3,3)	Bot 101 General Botany	4 (3,3)
Engl 101 Engl. Composition	3 (3,0)	Ch 102 General Chemistry	4 (3,3)
Hist 101 American History	3 (3,0)	Engl 102 Engl. Composition	3 (3,0)
Math 101 Mathematical Analysis	3 (3,0)	Math 102 Mathematical Analysis	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
17		18	
SOPHOMORE YEAR			
Ch 223 Org. Chem.	3 (3,0)	Ch 224 Org. Chem.	3 (3,0)
Ch 227 Org. Chem. Lab.	1 (0,3)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Econ 201 Prin. of Economics	3 (3,0)
Hist 102 American History	3 (3,0)	Engl 204 Survey of Engl. and Amer. Lit.	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Zool 101 Gen. Zoology	3 (3,0)	Phys 201 Gen. Physics	3 (3,0)
Zool 103 Gen. Zool. Lab.	1 (0,3)	Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
18		18	
JUNIOR YEAR			
Econ 202 Prin. of Economics	3 (3,0)	Gen 302 Genetics	3 (2,3)
Hist 203 Hist. of Civilization	3 (3,0)	Hist 204 History of Civilization	3 (3,0)
Phys 202 Gen. Physics	3 (3,0)	Psych 201 General Psychology	3 (3,0)
Phys 204 Gen. Physics Lab.	1 (0,3)	Zool 301 Comp. Vert. Anat.	3 (2,3)
Elective	7	Elective	3
17		15	
SENIOR YEAR			
Engl 301 Public Speaking	3 (3,0)	Psych 302 Social Psych.	3 (3,0)
Soc 201 Introd. Sociology	3 (3,0)	Electives	12
Zool 302 Vertebrate Embryology	3 (2,3)		
Electives	6		
15		15	

A minimum of 133 semester hours required for graduation.

PRE-PHARMACY

Pharmacy is a five-year program, the first two years of which may be taken at Clemson and the student who does pre-pharmacy here will, as a rule, transfer to the S. C. Medical College. His degree, once he completes the final three years, will be in Pharmacy and will be awarded by the School of Pharmacy of the Medical College, not by Clemson. In the event the student plans to enter the Pharmacy School at the University of South Carolina after two years at Clemson, he is advised to schedule Ch 223, 224, 227, 228 in place of the foreign language during his second year.

PRE-PHARMACY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Bot 101 General Botany	4 (3,3)
Engl 101 English Composition	3 (3,0)	Ch 102 General Chemistry	4 (3,3)
Hist 101 American History	3 (3,0)	Engl 102 English Composition	3 (3,0)
Math 101 Mathematical Analysis	3 (3,0)	Math 102 Mathematical Analysis	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		18

SOPHOMORE YEAR

Phys 201 Gen. Physics	3 (3,0)	Phys 202 Gen. Physics	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)	Phys 204 Gen. Physics Lab.	1 (0,3)
Engl 203 Survey of Eng. Lit.	3 (3,0)	Engl 204 Survey of Engl. and	
Hist 102 American History	3 (3,0)	Amer. Literature	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Zool 101 Gen. Zoology	3 (3,0)	AS or MS—Basic	1 (2,1)
Zool 103 Gen. Zool. Lab.	1 (0,3)	Electives	3
AS or MS—Basic	1 (2,1)	Social Science Elective (other	
	18	than Econ 201)	3
			17

ASSOCIATE IN ARTS IN NURSING

In order to assist in decreasing the shortage of trained nurses existing in the State at the present time, Clemson University, in cooperation with the Anderson Memorial Hospital in Anderson, S. C., instituted a two-year Nursing Program leading to the degree of Associate in Arts in Nursing. Approximately half of the course work is taken on the Clemson campus and the remainder is taken in the new facilities at the Anderson Memorial Hospital.

NURSING CURRICULUM

<i>First Semester</i>		<i>Second Semester</i>	
Nurs 101 Intro. to Nursing	6 (3,9)	Engl 101 English Composition	3 (3,0)
Nurs 103 Prin. of Nutrition	4 (3,3)	Nurs 102 Acute Illnesses	6 (2,12)
Nurs 105 Integrated Science I	4 (3,3)	Nurs 106 Integrated Science II	4 (3,3)
Psych 101 Psych. of Nursing	3 (3,0)	Psych 211 Growth and Develop.	3 (3,0)
	17		16

SUMMER SESSION (6 Weeks)

Nurs 104 Medical Surgical Nursing I 5 (3,6)

<i>Third Semester</i>		<i>Fourth Semester</i>	
Engl 102 English Composition	3 (3,0)	Nurs 201 Psychodynamic Nursing	5 (3,6)
Nurs 202 Pediatric Nursing	5 (3,6)	Nurs 204 Mat. and Newborn Care	5 (3,6)
Nurs 206 Medical-Surg. Nurs. II.	6 (3,9)	Psych 402 Abnormal Psychology	3 (3,0)
Soc 101 Sociology for Nurses	3 (3,0)	Soc 311 The Family	3 (3,0)
	17		16

APPROVED ELECTIVES FOR STUDENTS IN THE COLLEGE OF ARTS AND SCIENCES

The following are approved electives in the College of Arts and Sciences:

All undergraduate courses taught in the College of Arts and Sciences except the following:

Ch 450, Engl 351, Geol 406, Phys 460, Psych 101, 211, Soc 101.

Certain upper-level courses, not given in the College of Arts and Sciences, listed below, plus others recommended in a particular Arts and Sciences curriculum:

Acct 201, 202; Ag Ec 352, 357, 456; Arch 315, 316, 403, 415, 416, 511, 512; Bact 301, 401; Bot 101, 352, 356, 404, 451, 455; Econ 201, 202, 301, 302, 305, 306, 308, 309, 314, 403, 404, 407, 410, 412, 416, 420, 422; Ed 301, 302, 335, 405, 406; Ent 301, 405, 408, 455; Ex St 402, 462; Gen 302; IM 305, 307, 312, 313, 322, 404; 415; Mus 310, 315, 316, 361, 362, 363, 364, 405, 406, 411; Vis 203, 205, 207, 209, 211, 213, 215, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416; Zool 101, 103, 301, 302, 307, 403, 404, 405.

In exceptional instances certain other courses, but not in excess of 6 semester hours for the Bachelor of Arts program and 9 hours for other Arts and Sciences curriculums, may be approved by the class adviser and the Dean of the College of Arts and Sciences.

SCHOOL OF EDUCATION

The School of Education provides professional programs designed to prepare undergraduate and graduate students for careers in the field of Education. These curriculums are organized to give students the opportunities to (1) acquire a broad general education through liberal arts and science courses; (2) develop depth of knowledge in the teaching area; (3) gain an understanding of the historical, philosophical and psychological backgrounds of American Education; and (4) acquire knowledge of and skill and experience in using effective teaching techniques.

Curriculums for those preparing to teach have been especially designed by a committee from each department offering a teaching major and the School of Education. The Clemson University Teacher Education Committee, composed of four representatives from the teaching-major departments and four public-school administrators, serves in a curriculum advisory capacity to the Dean of the School of Education.

The School of Education offers courses in Music Education, Agricultural Education, Elementary Education, Industrial Education, Recreation and Park Administration, and Secondary Education.

Programs leading to the Bachelor of Science degree are available in Agricultural Education, Industrial Education, Recreation and Park Administration, and Science Teaching (Biological Science, Chemistry, Physics, or Mathematics). Students preparing to teach in these fields should register as freshmen in the appropriate curriculum in the School of Education.

Students preparing to teach Economics, English, History, Mathematics, French, German, Spanish, Natural Sciences, Psychology, or Sociology should register in the Bachelor of Arts program in Secondary Education. Those preparing for the elementary level should register for the Bachelor of Arts program in Elementary Education.

Any student who has been admitted to the University and who is eligible for continuing enrollment may be admitted to the School of Education. However, admission to specific curriculums is selective and requires meeting established criteria. Students who transfer to the School of Education as upperclassmen will be required to meet all the basic requirements for admission to that Education curriculum.

Application to a specific curriculum should be made to the office of the Dean or to the department concerned during the semester preceding that in which the student wishes to obtain admission. Completion of Sc Ed Form 01 and a personal interview are required as part of the application to a specific teacher education curriculum. Sc Ed Form 02, Application for Directed Teaching, must be filed with the faculty adviser no later than the fifth week of the semester preceding the one in which student teaching is to be scheduled. Sc Ed Form 03, Observation and Participation Data, must be completed prior to registration for Directed Teaching.

BACHELOR OF ARTS CURRICULUMS

ELEMENTARY EDUCATION

The curriculum in Elementary Education leads to a Bachelor of Arts degree in Elementary Education. It prepares students for teaching positions on the elementary level. Provisions are made for more detailed study in an instructional interest area. A minimum of 134 semester hours is required for graduation.

ELEMENTARY EDUCATION CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition	3 (3,0)
Engl 101 English Composition	3 (3,0)	Hist 102 American History	3 (3,0)
Hist 101 American History	3 (3,0)	Math 116 Contemporary Math for Elementary Teachers II	3 (3,0)
Math 115 Contemporary Math for Elementary Teachers I	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science*	4
Science*	4	AS or MS	1 (2,1)
AS or MS	1 (2,1)		
	17		17

SOPHOMORE YEAR

Engl 203 Survey of Engl. Lit. ...	3 (3,0)	Engl 204 Sur. of Engl. & Am. Lit. ...	3 (3,0)
Hist 203 History of Civilization ...	3 (3,0)	Hist 204 History of Civilization ...	3 (3,0)
Math 215 Algebra for Elem. Teach. ...	3 (3,0)	Math 216 Geom. for Elem. Teach. ...	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Science*	4	Science*	4
AS or MS	1 (2,1)	AS or MS	1 (2,1)
	17		17

JUNIOR YEAR

Ed 301 History of American Ed. ...	3 (3,0)	Ed 302 Educational Psychology ...	3 (3,0)
Engl 351 Children's Literature ...	3 (3,0)	Hist 313 S. C. History	3 (3,0)
In Ed 372 Arts and Crafts	3 (2,3)	Social Science Elective†	3
Mus 400 Music in Elementary ...	3 (3,0)	Interest Area ‡	3
Social Science Elective†	3	Electives	6
Interest Area ‡	3		
	18		18

SENIOR YEAR

Arch 403 Introd. to Visual Arts ...	3 (3,0)	Ed 458 Health Education	3 (3,0)
Ed 334 Child Growth & Develop. ...	3 (3,0)	Ed 480 Methods & Mater. in Elem. ...	3 (3,0)
Ed 461 Teaching Read. in Elem. ...	3 (3,0)	Ed 481 Directed Teaching	6 (1,15)
Interest Area ‡	6	Mus 310 Music Appreciation	3 (3,0)
	15		15

* Must include Bot 101, Zool 101, 103 and a two-semester sequence in Chemistry, Geology or Physics.

† Economics, Political Science, Sociology, Philosophy, Religion.

‡ Interest Area: 12 semester hours in one of these areas: English, Fine Arts, Mathematics, Modern Languages, Natural Sciences, Social Sciences, Special Education.

SECONDARY EDUCATION

Programs leading to a Bachelor of Arts degree in Secondary Education are available to students preparing to teach Economics, English, History, Mathematics, French, German, Spanish, Natural Sciences, Psychology, or Sociology on the high school level. The teaching field should be selected as early as possible in order that appropriate freshman and sophomore courses may be taken

Each curriculum requires a major concentration in the teaching field. Specific courses and sequences have been designated by teacher education committees to meet requirements for those planning to teach. Students who have elective courses in the teaching area should consult the departmental adviser prior to scheduling these courses.

The Professional Education courses must be completed in sequence prior to registering for the block schedule. Application to Directed

Teaching (Ed 412) should be made in writing no later than the fifth week of the semester preceding the one in which student teaching is to be scheduled. A student whose cumulative grade-point ratio is lower than the requirement for graduation will not be permitted to register for Directed Teaching.

Education 412 is conducted on a full-day basis for one-half semester. Students taking Ed 412 will register for Ed 424, 458 and Mus 310, these three courses being taught on a six-day basis during the first half of the semester.

SECONDARY EDUCATION CURRICULUMS

TEACHING AREA: ECONOMICS

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition....	3 (3,0)
Engl 101 English Composition...	3 (3,0)	Hist 204 Hist. of Civilization....	3 (3,0)
Hist 203 History of Civilization...	3 (3,0)	Math 102 Math. Anal.	3 (3,0)
Math 101 Math. Anal.	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science ^o	4
Science ^o	4	AS or MS—Basic	1 (2,1)
AS or MS—Basic.....	1 (2,1)		
	17		17
SOPHOMORE YEAR			
Engl 203 Survey of Engl. Lit. ...	3 (3,0)	Acct 201 Prin. of Accounting....	3 (3,0)
Econ 201 Prin. of Econ.	3 (3,0)	Econ 202 Prin. of Economics....	3 (3,0)
Math 203 Elem. Stat. Infer.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Science ^o	4	Science ^o	4
AS or MS—Basic.....	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		17
JUNIOR YEAR			
Ed 301 History of Am. Ed.....	3 (3,0)	Ed 302 Educ. Psych.	3 (3,0)
Teaching Major	9	Teaching Major	9
Elective	3	Elective	3
	15		15
SENIOR YEAR			
Arch 403 Introd. to Vis. Arts....	3 (3,0)	Ed 412 Direct. Teaching†	6(1,15)
Ed 335 Adol. Growth & Dev. ...	3 (3,0)	Ed 424 Meth. & Mat. in	
Ed 498 Sec. Sch. Reading	3 (3,0)	Secondary Schools	3 (3,0)
Teaching Major	6	Ed 458 Health Education	3 (3,0)
	15	Mus 310 Music Appreciation	3 (3,0)
			15

^o Bot 101, Zool 101, 103; and a two-semester sequence in Chemistry, Physics or Geology.

† This semester is a block schedule and must be taken as listed.

The teaching major requires twenty-four semester hours of junior and senior courses consisting of Econ 314, 407; nine semester hours from Econ 302, 403, 404, 410, 412, 420; distributed as follows:

Group A: Econ 314, 407.

Group B: Three courses from these: Econ 302, 403, 404, 410, 412, 420.

Group C: The remaining hours selected from Econ 301, 302, 305, 306, 308, 309, 403, 404, 410, 412, 416, 420, 422, Ex St 462, IM 404, 405, 406, Ag Ec 456, Mgt Sc 311.

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TEACHING AREA: ENGLISH

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition . . .	3 (3,0)
Engl 101 English Composition . . .	3 (3,0)	Hist 204 History of Civilization . .	3 (3,0)
Hist 203 History of Civilization . .	3 (3,0)	Math 102 Math. Anal.	3 (3,0)
Math 101 Math. Anal.	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science ^o	4
Science ^o	4	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
	17		17
SOPHOMORE YEAR			
Engl 203 Survey of Engl. Lit. . . .	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Science ^o	4	Science ^o	4
Social Science Elective†	3 (3,0)	Social Science Elective†	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	14		14
JUNIOR YEAR			
Ed 301 History of Am. Ed.	3 (3,0)	Ed 302 Educational Psych.	3 (3,0)
Hist 308 History of England	3 (3,0)	Hist 309 History of England	3 (3,0)
Teaching Major	9	Teaching Major	9
Elective	3	Elective	3
	18		18
SENIOR YEAR			
Arch 403 Introd. to Vis. Arts . . .	3 (3,0)	Ed 412 Directed Teaching†	6 (1,15)
Ed 335 Adol. Growth and Dev. . . .	3 (3,0)	Ed 424 Meth. & Mat. in Sec. Sch. 3	(3,0)
Hist 498 Sec. Sch. Reading	3 (3,0)	Ed 458 Health Education	3 (3,0)
Teaching Major	6	Mus 310 Music Appreciation	3 (3,0)
	15		15

^o Bot 101, Zool 101, 103 and a two semester sequence in Chemistry, Geology or Physics.

† Economics, Political Science, Sociology, Philosophy, Religion.

‡ This semester is a block schedule and must be taken as listed.

The teaching major requires twenty-four semester hours of junior and senior English courses distributed as follows:

Group A: Engl 402, 405 or 406, 423 or 424.

Group B: Three courses from the following are required: Engl 409, 425, 427, 431, 436, 443.

Group C: One course from the following is required: Engl 305, 415, 416, 435, 437, 438, 439, 440, 441, 442.

Group D: One course on the 400 level.

Engl 304 or departmental certification of proficiency in composition is required.

TEACHING AREA: HISTORY

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition . . .	3 (3,0)
Engl 101 English Composition . . .	3 (3,0)	Hist 204 History of Civilization . .	3 (3,0)
Hist 203 History of Civilization . .	3 (3,0)	Math 102 Math. Anal.	3 (3,0)
Math 101 Math. Anal.	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science ^o	4
Science ^o	4	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
	17		17
SOPHOMORE YEAR			
Engl 203 Survey of Engl. Lit. . . .	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
Hist 101 American History	3 (3,0)	Hist 102 American History	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Science ^o	4	Science ^o	4
Social Science Elective†	3 (3,0)	Social Science Elective†	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		17

JUNIOR YEAR

First Semester

Ed 301 History of Am. Ed.	3 (3,0)
Teaching Major	9
Elective	3
	<hr/>
	15

Second Semester

Ed 302 Educational Psych.	3 (3,0)
Teaching Major	9
Elective	3
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SENIOR YEAR

Arch 403 Introd. to Vis. Arts	3 (3,0)
Ed 335 Adol. Growth and Dev. ...	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)
Teaching Major	6
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	15

Ed 412 Directed Teaching†	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Sch. ...	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)
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* Bot 101, Zool 101, 103 and a two semester sequence in Chemistry, Geology or Physics.

† Economics, Political Science, Sociology, Philosophy, Religion.

‡ This semester is a block schedule and must be taken as listed.

The teaching major requires twenty-four semester hours of junior and senior History courses: Hist 313 and at least one course from Group A and two courses each from Group B and C.

Group A: Hist 306, 314, 321, 410, 411, 412, 413.

Group B: Hist 308, 309, 310, 312, 402, 404, 408.

Group C: Hist 331, 332, 341, 342.

TEACHING AREA: MATHEMATICS

FRESHMAN YEAR

First Semester

Ed 100 Orientation	0 (1,0)
Engl 101 English Composition	3 (3,0)
Hist 203 History of Civilization ...	3 (3,0)
Math 106 Anal. Geom., Cal. I ...	4 (4,0)
Modern Language	3 (3,1)
Science*	4
AS or MS—Basic	1 (2,1)
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Second Semester

Engl 102 English Composition	3 (3,0)
Hist 204 History of Civilization ...	3 (3,0)
Math 205 Anal. Geom., Cal. II ...	4 (4,0)
Modern Language	3 (3,1)
Science*	4
AS or MS—Basic	1 (2,1)
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SOPHOMORE YEAR

Engl 203 Survey of Engl. Lit. ...	3 (3,0)
Math 206 Anal. Geom., Cal. III ...	4 (4,0)
Modern Language	3 (3,1)
Science*	4
AS or MS—Basic	1 (2,1)
	<hr/>
	15

Engl 204 Surv. of Engl. & Am. Lit. ...	3 (3,0)
Math 305 Found. of Analysis.	3 (3,0)
Modern Language	3 (3,0)
Science*	4
Social Science Elective†	3 (3,0)
AS or MS—Basic	1 (2,1)
	<hr/>
	17

JUNIOR YEAR

Ed 301 History of Am. Ed.	3 (3,0)
Math 308 College Geometry	3 (3,0)
Math 411 Linear Algebra	3 (3,0)
Social Science Elective†	3 (3,0)
Elective	3
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Arch 403 Introd. to Visual Arts ..	3 (3,0)
Ed 302 Educational Psych.	3 (3,0)
Math 313 Stat. Meth. I	3 (3,0)
Math 412 Introd. to Mod. Alg. ...	3 (3,0)
Elective	3
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	15

SENIOR YEAR

Ed 335 Adol. Growth and Dev. ...	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)
Math 408 Topics in Geometry ...	3 (3,0)
Math 417 Math Programs	3 (3,0)
Math Elective	3 (3,0)
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	15

Ed 412 Directed Teaching†	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Sch. ...	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)
	<hr/>
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* Bot 101, Zool 101, 103 and a two semester sequence in Chemistry, Geology or Physics.

† Economics, Political Science, Sociology, Philosophy, Religion.

‡ This semester is a block schedule and must be taken as listed.

178 Degrees and Curriculums

TEACHING AREA: MODERN LANGUAGES (FRENCH, GERMAN, OR SPANISH)

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition....	3 (3,0)
Engl 101 English Composition....	3 (3,0)	Hist 204 History of Civilization....	3 (3,0)
Hist 203 History of Civilization....	3 (3,0)	Math 102 Math. Anal.	3 (3,0)
Math 101 Math. Anal.	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science ^o	4
Science ^o	4	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
	17		17
SOPHOMORE YEAR			
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
Science ^o	4	Science ^o	4
Social Science Elective†	3 (3,0)	Social Science Elective†	3 (3,0)
Elective	3	Elective	3
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		17
JUNIOR YEAR			
Ed 301 History of Am. Ed.	3 (3,0)	Ed 302 Educational Psych.	3 (3,0)
Teaching Major	9	Teaching Major	9
Elective	3	Elective	3
	15		15
SENIOR YEAR			
Arch 403 Introd. to Vis. Arts	3 (3,0)	Ed 412 Directed Teaching†	6(1,15)
Ed 335 Adol. Growth and Dev.	3 (3,0)	Ed 424 Meth. & Mat. in Sec. Sch. 3	(3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)	Ed 458 Health Education	3 (3,0)
Teaching Major	6	Mus 310 Music Appreciation	3 (3,0)
	15		15

^o Bot 101, Zool 101, 103 and a two semester sequence in Chemistry, Geology or Physics.

† Economics, Political Science, Sociology, Philosophy, Religion.

† This semester is a block schedule and must be taken as listed.

The *French* teaching major consists of twenty-four semester hours including Fr 303, 304, 305, 306. Electives from Fr 403, 404, 406, 407, 408.

The *German* teaching major consists of twenty-four semester hours including Ger 303, 304, 305, 306. Electives to complete the requirement.

The *Spanish* teaching major consists of twenty-four semester hours including Span 303, 304, 305, 306. Electives from Span 401, 402, 405, 406.

A student desiring to become certified to teach a second Modern Language must complete the third year of the second language.

TEACHING AREA: NATURAL SCIENCES

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition....	3 (3,0)
Engl 101 English Composition....	3 (3,0)	Hist 204 History of Civilization....	3 (3,0)
Hist 203 History of Civilization....	3 (3,0)	Language	3 (3,1)
Language	3 (3,1)	Math 102 Mathematical Analysis..	3 (3,0)
Math 101 Mathematical Analysis..	3 (3,0)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
	17		17
SOPHOMORE YEAR			
Bot 101 General Botany	4 (3,3)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Language	3 (3,0)
Language	3 (3,1)	Social Science Elective ^o	3
Math 203 Elem. Stat.	3 (3,0)	Zool 101, 103 General Zoology ..	4 (3,3)
Social Science Elective ^o	3	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
	17		14

JUNIOR YEAR

First Semester

Ed 301 History of Am. Ed.	3 (3,0)
Geol 201 Phys. Geol.	3 (3,0)
Geol 203 Phys. Geol. Lab.	1 (0,3)
Phys 201 Gen. Phys.	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
Elective	3
Science Elective	3

17

Second Semester

Ed 302 Educational Psych.	3 (3,0)
Geol 204 Hist. Geol.	3 (3,0)
Geol 205 Hist. Geol. Lab.	1 (0,3)
Phys 202 Gen. Phys.	3 (3,0)
Phys 204 Gen. Phys. Lab.	1 (0,3)
Elective	3
Science Elective	3

17

SENIOR YEAR

Arch 403 Introd. to Vis. Arts ...	3 (3,0)
Ed 335 Adol. Growth & Develop. ...	3 (3,0)
Ed 498 Sec. Sch. Reading ...	3 (3,0)
Phys 304 Descriptive Astronomy ...	3 (3,0)
Science Elective	3

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Ed 412 Directed Teaching† ...	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Sch. ...	3 (3,0)
Ed 458 Health Education ...	3 (3,0)
Mus 310 Music Appreciation ...	3 (3,0)

15

Science electives to be taken in: Biological Sciences, Chemistry, Physics, Geology. This major will meet all state requirements for certification in Natural Science, General Science and one Science field.

* Economics, Political Science, Sociology, Philosophy, Religion.

† The last semester of the senior year is a block schedule and must be taken as listed.

This program requires 129 semester hours for graduation.

TEACHING AREA: PSYCHOLOGY

FRESHMAN YEAR

First Semester

Ed 100 Orientation	0 (1,0)
Engl 101 English Composition ...	3 (3,0)
Hist 203 Hist. of Civilization ...	3 (3,0)
Math 101 Math. Anal.	3 (3,0)
Modern Language	3 (3,1)
Science*	4
AS or MS—Basic	1 (2,1)

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Second Semester

Engl 102 Engl. Composition	3 (3,0)
Hist 204 Hist. of Civilization ...	3 (3,0)
Math 102 Math. Anal.	3 (3,0)
Modern Language	3 (3,1)
Science*	4
AS or MS—Basic	1 (2,1)

17

SOPHOMORE YEAR

Engl 203 Surv. of Engl. Lit.	3 (3,0)
Math 203 Elem. Stat. Infer.	3 (3,0)
Modern Language	3 (3,1)
Psych 201 General Psychology ...	3 (3,0)
Science*	4
AS or MS—Basic	1 (2,1)

17

Engl 204 Surv. of Engl. & Am. Lit. ...	3 (3,0)
Modern Language	3 (3,0)
Psych 202 Exp. Psych. I	3 (3,0)
Science*	4
Social Science Elective †	3 (3,0)
AS or MS—Basic	1 (2,1)

17

JUNIOR YEAR

Ed 301 Hist. of Amer. Ed.	3 (3,0)
Teaching Major	9
Elective	3

15

Ed 302 Educ. Psych.	3 (3,0)
Teaching Major	6
Social Science Elective †	3 (3,0)
Elective	3

15

SENIOR YEAR

Arch 403 Introd. to Vis. Arts ...	3 (3,0)
Ed 335 Adol. Growth & Dev. ...	3 (3,0)
Ed 498 Sec. School Reading ...	3 (3,0)
Teaching Major	6

15

Ed 412 Direct Teach.†	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Schs. ...	3 (3,0)
Ed 458 Health Education ...	3 (3,0)
Mus 310 Music Appreciation ...	3 (3,0)

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* Bot 101, Zool 101, 103; and a two semester sequence in Chemistry, Physics or Geology.

† Economics, Philosophy, Political Science, Religion, Sociology.

‡ This semester is a block schedule and must be taken as listed.

The teaching Major requires twenty-four semester hours of junior and senior courses selected from Psych 302, 321, 331, 341, 351, 361, 363, 401, 402, 403, Ed 302, 335.

Ed 335 is counted in the teaching area.

TEACHING AREA: SOCIOLOGY

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Ed 100 Orientation	0 (1,0)	Engl 102 Engl. Composition	3 (3,0)
Engl 101 English Composition . . .	3 (3,0)	Hist 204 Hist. of Civilization . . .	3 (3,0)
Hist 203 Hist. of Civilization . . .	3 (3,0)	Math 102 Math. Anal.	3 (3,0)
Math 101 Math. Anal.	3 (3,0)	Modern Language	3 (3,1)
Modern Language	3 (3,1)	Science °	4 (3,3)
Science °	4 (3,3)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		
		17	

SOPHOMORE YEAR			
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. .	3 (3,0)
Math 203 Elem. Stat. Infer.	3 (3,0)	Modern Language	3 (3,0)
Modern Language	3 (3,1)	Soc 202 Social Problems	3 (3,0)
Soc 201 Introductory Soc.	3 (3,0)	Science °	4 (3,3)
Science °	4 (3,3)	Elective †	3
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
		17	

JUNIOR YEAR			
Ed 301 Hist. of Amer. Ed.	3 (3,0)	Ed 302 Educ. Psych.	3 (3,0)
Teaching Major	9	Teaching Major	9
Elective †	6	Elective †	6
		18	

SENIOR YEAR			
Arch 403 Introd. to Vis. Arts	3 (3,0)	Ed 412 Direct Teach. †	6 (1,15)
Ed 335 Adol. Growth & Dev.	3 (3,0)	Ed 424 Meth. & Mat. in Sec. Schs. .	3 (3,0)
Ed 498 Sec. School Reading	3 (3,0)	Ed 458 Health Education	3 (3,0)
Teaching Major	6	Mus 310 Music Appreciation	3 (3,0)
		15	

° Bot 101, Zool 101, 103; and a two semester sequence in Chemistry, Physics or Geology.

† This semester is a block schedule and must be taken as listed.

‡ Electives must include Economics 201, 202, Philosophy 201, 302, Political Science 301. The teaching major consists of Sociology 411, Sociology 421, and the remaining from Sociology 311, 321, 331, 341, 351, 431, 441, 451.

The curriculum requires a minimum of 134 semester hours for graduation.

BACHELOR OF SCIENCE CURRICULUMS

AGRICULTURAL EDUCATION

The Agricultural Education curriculum is designed for students who wish to prepare for positions in vocational agriculture and other wish to prepare for positions in vocational agriculture and other teaching positions in the secondary schools; engage in other forms of educational work such as agricultural missionary, public relations and agricultural extension; farming, soil conservation and other governmental work; business and industry.

The curriculum provides for a broad training in agriculture as well as general and professional education including student teaching.

AGRICULTURAL EDUCATION CURRICULUM †

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
AgBio 101 Introd. to Agric. and Biol. Sci.	1 (1,0)	Agron 102 Crop Science	3 (2,3)
Bot 101 Gen. Botany	4 (3,3)	An Sc 102 Animal Science	2 (2,0)
Ch 101 Gen. Chemistry	4 (3,3)	An Sc 104 Animal Science Lab. ..	1 (0,3)
Engl 101 English Composition ..	3 (3,0)	Ch 102 General Chemistry	4 (3,3)
Math 103 College Algebra	2 (3,0)	Engl 102 English Composition ..	3 (3,0)
Math 104 Trigonometry	2 (3,0)	Zool 101 Gen. Zoology	3 (3,0)
AS or MS—Basic	1 (2,1)	Zool 103 Gen. Zoology Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)
	17		18

SOPHOMORE YEAR

Ag Ed 201 Introd. to Ag. Ed.	3 (2,3)	Ag Ec 202 Agric. Economics ...	3 (3,0)
Agron 202 Soils	3 (2,3)	AgE 205 Farm Shop	3 (2,3)
Econ 201 Principles of Econ.	3 (3,0)	AgE 206 Agric. Mechanization ...	3 (2,3)
Engl 203 Survey of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Phys 201 Gen. Physics	3 (3,0)	Hort 201 Gen. Horticulture	3 (2,3)
Phys 203 Gen. Physics Lab.	1 (0,3)	PS 201 Introd. to Poultry Sci. ...	3 (2,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		19

JUNIOR YEAR

AgE 301 Soil Conservation	3 (2,3)	Ag Ec 452 Agric. Policy	3 (3,0)
Dy Sc 201 Introd. Dairying	3 (2,3)	An Sc 301 Feeds and Feeding ..	3 (3,0)
Engl 301 Public Speaking	3 (3,0)	Ed 302 Educ. Psychology	3 (3,0)
Hort 464 Food Preservation*	3 (2,3)	For 307 Elem. of Forestry	3 (2,3)
Pol Sc 301 Am. Gov. and Pol. Par.	3 (3,0)	RS 301 Rural Sociology	3 (3,0)
Approved Elective	3	Approved Elective	3
	18		18

SENIOR YEAR

Ag Ec 302 Agric. Firm Mgt.	3 (2,3)	Ag Ed 401 Methods in Ag. Educ.	3 (2,3)
Agron 301 Fertilizers	3 (3,0)	Ag Ed 406 Directed Teaching ..	6 (0,18)
Bot 401 Plant Pathology	3 (2,3)	Ag Ed 422 Introd. to Adult Educ.	3 (2,3)
Ent 301 Elem. and Econ. Ent.	3 (2,3)	Ed 458 Health Education†	3 (3,0)
Hort 407 Landscape Design	3 (2,3)	Mus 310 Music Appreciation† ..	3 (3,0)
Approved Elective	4		
	19		18

* Hort 302 or 305 or 352 or 451 or 456 may be substituted upon approval of the class adviser.

† Students electing Advanced AS or MS must schedule Ed 458 or Mus 310 prior to the second semester of the senior year.

‡ Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.

INDUSTRIAL EDUCATION

The curriculum in Industrial Education is designed to prepare students for careers in the teaching of industrial subjects and in training programs in industry. To accomplish these purposes the curriculum is divided into three areas of specialization leading to the degree of Bachelor of Science in Industrial Education. At the end of his freshman year, each student will select one of three options: Industrial Arts Education, Vocational-Technical Education, or Education for Industry. Each option requires 135 semester hours of course work.

The Industrial Arts Education option is for those students who desire to teach industrial arts in the secondary schools. Industrial

arts is the subject area in the public school system which attempts to provide youth with an interpretation of American industry. It is a general education subject designed to give students exploratory experience in the classroom and laboratory. Majors in this option are qualified for full certification as secondary school teachers of industrial arts.

The Vocational-Technical Education option is designed to prepare teachers of vocational and technical subjects in the Senior High Schools, Area Vocational Schools, and Technical Education Centers. All elective courses in this option will be in an area of specialization or related fields. Teachers graduating from this option will possess the skills and knowledge required to teach the occupation or family of occupations in their area of specialization.

The Education for Industry option is designed to prepare students to enter industry as training specialists. Due to the expansion of technology and industrial development, there is a rapidly increasing demand for training specialists and training directors in industry. There are unlimited opportunities in industry for graduates of this option.

INDUSTRIAL EDUCATION CURRICULUM

ALL OPTIONS

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Engl 101 English Composition . . .	3 (3,0)	Engl 102 English Composition . . .	3 (3,0)
In Ed 101 In. Ed. Lab.	2 (1,2)	In Ed 102 In. Ed. Lab. (Wood) . .	3 (1,6)
Math 103 College Algebra	2 (3,0)	Math 104 Trigonometry	2 (3,0)
Science Elective*	4 (3,3)	Science Elective*	4 (3,3)
Social Science Elective†	3 (3,0)	Social Science Elective†	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
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EDUCATION FOR INDUSTRY OPTION ‡

SOPHOMORE YEAR

Engl 203 Survey of Engl. Lit. . . .	3 (3,0)	Econ 201 Prin. of Economics . . .	3 (3,0)
EG 201 Engr. Graph for In. Ed. . .	3 (1,6)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
In Ed 203 In. Ed. Lab. (Metal) . .	3 (1,6)	In Ed 204 Graphic Arts	3 (2,2)
Math 106 Anal. Geom. and Cal. I 4	(4,0)	Psych 201 Gen. Psychology . . .	3 (3,0)
Science Elective*	4 (3,3)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)	Approved Elective	3 (3,0)
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JUNIOR YEAR

Econ 301 Econ. of Labor	3 (3,0)	IM 415 Managerial Dec. Making . .	3 (3,0)
Ed 302 Ed. Psychology	3 (3,0)	In Ed 305 In. Ed. Lab. (Mach.) 3	(1,6)
IM 307 Personnel Management . .	3 (3,0)	In Ed 325 Industrial Safety . . .	3 (3,0)
In Ed 302 Dwell. Mat. & Constr. 2	(1,2)	Soc 201 Introd. to Sociology . . .	3 (3,0)
In Ed 303 In. Ed. Lab. (Elec.) . .	3 (1,6)	Approved Elective	6 (6,0)
Approved Elective	3 (3,0)		
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SENIOR YEAR

First Semester

Engl 301 Public Speaking	3 (3,0)
In Ed 405 Test & Meas. in In. Ed. ..	3 (3,0)
In Ed 422 Voc. Ed. Programs	3 (3,0)
In Ed 425 Teach. Indus. Subj.	3 (3,0)
Approved Elective	6 (6,0)
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Second Semester

In Ed 408 Train. Program in Ind. ..	3 (3,0)
In Ed 496 Pub. & Prof. Relations ..	3 (3,0)
Soc 351 Ind. Soc.	3 (3,0)
Approved Elective	8 (8,0)
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* Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy. At least two fields must be represented, with six, but not more than six, hours in one field.

‡ One summer (400 clock hours) of field experience is required of each student following the completion of his sophomore year.

INDUSTRIAL ARTS EDUCATION OPTION

SOPHOMORE YEAR

First Semester

Engl 203 Survey of Engl. Lit.	3 (3,0)
EG 201 Eng. Graph. for In. Ed.	3 (1,6)
In Ed 203 In. Ed. Lab. (Metal) ..	3 (1,6)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Science Elective*	4 (3,3)
AS or MS—Basic	1 (2,1)
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Second Semester

CrE 204 Lab. Procedures	1 (0,3)
CrE 303 Ceramic Prod.	2 (2,0)
Engl 204 Surv. of Engl. & Am. Lit. ..	3 (3,0)
EG 202 Graphic Tech. for In. Ed.	3 (1,6)
In Ed 204 Graphic Arts	3 (2,2)
In Ed 205 Power Technology	3 (2,2)
AS or MS—Basic	1 (2,1)
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JUNIOR YEAR

Ed 302 Ed. Psychology	3 (3,0)
EE 303 Intro. to Elec. Engr.	3 (3,0)
In Ed 302 Dwell. Mat. & Constr. ..	2 (1,2)
In Ed 303 In. Ed. Lab. (Elec.) ..	3 (1,6)
Text 460 Textile Processes	3 (3,0)
Approved Elective	3 (3,0)
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	17

Ed 335 Adol. Growth & Develop.	3 (3,0)
In Ed 305 In. Ed. Lab. (Mach.) ..	3 (1,6)
In Ed 333 Design	3 (2,3)
In Ed 441 Com. Shop Practice ..	2 (2,0)
Social Science Elective †	6 (6,0)
Approved Elective	3 (3,0)
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SENIOR YEAR

Arch 403 Intro. to Vis. Arts	3 (3,0)
Ed 406 Hist. & Philos. of Ed.	3 (3,0)
Engl 301 Public Speaking	3 (3,0)
In Ed 405 Tests and Meas. in In. Ed.	3 (3,0)
In Ed 416 Des. & Op. In. Ed. Lab.	3 (2,2)
In Ed 422 Voc. Ed. Programs	3 (3,0)
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Ed 458 Health Education	3 (3,0)
In Ed 402 Directed Teaching	6 (0,18)
In Ed 425 Teaching Ind. Subj.	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)
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* Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy. At least two fields must be represented, with six, but not more than six, hours in one field.

VOCATIONAL-TECHNICAL EDUCATION OPTION

SOPHOMORE YEAR

First Semester

Engl 203 Surv. of Engl. Lit.	3 (3,0)
EG 201 Engr. Graph for In. Ed.	3 (1,6)
In Ed 203 In. Ed. Lab. (Metal) ..	3 (1,6)
Math 106 Anal. Geom., Cal. I	4 (4,0)
Science Elective*	4 (3,3)
AS or MS—Basic	1 (2,1)
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Second Semester

Engl 204 Surv. of Engl. & Am. Lit. ..	3 (3,0)
EG 202 Graphic Tech. for In. Ed.	3 (1,6)
In Ed 204 Graphic Arts	3 (2,2)
In Ed 205 Power Technology	3 (2,2)
Social Science Elective†	6 (6,0)
AS or MS—Basic	1 (2,1)
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JUNIOR YEAR

Ed 302 Ed. Psychology	3 (3,0)
Engl 301 Public Speaking	3 (3,0)
In Ed 302 Dwell. Mat. & Constr. ..	2 (1,2)
Approved Electives (in field of specialization)	10 (10,0)
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Ed 335 Adol. Growth & Develop.	3 (3,0)
In Ed 305 In. Ed. Lab. (Mach.) ..	3 (1,6)
In Ed 333 Design	3 (2,3)
Approved Electives (in field of specialization)	10 (10,0)
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		SENIOR YEAR	
<i>Third Semester</i>		<i>Fourth Semester</i>	
Arch 403 Intro. to Vis. Arts	3 (3,0)	Ed 458 Health Education	3 (3,0)
Ed 406 Hist. & Philos. of Ed. . . .	3 (3,0)	In Ed 402 Directed Teaching . . .	6 (0,18)
In Ed 405 Tests & Meas. in In. Ed. .	3 (3,0)	In Ed 425 Teaching Ind. Subj. . .	3 (3,0)
In Ed 416 Des. & Op. In. Ed. Lab. .	3 (2,2)	Mus 310 Music Appreciation . . .	3 (3,0)
In Ed 422 Voc. Ed. Programs . . .	3 (3,0)		
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* Science electives to be selected from Chemistry, Physics, Geology, Botany, or Zoology. At least two fields must be represented, one of which must be in the biological sciences.

† Social Science electives to be selected from History, Sociology, Economics, Political Science, Religion, or Philosophy. At least two fields must be represented, with six, but not more than six, hours in one field.

RECREATION AND PARK ADMINISTRATION

The curriculum in Recreation and Park Administration provides training for students who desire to become recreation supervisors and directors and park administrators. Graduates plan and supervise recreation programs in industry, institutions, municipalities and rural communities. The program which leads to a Bachelor of Science degree is designed to provide competencies in recreation administration, management, development, planning, and research. It requires 135 semester hours, including field training during one summer, for completion.

RECREATION AND PARK ADMINISTRATION CURRICULUM

		FRESHMAN YEAR	
<i>First Semester</i>		<i>Second Semester</i>	
Bot 101 General Botany	4 (3,3)	Econ 201 Prin. of Econ.	3 (3,0)
Engl 101 English Composition . . .	3 (3,0)	Engl 102 English Composition . . .	3 (3,0)
Hist 102 American History	3 (3,0)	Math 104 Trigonometry	2 (3,0)
Math 103 College Algebra	2 (3,0)	RPA 102 Hist. and Prin. of	
RPA 101 Intro. to Com. Rec. . . .	3 (3,0)	Outdoor Rec.	3 (3,0)
AS or MS—Basic	1 (2,1)	Zool 101, 103 Gen. Zoology . . .	4 (3,3)
<hr/>		AS or MS—Basic	1 (2,1)
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		SOPHOMORE YEAR	
Engl 203 Surv. of Engl. Lit. . . .	3 (3,0)	Engl 204 Surv. of Amer. and	
Physical Science [*]	4	Engl. Lit.	3 (3,0)
Psych 201 Gen. Psych.	3 (3,0)	Physical Science [*]	4
RPA 201 Meth. and Tech. of		RPA 202 Mgt. of Aquatic Facil. .	2 (2,0)
Rec. Leadership	3 (3,0)	RPA 203 Pers. and Com. Health .	3 (3,0)
Soc 201 Intro. to Soc.	3 (3,0)	Elective	3
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
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		JUNIOR YEAR	
AgEc 357 Cons. of Nat. Res. . . .	3 (3,0)	Ed 335 Adol. Growth and Develop. .	3 (3,0)
Engl 301 Public Speaking	3 (3,0)	Hort 308 Landscape Design . . .	3 (2,3)
Hort 303 Plant Materials I	3 (2,3)	IM 307 Personnel Mgt.	3 (3,0)
RPA 302 Camp Org. and Adm. . .	3 (2,3)	RPA 301 Sports in Recreation . .	3 (2,3)
Elective	3	RPA 303 Prog. Plan. for Rec. . .	2 (2,0)
<hr/>		Elective	3
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SUMMER
RPA 405 Field Training in Recreation 6

SENIOR YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ag Ec 352 Public Finance	3 (3,0)	RPA 402 Rec. Adm.	3 (3,0)
Ed 491 Descrip. Stat.	3 (3,0)	RPA 403 Facility and Site Plan.	3 (1,6)
For 406 For. Pol. and Adm.	2 (2,0)	RPA 404 Meth. of Rec. Research	3 (3,0)
Pol Sc 302 State and Local Govt.	3 (3,0)	Soc 331 Urban Sociology	3 (3,0)
RPA 401 Pk. Main. and Oper.	3 (3,0)	Elective	3
Elective	3		
	17		15

* Two-semester sequence in chemistry, geology, or physics.

SCIENCE TEACHING

The program leading to a Bachelor of Science degree in Science Teaching is designed for students planning to teach Mathematics, Biology, Chemistry or Physics and General Science on the secondary school level.

It requires a major concentration in Mathematics, Biological Sciences, Chemistry or Physics. The required science electives are included to give some degree of competency in a field other than the major area.

A student must have a minimum of 130 semester hours of credit for graduation.

TEACHING AREA: BIOLOGICAL SCIENCES

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 General Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
Ed 100 Orientation	0 (1,0)	Engl 102 English Composition	3 (3,0)
Engl 101 English Composition	3 (3,0)	Hist 204 History of Civilization	3 (3,0)
Hist 203 History of Civilization	3 (3,0)	Math 106 Anal. Geom., Cal. I	4 (4,0)
Math 103 College Algebra	2 (3,0)	AS or MS—Basic	1 (2,1)
Math 104 Trigonometry	2 (3,0)		
AS or MS—Basic	1 (2,1)		
	15		15

SOPHOMORE YEAR

Bot 101 General Botany	4 (3,3)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Chemistry Elective	4
Chemistry Elective	4	Phys 202 Gen. Phys.	3 (3,0)
Phys 201 Gen. Phys.	3 (3,0)	Phys 204 Gen. Phys. Lab.	1 (0,3)
Phys 203 Gen. Physics Lab.	1 (0,3)	Zool 101 Gen. Zoology	3 (3,0)
AS or MS—Basic	1 (2,1)	Zool 103 Gen. Zoology Lab.	1 (0,3)
		AS or MS—Basic	1 (2,1)
	16		16

JUNIOR YEAR

Bot 202 Surv. of Plant Kingdom	4 (3,3)	Bact 301 Gen. Bacteriology	4 (3,3)
Ed 301 History of Am. Ed.	3 (3,0)	Bot 352 Plant Physiology	4 (3,3)
Zool 301 Vertebrate Anatomy	3 (2,3)	or Zool 458 Cell Physiology	3 (2,3)
Science Elective	3	Ed 302 Educational Psych.	3 (3,0)
Social Science Elective*	3	Gen 302 Genetics	3 (2,3)
Elective	3	Social Science Elective*	3
	19		17 or 16

SENIOR YEAR

First Semester

Arch 403 Introd. to Vis. Arts . . .	3 (3,0)
Ed 335 Adol. Growth & Develop. . .	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)
Major Electives†	6 or 7
Elective	3

18 or 19

Second Semester

Ed 412 Directed Teaching†	6(1,15)
Ed 424 Meth. & Mat. in Sec. Sch. . .	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)

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° Economics, Philosophy, Political Science, Religion, Sociology.

† Botany, Bacteriology, Genetics, Zoology.

‡ Block schedule must be taken as shown.

TEACHING AREA: CHEMISTRY

FRESHMAN YEAR

First Semester

Ch 101 General Chemistry	4 (3,3)
Ed 100 Orientation	0 (1,0)
Engl 101 English Composition	3 (3,0)
Hist 203 History of Civilization . . .	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
AS or MS—Basic	1 (2,1)

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Second Semester

Ch 102 General Chemistry	4 (3,3)
Engl 102 English Composition	3 (3,0)
Hist 204 History of Civilization . . .	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)
AS or MS—Basic	1 (2,1)

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SOPHOMORE YEAR

Bot 101 General Botany	4 (3,3)
Engl 203 Surv. of Engl. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)
Phys 201 Gen. Phys.	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

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Engl 204 Surv. of Engl. & Am. Lit. . .	3 (3,0)
Phys 202 Gen. Phys.	3 (3,0)
Phys 204 Gen. Phys. Lab.	1 (0,3)
Zool 101 Gen. Zoology	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)
Social Science Elective°	3
AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Ed 301 History of Am. Ed.	3 (3,0)
Ch 223 Organic Chemistry	3 (3,0)
Ch 227 Organic Chem. Lab.	1 (0,3)
Ch 313 Quantitative Analysis	3 (3,0)
Science Elective	3
Social Science Elective°	3
Elective	3

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Ed 302 Educational Psych.	3 (3,0)
Ch 219 Chemical Principles	2 (2,0)
Ch 224 Organic Chemistry	3 (3,0)
Ch 331 Physical Chem.	3 (3,0)
Ch 339 Physical Chem. Lab.	1 (0,3)
Science Elective	3
Elective	3

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SENIOR YEAR

Arch 403 Introd. to Vis. Arts	3 (3,0)
Ch 332 Physical Chem.	3 (3,0)
Ch 334 Physical Chem. Lab.	2 (0,6)
Ch 402 Inorganic Chemistry	3 (3,0)
Ed 335 Adol. Growth & Develop. . . .	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)

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Ed 412 Directed Teaching†	6(1,15)
Ed 424 Meth. & Mat. in Sec. Sch. . .	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)

15

° Economics, Philosophy, Political Science, Religion, Sociology.

† Block schedule must be taken as shown.

TEACHING AREA: PHYSICS

FRESHMAN YEAR

First Semester

Ch 101 General Chemistry	4 (3,3)
Ed 100 Orientation	0 (1,0)
Engl 101 English Composition	3 (3,0)
Hist 203 History of Civilization . . .	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
AS or MS—Basic	1 (2,1)

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Second Semester

Ch 102 General Chemistry	4 (3,3)
Engl 102 English Composition	3 (3,0)
Hist 204 History of Civilization . . .	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)
Phys 122 Mech. and Wave Phen. . . .	3 (3,0)
AS or MS—Basic	1 (2,1)

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SOPHOMORE YEAR

First Semester

Bot 101 General Botany	4 (3,3)
Engl 203 Surv. of Engl. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III.	4 (4,0)
Phys 221 Therm. and Elect. Phen.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

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Second Semester

Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 306 Differential Equations	3 (3,0)
Phys 222 Optics and Mod. Phys.	3 (3,0)
Phys 224 Engr. Phys. Lab.	1 (0,3)
Zool 101 Gen. Zoology	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

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JUNIOR YEAR

Ed 301 History of Am. Ed.	3 (3,0)
Phys 304 Descriptive Astronomy	3 (3,0)
Phys 321 Mechanics I	3 (3,0)
Science Elective	3
Social Science Elective*	3
Elective	3

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Ed 302 Educational Psych.	3 (3,0)
Phys 322 Mechanics II	3 (3,0)
Phys 325 Experimental Phys. I	4 (2,6)
Phys 341 Electricity & Magnetism	3 (3,0)
Social Science Elective*	3

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SENIOR YEAR

Arch 403 Introd. to Vis. Arts	3 (3,0)
Ed 335 Adol. Growth & Develop.	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)
Phys 326 Exp. Physics II	4 (2,6)
Phys 455 Quantum Phys. I	3 (3,0)
or Phys 460 Modern Phys.	3 (3,0)
Elective	3

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Ed 412 Directed Teaching†	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Sch.	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)

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* Economics, Philosophy, Political Science, Religion, Sociology.

† Block schedule must be taken as shown.

TEACHING AREA: MATHEMATICS

FRESHMAN YEAR

First Semester

Ch 101 General Chemistry	4 (3,3)
Ed 100 Orientation	0 (1,0)
Engl 101 English Composition	3 (3,0)
Hist 203 History of Civilization	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
AS or MS—Basic.	1 (2,1)

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Second Semester

Ch 102 General Chemistry	4 (3,3)
Engl 102 English Composition	3 (3,0)
Hist 204 History of Civilization	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)
AS or MS—Basic.	1 (2,1)

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SOPHOMORE YEAR

Bot 101 General Botany	4 (3,3)
Engl 203 Surv. of Engl. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III.	4 (4,0)
Phys 201 Gen. Phys.	3 (3,0)
Phys 203 Gen. Physics Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

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Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 305 Found. of Anal.	3 (3,0)
Phys 202 Gen. Phys.	3 (3,0)
Phys 204 Gen. Phys. Lab.	1 (0,3)
Zool 101 Gen. Zoology	3 (3,0)
Zool 103 Gen. Zoology Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)

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JUNIOR YEAR

Ed 301 History of Am. Ed.	3 (3,0)
Math 308 College Geometry	3 (3,0)
Math 411 Linear Algebra	3 (3,0)
Science Elective	3
Social Science Elective*	3
Elective	3

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Ed 302 Educational Psych.	3 (3,0)
Math 313 Stat. Th. & Meth. I	3 (3,0)
Math 412 Introd. to Mod. Algebra	3 (3,0)
Science Elective	3
Social Science Elective*	3
Elective	3

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SENIOR YEAR

Arch 403 Introd. to Vis. Arts	3 (3,0)
Ed 335 Adol. Growth & Develop.	3 (3,0)
Ed 498 Sec. Sch. Reading	3 (3,0)
Math 408 Topics in Geometry	3 (3,0)
Math 417 Math Programs	3 (3,0)
Math Elective	3 (3,0)

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Ed 412 Directed Teaching†	6 (1,15)
Ed 424 Meth. & Mat. in Sec. Sch.	3 (3,0)
Ed 458 Health Education	3 (3,0)
Mus 310 Music Appreciation	3 (3,0)

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* Economics, Philosophy, Political Science, Religion, Sociology.

† Block schedule must be taken as shown.

COLLEGE OF ENGINEERING

Six curriculums are offered under the College of Engineering: Agricultural Engineering, Ceramic Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering. These are accredited by the Engineers' Council for Professional Development. The curriculum in Agricultural Engineering is jointly administered by the College of Engineering and the College of Agriculture and Biological Sciences.

Although the College of Engineering does not offer specific options or majors under each of these curriculums, the instruction includes many phases of each respective field. Thus, a Civil Engineering student is graduated in Civil Engineering rather than structural engineering, highway engineering, sanitary engineering or other such options, but the curriculum in Civil Engineering includes definite preparation along these lines. In the same way, the other engineering curriculums include thorough education in various phases of the field of specialization without over-emphasizing one phase to the neglect of others.

All engineering consists of the application of the laws of physics, chemistry, and mathematics to the solution of specific problems. Furthermore, any engineer must be able to express his ideas both in words and in graphical communications. For these two reasons the first two years of all the branches of Engineering here listed are substantially the same and deal largely with the fundamentals mentioned above.

In all curriculums, over-specialization is carefully avoided by the inclusion of subjects which involve the most direct application of the basic sciences and which serve to develop habits of orderly analysis and logical thinking. Each curriculum leads to a wide range of choice of a career and serves as preparation for continued on-the-job study following graduation, or further formal graduate study in a broad spectrum of fields.

The work required in all Engineering curriculums for the freshman year is as follows except as noted:

FRESHMAN YEAR

First Semester

Ch 101 General Chemistry	4 (3,3)
Engr 101 Engineering Systems	0 (1,0)
EG 109 Engr. Com. and Design	3 (1,6)
or Hist 104 Western Civ.	3 (3,0)
Engr 101 English Composition	3 (3,0)
Math 106 Anal. Geom., Cal. I	4 (4,0)
AS or MS—Basic	1 (2,1)
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*Second Semester**

Ch 102 General Chemistry	4 (3,3)
Engr 102 English Composition	3 (3,0)
Hist 104 Western Civilization	3 (3,0)
or EG 109 Engr. Com. and Design	3 (1,6)
Math 205 Anal. Geom., Cal. II	4 (4,0)
Phys 122 Mech. & Wave Phenomena	3 (3,0)
AS or MS—Basic	1 (2,1)
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* Agricultural Engineering students take AgBio 101, Introduction to Agriculture and Biological Sciences, in addition to other courses in the second semester.

AGRICULTURAL ENGINEERING

The Agricultural Engineering curriculum is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

Agricultural Engineering deals fundamentally with the application of the engineering sciences to progress in agriculture. Agricultural engineers provide engineering services in the areas of power and machinery, soil and water conservation engineering, farm electrification, agricultural structures, and processing engineering.

The curriculum of Agricultural Engineering leads to the degree of Bachelor of Science in Agricultural Engineering. It is based on the study of fundamentals of mathematics, physics, chemistry, and biology. The engineering sciences of mechanics, fluids, thermodynamics, and electrical theory, together with the basic agricultural sciences of soils, plants and animals, provide the foundation for the Agricultural Engineering design and analysis. Courses in the humanities are included to provide the student with a well-rounded educational program. Graduate courses are offered leading to advanced degrees.

Opportunities in Agricultural Engineering include employment with industry as design engineers, research engineers, production engineers, and in sales and service; with state and federal agencies as teachers, research engineers, and extension engineers; as field engineers with soil conservation service, bureau of reclamation, etc.; with agricultural enterprises as managers, contractors, equipment retailers and consulting engineers. The Agricultural Engineering curriculum is accredited by the Engineers' Council for Professional Development.

AGRICULTURAL ENGINEERING CURRICULUM

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
AgE 209 Ag. Engr. Technology . . .	2 (1,3)	AgE 299 Digital Computation . . .	1 (0,3)
Agro 202 Soils . . .	3 (2,3)	Bot 101 General Botany . . .	4 (3,3)
EM 201 Statics . . .	3 (3,0)	EM 202 Dynamics . . .	3 (3,0)
Engl 203 Surv. of Engl. Lit. . .	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. . .	3 (3,0)
Math 206 Anal. Geom., Cal. III . . .	4 (4,0)	Math 208 Engr. Math. I . . .	4 (4,0)
Phys 221 Ther. & Elec. Phen. . .	3 (3,0)	Phys 222 Opt. & Mod. Phys. . .	3 (3,0)
Phys 223 Engr. Phys. Lab. . .	1 (0,3)	Phys 224 Engr. Phys. Lab. . .	1 (0,3)
AS or MS—Basic . . .	1 (2,1)	AS or MS—Basic . . .	1 (2,1)

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JUNIOR YEAR

AgE 355 Engr. Anal. & Creativity . . .	3 (2,3)	AgE 362 Energy Conv. in Ag. Sys. . .	3 (2,3)
EE 307 Basic Elec. Engr. . .	3 (3,0)	AgE 465 Engr. Prop. of Biol. Mat. . .	3 (2,3)
EM 304 Mech. of Materials . . .	3 (3,0)	Bot 352 Plant Physiology . . .	4 (3,3)
Math 309 Engr. Math. II . . .	3 (3,0)	or Zool 307 An. Anat. & Physio. . .	3 (2,3)
or Math 313 Stat. Theory & Meth. . .	3 (3,0)	or Bact 301 Gen. Bacteriology . . .	4 (3,3)
ME 311 Engr. Thermo. I . . .	3 (3,0)	CE 201 Terrestrial Meas. I . . .	3 (2,3)
Zool 101 General Zoology . . .	3 (3,0)	EE 308 Basic Elec. Engr. . .	3 (3,0)
Zool 103 Gen. Zoology Lab. . .	1 (0,3)		

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16 or 15

SENIOR YEAR

AgE 431 Ag. Struct. Design . . .	3 (2,3)	AgE 416 Agr. Machinery . . .	4 (3,3)
AgE 407 Undergrad. Research . . .	1 (0,3)	AgE 422 Soil & Water Con. Engr. . .	4 (3,3)
Econ 201 Prin. of Economics . . .	3 (3,0)	AgE 442 Agric. Proc. Engr. . .	4 (3,3)
EM 320 Fluid Mechanics . . .	3 (3,0)	Pol Sc 301 Am. Gov. and	
EM 322 Fluid Mech. Lab. . .	1 (0,3)	Pol. Par. . .	3 (3,0)
ME 304 Heat Transfer I . . .	3 (3,0)	Approved Electives . . .	3 or 4
Approved Electives . . .	3		

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CERAMIC ENGINEERING

The ceramic industries have as their raw materials the non-metallic minerals other than fuel. These minerals constitute over 90 per cent of the earth's crust while the industries dependent on them comprise almost one-third the entire field of industrial activity. Ceramic industries produce products in eight major classifications: structural clay products; glass whitewares; refractories; abrasives; cements; limes and plaster; enameled metals; and raw material processing.

South Carolina possesses a wide variety of ceramic minerals which rank with forests as the richest natural resources in the State and make it possible for South Carolina to contribute raw materials to every major classification of the ceramic industry. South Carolina has a diversified ceramic industry with plants manufacturing portland cement, glass containers, glass fibers, sewer pipes, brick, refractories, special raw materials, and whitewares. The growth of these industries and the development of new ones is to a large measure dependent on the availability of trained engineers capable of incorporating and operating the modern techniques and equipment of the ceramic industries.

The curriculum of Ceramic Engineering leads to the degree of Bachelor of Science in Ceramic Engineering, and graduate courses are offered leading to advanced degrees. The course is based on a study of the fundamental courses in chemistry, physics, mathematics, and geology, and advanced courses are designed to apply these fundamental sciences to Ceramic Engineering. Courses in the humanities and social sciences together with courses in engineering sciences form major parts of the curriculum.

The Olin Foundation in 1953 provided a grant for the construction and equipping of a Ceramic Engineering building. The grant has provided Clemson University with the outstanding facilities for Ceramic Engineering education and research. An excellent ceramic laboratory has been equipped to demonstrate all processes of ceramic manufacturing including beneficiation of ores and clays, grinding and crushing materials, mixing and blending raw materials, forming the materials into various shapes, and drying and firing the prepared objects. Equipment for the control of industrial processes is studied and tests are made to determine the quality of various ceramic products. Well-equipped laboratories are available for research on raw materials and problems of ceramic industries in South Carolina.

Ceramic Engineering graduates find employment as plant executives, research engineers, plant designers and constructors, equipment manufacturers, consulting engineers, ceramic chemists, and technologists in the ceramic industries and in allied fields.

CERAMIC ENGINEERING CURRICULUM

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
CrE 201 Introd. Cer.	2 (2,0)	CrE 202 Materials	3 (3,0)
CrE 299 Digital Computation ..	1 (0,3)	CrE 204 Lab. Procedures	1 (0,3)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	EM 201 Statics	3 (3,0)
Math 206 Anal. Geom., Cal. III ..	4 (4,0)	Engl 204 Surv. of Engl. & Am. Lit. 3	(3,0)
Phys 221 Ther. & Elec. Phen.	3 (3,0)	Math 208 Engr. Math. I	4 (4,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 222 Opt. & Mod. Phys.	3 (3,0)
AS or MS—Basic	1 (2,1)	Phys 224 Engr. Phys. Lab.	1 (0,3)
Approved Elective	3	AS or MS—Basic	1 (2,1)
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JUNIOR YEAR

CrE 304 Exp. Design	1 (0,3)	CrE 302 Thermo. Chem. Cer.	3 (3,0)
CrE 306 Fuels Comb., Heat Trsf. 1	(0,3)	CrE 309 Res. Methods	2 (0,6)
CrE 307 Thermal Proc. of Ceram. 3	(3,0)	Ch 332 Physical Chemistry	3 (3,0)
Ch 331 Physical Chem.	3 (3,0)	EE 308 Basic EE	3 (3,0)
EE 307 Basic EE	3 (3,0)	EE 310 Elec. Engr. Lab.	1 (0,2)
Math 313 Stat. Th. & Meth. I.	3 (3,0)	EM 304 Mech. of Matr.	3 (3,0)
ME 304 Heat Transfer I	3 (3,0)	Approved Electives	3 (3,0)
	<hr/> 17		<hr/> 18

SENIOR YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
CrE 403 Glasses	3 (3,0)	CrE 402 Solid State Ceramics ...	3 (3,0)
CrE 406 Project	2 (0,6)	CrE 407 Plant Design	3 (1,6)
Geol 406 Engr. Geol.	3 (2,3)	CrE 418 Proc. Control	3 (3,0)
IE 410 Engr. & Organization	3 (3,0)	Geol 307 Optical Min.	3 (2,2)
Approved Electives	9	Approved Electives	7
<hr/>		<hr/>	
20		19	

Elective Policy. Nine credits humanistic-social and 7 credits engineering-scientific must be chosen. Each class adviser has a list of approved electives.

CHEMICAL ENGINEERING

The graduate of the science-oriented, research-minded Chemical Engineering Department is finding intellectually stimulating and financially rewarding positions in all phases of modern industry. Because of the fundamental nature of the Chemical Engineering curriculum, the graduate is avidly sought by the newer nuclear and space-oriented industries, as well as by the equally important chemical-process industries. Indeed, the chemical engineer is in great demand in areas of technology, such as textiles, metals, aircraft, power, instrumentation, computers, foods, pulp and paper, and petroleum.

The curriculum is built upon a base of *three* sciences (chemistry, physics, and mathematics) with supporting courses in mechanics, electrical engineering, and materials engineering and culminates in a solid core of courses in chemical engineering. In all such courses the emphasis is upon *why* things happen as they do and not *how*; thus, the student is taught principles that will endure and not the methods of the present or past. He is taught to realize that all material things are chemical in nature; hence, the chemical engineer in the practice of his profession may be called upon to work with anything on the face of the earth. The scope of chemical engineering is broad.

In spite of the strong scientific flavor of the Chemical Engineering curriculum, the faculty is constantly striving to impress upon the student that he is studying engineering and not pure science. The ultimate purpose of engineering is to make some practical use of scientific and engineering theories; hence, economics must always be kept in mind during the design of engineering processes or products. In brief, the chemical engineer in industry, as contrasted to the pure research scientist, is concerned that his company makes a profit.

In industry the chemical engineer may pursue one of two parallel lines of advancement. One path leads to management, and it should be noted that the top management of most chemical companies

consists of former technical men. The second and equally rewarding path is in engineering research and development. In this latter category are found the men who have developed the processes and products which shape the modern world in which we live.

The Chemical Engineering Department at Clemson is housed in Earle Hall which is one of the newest and best equipped buildings for chemical engineering education in the Southeast. All members of the Chemical Engineering faculty have been educated at the doctoral level and the department offers work leading to the Master of Science and Doctor of Philosophy degrees as well as the Bachelor of Science degree.

CHEMICAL ENGINEERING CURRICULUM

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
ChE 204 Introd. ChE I	2 (1,3)	ChE 205 Introd. to ChE II	3 (2,3)
ChE 299 Digital Comp.	1 (0,3)	Ch 224 Org. Chem.	3 (3,0)
Ch 223 Organic Chemistry	3 (3,0)	Ch 228 Org. Chem. Lab.	1 (0,3)
Engl 203 Survey of English Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 208 Anal. Geom., Cal. III	4 (4,0)	Math 208 Engr. Math. I	4 (4,0)
Phys 221 Ther. & Elec. Phen.	3 (3,0)	Phys 222 Opt. & Mod. Phys.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
18		19	

JUNIOR YEAR

ChE 301 Unit Op. Theory I	3 (3,0)	ChE 302 Unit Op. Theory II	3 (3,0)
Ch 331 Physical Chemistry	3 (3,0)	ChE 306 Unit Op. Lab. I	1 (0,3)
Ch 339 Physical Chemistry Lab.	1 (0,3)	ChE 307 Analog Comp.	1 (0,3)
EM 201 Statics	3 (3,0)	ChE 331 ChE Thermo. I	3 (3,0)
Math 309 Engr. Math. II	3 (3,0)	Ch 332 Physical Chemistry	3 (3,0)
Comp Sc 312 Numer. Alg.	3 (3,0)	Ch 340 Phys. Chemistry Lab.	1 (0,3)
Humanistic—Social Elective	3 (3,0)	EM 304 Mech. of Mat.	3 (3,0)
19		Humanistic—Social Elective	3 (3,0)
		18	

SENIOR YEAR

ChE 401 Transport Phenomena	3 (3,0)	ChE 409 ChE Design II	2 (0,6)
ChE 407 Unit Op. Lab. II	2 (0,6)	ChE 410 Unit Op. Theory III	3 (3,0)
ChE 408 ChE Design I	1 (0,3)	ChE 412 Development Lab.	2 (0,6)
ChE 430 ChE Thermodynamics II	3 (3,0)	ChE 450 ChE Kinetics	3 (3,0)
ChE 453 Process Control	3 (3,0)	CrE 419 Engr. Matl.	3 (3,0)
EE 307 Basic EE	3 (3,0)	EE 308 Basic EE	3 (3,0)
Humanistic—Social Elective	3 (3,0)	Humanistic—Social Elective	3 (3,0)
18		19	

Elective Policy. All electives must be chosen from a departmental elective list. A copy of this list may be obtained from the departmental secretary.

CIVIL ENGINEERING

Civil Engineering is the broadest in scope of the engineering professions, being the parent stem from which most of the other branches of engineering have developed. All branches of Civil Engineering rest on a comparatively compact body of principles, in which the students are thoroughly trained in the classroom, the drafting room, the laboratory, and the field. Particular effort is

made to develop those qualities essential to success in any field of endeavor and to fit the graduate to become a useful citizen—a good business man as well as a successful engineer.

The practice of civil engineering involves the planning, design, construction, maintenance, and use of large structures and systems to control and improve the environment for modern civilization. The structures may serve many purposes, such as buildings for commerce and industry, bridges for transportation, vehicles for space exploration, or dams for the control and storage of water or for generation of power. The systems provide essential services: water supply; waste water treatment; rail, air, and water transportation; and systems of highways. Projects such as these require that the civil engineer be trained in the social and economic issues as well as in basic science, engineering science, and technology. Though he may specialize in a particular branch of civil engineering, such as structural or transportation, he will need some acquaintance with all subdivisions of civil engineering as well as of other branches of engineering.

The course in Civil Engineering at Clemson University leads to the degree of Bachelor of Science and is planned to equip the graduate with a working knowledge of the above subjects. The student receives early drill in the basic sciences of mathematics, chemistry, and physics, and is introduced gradually to the engineering sciences and the technical courses in civil engineering. By the end of the junior year the student will have had courses in the subdivisions of structural design, fluid flow, construction materials, environmental engineering, and soil mechanics. These will enable him to choose technical electives in his senior year in the subdivision of his choice. The non-technical electives are sufficient in number to provide breadth in the arts and humanities, and assure that the graduate has a well-rounded education.

The civil engineering graduate is prepared to work immediately upon graduation in practically any of the areas or subdivisions of the profession. He may find himself in responsible charge at an early date, so every effort is made to train him at Clemson in the ethical standards demanded by the profession. All courses are directed toward the development of initiative, self-reliance, and integrity in the student.

This department also offers a Fifth-year Professional Program to graduates of the four-year program who wish additional training in economics, management, operations, and a technical specialty. This program is designed to provide the engineer who enters construction, sales, or management with a breadth of training which

is not possible under the normal four-year curriculum. The construction industry is the largest in the nation and this program is particularly designed for those who enter the field of heavy construction. More details on the Fifth-year Professional Program are available from the Department of Civil Engineering.

The department is located in the Civil Engineering Building, a modern air-conditioned structure erected in 1958. The laboratories are well equipped, and the classrooms are light and conducive to study. The building has an internal television system and the 220-seat auditorium is one of the most attractive ones on the campus.

CIVIL ENGINEERING CURRICULUM

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR					
<i>First Semester</i>			<i>Second Semester</i>		
CE 201 Terrestrial Meas. I	3	(2,3)	CE 202 Terrestrial Meas. II	3	(2,3)
EM 201 Statics	3	(8,0)	CE 299 Digital Computation	1	(0,3)
Engl 203 Survey of Engl. Lit.	3	(8,0)	EM 304 Mech. of Materials	3	(3,0)
Math 206 Anal. Geom., Cal. III	4	(4,0)	Engl 204 Surv. of Engl. & Am. Lit. . .	3	(3,0)
Phys 221 Ther. & Elec. Phen.	3	(3,0)	Math 208 Engr. Math. I	4	(4,0)
Phys 223 Engr. Phys. Lab.	1	(0,3)	Phys 222 Opt. & Mod. Phys.	3	(3,0)
AS or MS—Basic	1	(2,1)	Phys 224 Engr. Phys. Lab.	1	(0,3)
	18		AS or MS—Basic	1	(2,1)
JUNIOR YEAR					
CE 308 Structural Analysis	4	(3,2)	CE 309 Structural Design	4	(3,2)
CE 320 Conc. & Bitum. Matls.	2	(1,3)	CE 311 Transport Engr.	3	(3,0)
EM 202 Dynamics	3	(8,0)	CE 331 Soil Mechanics	3	(2,2)
EM 305 Mech. of Materials Lab.	1	(0,3)	CE 341 Environmental Engr.	3	(3,0)
Geol 406 Engr. Geology	3	(2,3)	EM 320 Fluid Mechanics	3	(3,0)
Math 309 Engr. Math. II	3	(3,0)	EM 322 Fluid Mech. Lab.	1	(0,3)
Aprv. Humanistic-Social Elective†	3				
	19			17	
SENIOR YEAR					
CrE 310 Introd. to Mat. Science	3	(3,0)	CE 404 Concrete Structures	4	(3,2)
CE 408 Mat. & Meth. of Const.	3	(3,0)	CE 422 Engr. Relations	3	(3,0)
Econ 201 Prin. of Economics	3	(3,0)	ME 311 Engr. Thermo. I	3	(3,0)
EM 420 Hydraulic Engr.	3	(3,0)	Aprv. Humanistic-Social Electives†	6	
EE 307 Basic Elec. Engr.	3	(3,0)	Approved Technical Elective†	3	
Approved Technical Elective†	4				
	19			19	

† Each class adviser has a list of approved electives from which students must make selections. Any exception to this list must have the written approval of the department head.

ELECTRICAL ENGINEERING

Electrical Engineering has a proud and rich heritage. The scope of this profession is so broad that it extends deeply into the basic sciences. The electrical engineer may find himself studying massive equipment producing millions of watts of power, or he may be concerned with the minuscule electrical charges that are manifested in the human brain. He may be working at the microscope examining the electronic circuitry measured in the thousands of an inch or he may be concerned with a complex guidance and control sys-

tem that is steering a 500-foot missile in outer space. The electronic engineer is the parent of modern computers and although these machines are enormously complex today it is clear that the field has been just barely explored.

It is not reasonable to expect to divide electrical engineering into mutually exclusive fields of work. However, classifications which are reasonably accurate include communications theory, network analysis, energy conversion, control systems analysis, electromagnetic fields, computing machinery and electronics. Other fields exist in which the electronics engineer plays an important part, among them are Operations Research and Biomedical Engineering.

The curriculum in Electrical Engineering contains the fundamental course work which enables the student to enter any of the subdivisions of the profession. These fundamental courses have been chosen to assure that the rapid changing technology will not make them obsolete in the near future.

The first two years of the program are devoted largely to basic sciences such as mathematics, physics and chemistry. Courses in the arts and sciences are required in order to broaden the training in non-engineering areas. Approximately the last two years of course work in the Electrical Engineering Department place major emphasis on technological fundamentals.

Both theoretical and laboratory courses are offered. The theoretical material is supplemented by corresponding laboratory work using modern well-equipped facilities.

The curriculum is designed such that both the student who wishes to terminate his formal education at the bachelor's level and that student who wishes to continue in Graduate Studies will have the necessary prerequisites.

Students with a high level of competency are encouraged to enter the honors program in Electrical Engineering. This program allows students to look in great depth at certain specific problems. In some cases it is also used to introduce students to topics which might not otherwise have been studied.

ELECTRICAL ENGINEERING CURRICULUM

(See page 182 for Freshman Year)

SOPHOMORE YEAR

First Semester

EE 205 Elec. Circuits I	3 (3,0)
EE 299 Digital Comp.	1 (0,3)
EM 201 Statics	3 (3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)
Phys 221 Ther. & Elec. Phen.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

19

Second Semester

EE 206 Elec. Circuits II	3 (3,0)
EE 208 Elec. Engr. Lab. I	1 (0,2)
EM 202 Dynamics	3 (3,0)
Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 208 Engr. Math. I	4 (4,0)
Phys 222 Opt. & Mod. Phys.	3 (3,0)
Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

19

JUNIOR YEAR

EE 320 Electronics I	3 (3,0)
EE 323 Elec. & Mag. Fields	3 (3,0)
EE 325 Elec. Engr. Lab. II	1 (0,2)
EE 327 Network Theory I	3 (3,0)
Math 309 Engr. Math II	3 (3,0)
ME 311 Engr. Thermodynamics I	3 (3,0)
Aprv. Humanistic—Social Elect.*	3

19

EE 312 Electromechanics	3 (3,0)
EE 314 Elec. Engr. Lab. III	1 (0,2)
EE 324 Electronics II	3 (3,0)
EE 326 Elec. Engr. Lab. IV	1 (0,2)
EE 328 Network Theory II	3 (3,0)
ME 304 Heat Transfer I	3 (3,0)
ME 307 Mech. Engr. Lab.	1 (0,2)
Aprv. Humanistic—Social Elect.*	3 (3,0)

18

SENIOR YEAR

EE 401 Seminar	1 (1,0)
EE 409 Elec. Engr. Lab. V	1 (0,2)
EE 410 Feedback Control Systems	3 (3,0)
Math 313 Stat. Theory & Methods I	3 (3,0)
Humanistic—Social Elective*	3 (3,0)
Approved Tech. Elective*†	6 (6,0)

17

EE 402 Engineering Analysis	1 (1,0)
EE 450 Analog, Digital and Hybrid Computation	3 (3,0)
EM 320 Fluid Mechanics	3 (3,0)
Phys 446 Solid State Physics	3 (3,0)
or CrE 310 Intro. to Mat. Sci.	3 (3,0)
Humanistic—Social Elect.*	3 (3,0)
Approved Tech. Elect.*†	6 (6,0)

19

* A list of approved electives is available from the student's adviser. Any exceptions to this list must be approved in writing by the department head.

† A minimum of 6 credits with Electrical Engineering designations.

INDUSTRIAL ENGINEERING*

INDUSTRIAL ENGINEERING CURRICULUM*

(See page 189 for Freshman Year)

SOPHOMORE YEAR

First Semester

EM 201 Statics	3 (3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)
IE 200 Geom. Chang. Proc. I	2 (1,3)
Math 206 Anal. Geom., Cal. III	4 (4,0)
Phys 221 Ther. & Elec. Phen.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

17

Second Semester

Econ 201 Prin. of Economics	3 (3,0)
Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
IE 201 Geom. Chang. Proc. II	2 (1,3)
IE 299 Digital Computation	1 (0,3)
Math 208 Engr. Math. I	4 (4,0)
Phys 222 Opt. & Mod. Phys.	3 (3,0)
Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)

18

JUNIOR YEAR

EM 304 Mech. of Materials	3 (3,0)
EM 305 Mech. of Mat. Lab.	1 (0,3)
IE 301 Process Planning I	3 (2,3)
IE 304 Methods & Standards	3 (2,3)
Math 313 Stat. Th. & Meth. I	3 (3,0)
ME 311 Thermodynamics	3 (3,0)
MetE 302 Gen. Metallurgy	3 (2,3)

19

EE 307 Basic Elec. Engr.	3 (3,0)
EE 309 Elec. Engr. Lab.	1 (0,2)
EM 202 Dynamics	3 (3,0)
IE 306 Process Planning II	3 (2,3)
IE 407 Ind. Applic. of Statis.	3 (2,3)
ME 304 Heat Transfer	3 (3,0)
Humanistic—Social Elective	3

19

* This program is to be discontinued. No new students admitted after January 1966.
Each class adviser has an up-to-date list of approved electives. Students must select their electives from this list. Any exceptions to list must be approved in writing by the department head.

		SENIOR YEAR	
<i>First Semester</i>		<i>Second Semester</i>	
EE 308 Basic Elec. Engr.	3 (3,0)	IE 404 Engr. Econ. Anal.	3 (3,0)
EE 310 Elec. Engr. Lab.	1 (0,2)	IE 408 Plant Design	2 (1,3)
EM 320 Fluid Mechanics	3 (3,0)	IE 411 Work Flow Sys. & Contr.	3 (3,0)
IE 412 Seminar	1 (1,0)	IE 413 Seminar	1 (1,0)
ME 315 Kinematics of Mech.	3 (2,3)	ME 481 Methods of O.R. II	3 (3,0)
ME 480 Methods of O.R. I	3 (3,0)	Approved Elective	3
Approved Elective	3	Humanistic-Social Elective	3
Humanistic-Social Elective	3		
<hr/>		<hr/>	
20		18	

MECHANICAL ENGINEERING

Mechanical engineers are involved in a variety of industries: aerospace, machinery, textile, chemical, automotive, appliance, and many others. Therefore, their education must be rather broad and not overly specialized. It begins with a thorough preparation in the basic sciences: mathematics, chemistry and physics. This is followed by rigorous study of the engineering sciences: electrical sciences, thermal sciences, mechanical sciences, computers, and systems engineering which is a generalized treatment of automatic control systems.

The program is designed to develop technical competence in the three broad technical areas of Thermal Science, Mechanical Design and Systems Engineering.

The thermal sciences are concerned with energy conversion and heat transfer. The chemical energy of fuels may be converted to other more useful forms to propel high-speed jet aircraft, to provide the thrust for space vehicles, or to operate refrigeration or air conditioning systems. The thermal sciences also involve fluid flow phenomena: supersonic flow, aerodynamics, and flow through turbo-machinery.

Mechanical design requires a knowledge of the strength of materials; mechanisms for converting motion; stress, strain, and deflection analyses; automatic control; lubrication theory; and other engineering sciences. It involves the application of the basic and engineering sciences to the creative design of a wide variety of new devices and systems from prosthetic devices for the handicapped to completely automated machines for manufacturing plants.

Systems engineering is an outgrowth of automatic control theory. It involves instrumentation, and both analog and digital computers for the mathematical and experimental analyses of complex physical systems. These systems may be made up of various mechanical, electrical, and hydraulic components. It is the engineering science upon which the field of automation is based.

All of the mechanical engineering laboratories and mechanical design rooms at Clemson are modern and well equipped. A new Analog Computer Laboratory has recently been developed as well as a new Instrumentation Laboratory. All research activities in the department are housed in a new, modern, air-conditioned laboratory building.

In order that mechanical engineering students may obtain a well-rounded education, approximately one-fifth of the program is devoted to subjects in the arts and humanities. Thus, with a broad education in the basic sciences, engineering sciences, and in the humanities, mechanical engineering graduates are prepared for careers in industry, research, development, mechanical design, management or further graduate study.

The Mechanical Engineering Department offers work leading to the Master of Science and the Doctor of Philosophy degrees as well as to the Bachelor of Science degree.

MECHANICAL ENGINEERING CURRICULUM

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR

<i>First Semester</i>		<i>Second Semester</i>	
EE 205 Electric Circuits I	3 (3,0)	EE 206 Electric Circuits II	3 (3,0)
EM 201 Statics	3 (3,0)	EE 208 Elect. Engr. Lab.	1 (0,2)
Math 206 Anal. Geom., Cal. III	4 (4,0)	EM 202 Dynamics	3 (3,0)
ME 201 Engr. Design & Prod.	3 (2,3)	Math 208 Engr. Math I	4 (4,0)
or Elective	3	ME 201 Engr. Design & Prod.	3 (2,3)
ME 299 Digital Computations	1 (0,3)	or Elective	3
Phys 221 Therm. & Elec. Phen.	3 (3,0)	Phys 222 Optics & Mod. Phys.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic.	1 (2,1)	AS or MS—Basic.	1 (2,1)
	19		19

JUNIOR YEAR

Engl 203 Surv. of Engl. Lit.	3 (3,0)	CrE 310 Introd. to Mat. Sci.	3 (3,0)
EM 304 Mech. of Materials	3 (3,0)	EM 320 Fluid Mech.	3 (3,0)
Math 313 Stat. Th. & Meth.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. . .	3 (3,0)
ME 311 Engr. Thermo. I	3 (3,0)	ME 304 Heat Transfer	3 (3,0)
ME 313 Inst. & Meas.	1 (0,2)	ME 312 Engr. Thermo. II	3 (3,0)
ME 315 Kinematics of Mech.	3 (2,3)	ME 314 Engr. Experimentation	1 (0,2)
Elective	3	ME 318 Dynam. Anal. of Mach.	3 (2,3)
	19		19

SENIOR YEAR

ME 401 Prin. of Mech. Engr. Des. . . .	3 (3,0)	ME 402 M. E. Anal. & Des.	3 (1,6)
ME 403 Fluid Dynamics	3 (3,0)	ME 414 M. E. Lab.	1 (0,2)
ME 404 Phys. Systems Anal. I	3 (3,0)	Electives	12
ME 413 M. E. Lab.	1 (0,2)		
Electives	9		16
	19		

Elective Policy

12 hours must be Humanistic-Social Electives.

15 hours must be Technical Electives (Advanced ROTC may be used for 6 hours of Technical Electives).

Each class adviser has a list of approved electives.

METALLURGICAL ENGINEERING

Metallurgical Engineering is the adaptation of metallic materials to fulfill the needs of mankind. The curriculum in Metallurgical Engineering leads to the degree of Bachelor of Science in Metallurgical Engineering. The course encompasses the principles of physics, chemistry and the engineering sciences. To these studies are added the art and science of metallurgy. Courses in humanities and the social sciences are included to broaden the student's background. The curriculum is designed to prepare the graduate for immediate employment in industry or for postgraduate education.

A majority of metallurgical engineers are employed in the development and production of metal products. This includes the selection and application of metals and alloys in industries, such as the aircraft, automotive, shipbuilding and allied fields, the rolling, forging, casting or welding of metal parts, the extraction of metals from their ores, the interaction between metals and their environment—either high temperature or corrosive chemicals—and the heat treatment of metals and alloys. In order to understand and improve on the useful characteristics of metals and alloys, metallurgical engineers study the structure of metals, changes in structure caused by heat treatment or forging or casting, and the relationship between the structure and the desired properties of the metals.

The metallurgical engineer is also employed in other areas of engineering, in sales and in management positions. Quite often he is the technical "jack-of-all-trades." In addition to the metallurgical problems described previously, the metallurgical engineer is frequently faced with questions of product design, process engineering, engineering economics, and product failure analysis. The metallurgical engineer may serve as a consultant to management, purchasing, inspection, engineering, sales, or field service personnel. He may work in various areas of pure or applied research. A wide spectrum of job opportunities is available to the metallurgical engineering graduate.

As new and more rigid demands are placed on materials in this age of nuclear and aerospace technology, more metallurgical engineers than are now available will be vitally needed to develop materials and new materials applications. This situation is particularly acute in the Southeastern United States.

The Metallurgical Engineering Department at Clemson is located on the ground floor of Earle Hall, a new and well-equipped building with outstanding research and teaching facilities.

METALLURGICAL ENGINEERING CURRICULUM †

(See page 189 for *Freshman Year*)

SOPHOMORE YEAR	
<i>First Semester</i>	<i>Second Semester</i>
Engl 203 Surv. of Engl. Lit.	CrE 299 Digital Computation
Math 206 Anal. Geom., Cal. III. . . .	EM 201 Statics
MetE 202 Introd. to Metallurgy	Engl 204 Surv. of Engl. & Am. Lit. .
MetE 323 Metallography	Math 208 Engr. Math.
Phys 221 Ther. & Elec. Phen.	MetE 220 Extractive Metallurgy . .
Phys 223 Engr. Phys. Lab.	Phys 222 Opt. & Mod. Phys.
AS or MS—Basic	Phys 224 Engr. Phys. Lab.
17	19
JUNIOR YEAR	
Ch 313 Quan. Anal.	ChE 331 Chem. Engr. Thermo. . . .
Ch 317 Quan. Anal. Lab.	Ch 332 Phys. Chemistry
Ch 331 Phys. Chemistry	Ch 340 Phys. Chemistry Lab.
Ch 339 Phys. Chemistry Lab.	EE 308 Basic Elec. Engr.
EE 307 Basic Elec. Engr.	EM 304 Mechanics of Mats.
Math 313 Stat. Th. & Meth. I.	EM 305 Mech. of Mats. Lab.
MetE 301 Phys. Metallurgy	MetE 304 Physical Metallurgy
Non-Technical Elective*	MetE 320 Mech. Metallurgy
20	19
SENIOR YEAR	
CrE 410 Analytical Processes	MetE 408 Heat Treating
CrE 419 Science of Engr. Mats. . . .	MetE 425 Senior Thesis
ChE 430 Chem. Engr. Thermo.	MetE 450 Metallic Corrosion
MetE 402 Metallurgical Lit.	Non-Technical Electives*
MetE 455 Electrometallurgy	Technical Electives*
Non-Technical Elective*	
19	17

† This program to be discontinued. No new students admitted after January 1968.

* Class advisers have an up-to-date list of approved electives and will suggest course sequences. A minimum of nine credits in the humanities or social sciences must be elected. Any exception to the courses on the list must be approved by the department head.

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

The programs of the School of Industrial Management and Textile Science embrace three major areas, teaching, research, and public service. The school is responsible for six graduate programs (two in cooperation with other administrative units), four undergraduate programs, and a "non credit" series of professional development courses for business and industry. The undergraduate curriculums are in the areas of Economics, Industrial Management, Textiles, and Textile Chemistry. These curriculums are designed to prepare the students for a variety of careers, as well as to furnish an education on which to build for a lifetime. The curriculums recognize the need for an understanding of the basic principles of science and appreciation for the nature of human beings, and the comprehension of the economic, political, and social en-

vironment. Flexibility in course selection and choice of areas for emphasis is made possible by secondary concentrations and minors as indicated.

ECONOMICS

The curriculum leading to the Bachelor of Arts degree in Economics is designed to combine a broad general education with a thorough understanding of economics.

The economics curriculum is administered in the School of Industrial Management and Textile Science. Although separate and distinct from the Bachelor of Arts program in the College of Arts and Sciences, it shares several ingredients with that program. The two programs share an identical freshman year sequence, identical minor concentrations in most cases, and many of the same approved electives.

The degree requirements, effective for freshmen entering 1967-1968 and thereafter, are given below. The Bachelor of Arts degree in Economics requires 128 semester hours for graduation; and whenever scheduling permits, the students will be required to take the courses in the sequence given. The curriculum shown, however, can be considered adequate preparation for graduate study in economics only if it is taken with the mathematics minor.

BACHELOR OF ARTS IN ECONOMICS

FRESHMAN YEAR			
<i>First Semester</i>		<i>Second Semester</i>	
Engl 101 Engl. Composition	3 (3,0)	Engl 102 Engl. Composition	3 (3,0)
Hist 203 Hist. of Civilization	3 (3,0)	Hist 204 Hist. of Civilization	3 (3,0)
Math 101 Math. Analysis ^o	3 (3,0)	Math 102 Math. Analysis ^o	3 (3,0)
Modern Language	3 (3,1)	Modern Language	3 (3,1)
Natural Science†	4	Natural Science†	4
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	17		17
SOPHOMORE YEAR			
Econ 201 Prin. of Economics	3 (3,0)	Econ 202 Prin. of Economics	3 (3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit. . .	3 (3,0)
Hist 101 American History	3 (3,0)	Hist 102 American History	3 (3,0)
Math 203 Elem. Stat. Inference ^o . .	3 (3,0)	Math 106 Anal. Geom., Cal. I.	4 (4,0)
Modern Language	3 (3,1)	Modern Language	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
	16		17
JUNIOR YEAR			
Acct 201 Prin. of Accounting	3 (3,0)	Humanities†	3
Humanities†	3	Major	6
Major	6	Minor§	6
Minor§	3		
	15		15

First Semester		SENIOR YEAR	Second Semester	
Major	6	Major	6	
Minor	6	Approved Electives¶	10	
Approved Elective¶	3			
	15			16

* The sequence of Math 101, 102, and 203 may be replaced by Math 106, 205, and 313 or by Math 106, 205, and Ex St 401.

† Election of a two-semester sequence of the same science is required.

‡ Courses for the Humanities requirement may not be selected from the minor field. Humanities include Art, English, Foreign Language, Music, Philosophy and Religion.

§ Where the student selects a minor which contains prerequisites, the prerequisite courses will be counted as approved electives.

¶ Students taking Advanced Aerospace Studies must complete 134 semester hours. Those seeking teacher certification will be required to complete more than 128 semester hours.

Twenty-four semester hours above the sophomore level are required including Econ 314 and Econ 407. Courses must also include 9 semester hours selected from Econ 302, 403, 404, 410, 412 and 420. The remaining hours may be selected from Econ 301, 302, 305, 306, 308, 309, 403, 404, 410, 412, 416, 420, 422, Ex St 462, Mgt Sci 311, IM 404, 405, 406, and Ag Ec 456. (Econ 314 should be scheduled to follow immediately after Econ 202.)

MINOR CONCENTRATION

A major in economics must select a secondary (minor) concentration from the following:

Accounting (to include Acct 202, 301, 302, 303, 410)	History
Biology	Mathematics
Chemistry	Modern Languages
English	Political Science
Geology	Psychology
	Sociology

Students who plan to take the Bachelor of Arts curriculum in Economics and expect to go into secondary school teaching may select education courses as a minor. The courses will be those required for teaching certificates as specified by the South Carolina Department of Education.

Specific requirements (where not shown) for these minors may be found under the section on the College of Arts and Sciences, Bachelor of Arts Curriculum. Specific requirements for a minor in education are available from the School of Education.

A minor in economics is provided for other degree programs consisting of 15 hours above the sophomore level which must include Econ 314 and 407.

APPROVED ELECTIVES

A list of approved electives for both degree and quality requirements may be obtained from the departmental secretary or from an adviser.

INDUSTRIAL MANAGEMENT

This curriculum is designed to prepare students adequately for positions in industry, business, government, or further academic work. During the first two years education in the humanities, social, and physical sciences is emphasized. During the junior and senior years the student concentrates on various basic engineering, management, finance, economics, and technical courses designed to furnish a balanced curriculum. As preparation for careers in management, the Industrial Management curriculum is predicated on the philosophy that the individual must manage first himself, coupling this objective with the acquisition of a general education and a mastery of the "tools" of management—Management Science. It might be called a "breadth" program.

INDUSTRIAL MANAGEMENT CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 Gen. Chemistry	4 (3,3)	Ch 102 Gen. Chemistry	4 (3,3)
EG 103 Engr. Com.	3 (1,6)	Engl 102 Engl. Composition	3 (3,0)
Engl 101 English Comp.	3 (3,0)	Math 200 Linear Algebra	3 (3,0)
Hist 104 Hist. of Western Civil. .	3 (3,0)	Phys 122 Mech. & Wave Phen. .	3 (3,0)
IM 100 Introd. to IM	0 (1,0)	Soc 201 Introd. to Sociology	3 (3,0)
Math 106 Anal. Geom., Cal. I ...	4 (4,0)	AS or MS—Basic	1 (2,1)
AS or MS—Basic	1 (2,1)		

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SOPHOMORE YEAR

Acct 201 Prin. of Accounting ...	3 (3,0)	Acct 202 Prin. of Accounting ...	3 (3,0)
Econ 201 Prin. of Economics ...	3 (3,0)	Econ 202 Prin. of Economics ...	3 (3,0)
Engl 203 Surv. of Engl. Lit.	3 (3,0)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 207 Mult. Dim. Cal.	4 (4,0)	IM 201 Introd. to Ind. Mgt.	3 (3,0)
Phys 221 Thermal & Elect. Phen. .	3 (3,0)	IM 299 Comp. Program. I	1 (0,3)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Psych 201 Gen. Psychology	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)

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JUNIOR YEAR *

Acct 303 Cost Acct.	3 (3,0)	Engl 304 Adv. Composition	3 (3,0)
Econ 314 Inter. Econ. Theory ...	3 (3,0)	IM 304 Quality Control	3 (3,0)
Engl 301 Public Speaking	3 (3,0)	IM 322 Legal Env. of Bus.	3 (3,0)
IE 307 Survey of Engr.	3 (3,0)	Mgt Sc 311 Introd. to Econometrics	3 (3,0)
Math 313 Statistical Methods I ...	3 (3,0)	Pol Sc 301 Amer. Gov. and	
Secondary Concentration	3	Pol. Par.	3 (3,0)
		Soc 351 Indus. Sociology	3 (3,0)
		Secondary Concentration	3

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SENIOR YEAR

Acct 410 Budget & Exec. Cont. ...	3 (3,0)	IM 402 Prod., Plan., and Control	3 (3,0)
IM 401 Marketing Analysis	3 (3,0)	IM 404 Managerial Econ.	3 (3,0)
IM 408 Work Simplif. & Stand. .	3 (2,3)	IM 407 Special Problems	1 (1,0)
Mgt Sc 414 Stat. Anal.	3 (3,0)	IM 409 Management Simul.	0 (1,0)
Secondary Concentration	3	IM 415 Managerial Decision	
Approved Elective	3	Making	3 (3,0)
		IM 499 Comp. Program. II	1 (0,3)
		Secondary Concentration	3
		Approved Elective	3

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* Industrial Management majors are expected to begin their secondary concentration in the junior year.

SECONDARY CONCENTRATION

During the junior and senior years the student is required to select courses from *one* of the following areas for the purpose of emphasizing a particular phase of the curriculum. This constitutes 12 credits.

- | | |
|--|---------------------------|
| A. Accounting | F. Industrial Engineering |
| B. Ceramics | G. Management Science |
| C. Economics | H. Marketing Analysis |
| D. Finance | I. Mathematics |
| E. Health and Hospital
Administration | J. Regional Analysis |
| | K. Textile Chemistry |
| | L. Textiles |

The student must select an additional 6 elective credits approved by his class adviser or the Dean of the School of Industrial Management and Textile Science. Students enrolled in the advanced ROTC program may use 6 credits of advanced military courses to meet this requirement.

TEXTILE CHEMISTRY

Preparation for a future in the modern textile industry requires training in a great many areas of science. The manifold types of materials used in the textile industry, such as natural fibers, synthetic polymers, dyes, and finishing agents, necessitates a working knowledge of the fundamental concepts underlying the properties and behavior of these products along with their practical utilization. The curriculum in Textile Chemistry is designed to accomplish this purpose by including several courses in chemistry, mathematics and physics. Courses in fiber and fabric formulation, dyeing, polymer chemistry, colloid chemistry and inorganic chemistry all related to the textile industry are offered within the department. Other areas of study include statistics, quality control and fiber science.

This should prepare the student either for work in the textile industry or for graduate study in textiles or other scientific fields depending on his elective area of study.

The Textile Department offers the Master of Science degree and, in conjunction with the Chemistry Department, the Doctor of Philosophy in chemistry with a major in Textile Chemistry.

TEXTILE CHEMISTRY CURRICULUM

FRESHMAN YEAR

<i>First Semester</i>		<i>Second Semester</i>	
Ch 101 Gen. Chemistry	4 (3,3)	Ch 102 General Chemistry	4 (3,3)
EG 109 Engr. Comp. & Design	3 (1,6)	Engl 102 Engl. Composition	3 (3,0)
Math 106 Anal. Geom., Cal. I*	4 (4,0)	Hist 104 Western Civilization	3 (3,0)
Engl 101 Engl. Composition	3 (3,0)	Math 205 Anal. Geom., Cal. II	4 (4,0)
Text 122 Introd. Textiles	1 (1,0)	Phys 122 Mech. & Wave Phen.	3 (3,0)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
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SOPHOMORE YEAR

Ch 223 Organic Chemistry	3 (3,0)	Ch 219 Chem. Principles	2 (2,0)
Ch 225 Org. Chem. Lab.	2 (0,6)	Ch 224 Organic Chemistry	3 (3,0)
Engl 203 Surv. Engl. Lit.	3 (3,0)	Ch 226 Org. Chem. Lab.	2 (0,6)
IM 299 Comp. Program. I	1 (0,3)	Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 206 Anal. Geom., Cal. III	4 (4,0)	Math 208 Engr. Math	4 (4,0)
Phys 221 Thermal & Elect. Phen.	3 (3,0)	Phys 222 Optics & Mod. Phys.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)	Phys 224 Engr. Phys. Lab.	1 (0,3)
AS or MS—Basic	1 (2,1)	AS or MS—Basic	1 (2,1)
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JUNIOR YEAR

Ch 331 Phys. Chemistry	3 (3,0)	Engl 304 Adv. Composition	3 (3,0)
Math 313 Stat. Theory & Methods	3 (3,0)	TC 316 Chem. Prep. of Text.	3 (2,3)
TC 315 Chem. of Fibers	3 (3,0)	Ch 332 Phys. Chem.	3 (3,0)
TC 317 Syn. Fiber Lab.	1 (0,3)	Ch 313 Quan. Anal.	3 (3,0)
Text 305 Yarn Structure I	3 (2,3)	Ch 315 Quan. Anal. Lab.	2 (0,6)
Elective	3	Text 306 Yarn Structure II	3 (2,3)
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16		<hr/>	
		20	

SENIOR YEAR

Econ 201 Prin. of Economics	3 (3,0)	TC 448 Dyeing & Fin. II	3 (3,0)
TC 457 Dyeing & Fin. I	3 (3,0)	TC 450 Finishing Lab.	1 (0,3)
TC 459 Dye Lab.	1 (0,3)	TC 466 Text. Unit Operations	3 (3,0)
TC 461 Sem. & Research	3 (1,6)	Text 313 Fabric Structure I	3 (2,3)
TC 475 Cellulose Chem.	2 (2,0)	Text 322 Prop. of Text. Structure	3 (2,3)
Text 321 Fiber Science	3 (2,3)	Text 426 Instrumentation	3 (3,0)
Elective	3	Elective	3
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18		19	

* Effective 1969-1970.

TEXTILES

The Textile curriculum is planned to give adequate training in the textile technological and scientific subjects.

The first two years are devoted to the basic sciences of mathematics, physics, chemistry and English.

The curriculum is designed for the student with a strong desire to enter into the manufacturing or the scientific area of the textile industry. It prepares him for research and development work as well as for positions in production, standards and management administration. The curriculum has a very strong foundation for a graduate school program.

TEXTILE CURRICULUM

FRESHMAN YEAR

First Semester

Ch 101 Gen. Chemistry	4 (3,3)
EG 109 Engr. Comp. & Design	3 (1,6)
Engl 101 Engl. Composition	3 (3,0)
Math 106 Anal. Geom., Cal. I*	4 (4,0)
Text 122 Introd. Textiles	1 (1,0)
AS or MS—Basic	1 (2,1)

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Second Semester

Ch 102 General Chemistry	4 (3,3)
Engl 102 Engl. Composition	3 (3,0)
Hist 104 Western Civilization	3 (3,0)
Math 205 Anal. Geom., Cal. II	4 (4,0)
Phys 122 Mech. & Wave Phen.	3 (3,0)
AS or MS—Basic	1 (2,1)

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SOPHOMORE YEAR

Econ 201 Prin. of Economics	3 (3,0)
Engl 203 Surv. Engl. Lit.	3 (3,0)
IM 299 Computer Programming I	1 (0,3)
Math 206 Anal. Geo., Cal. III	4 (4,0)
Phys 221 Thermal & Elect. Phen.	3 (3,0)
Phys 223 Engr. Phys. Lab.	1 (0,3)
Text 201 Fiber Processing I	3 (2,3)
AS or MS—Basic	1 (2,1)

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Econ 202 Prin. of Economics	3 (3,0)
Engl 204 Surv. of Engl. & Am. Lit.	3 (3,0)
Math 208 Engr. Math	4 (4,0)
Phys 222 Optics & Mod. Phys.	3 (3,0)
Phys 224 Engr. Phys. Lab.	1 (0,3)
Text 202 Fiber Processing II	3 (2,3)
AS or MS—Basic	1 (2,1)

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JUNIOR YEAR

Math 313 Stat. Theory & Methods	3 (3,0)
TC 303 Text. Chemistry	3 (3,0)
TC 305 Text. Chem. Lab.	1 (0,3)
Text 303 Fiber Processing III	3 (2,3)
Text 311 Fabric Development I	3 (2,3)
Text 321 Fiber Science	3 (2,3)
Elective	3

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Acct 201 Prin. of Accounting	3 (3,0)
IM 304 Quality Control	3 (3,0)
TC 304 Text. Chemistry	3 (3,0)
TC 306 Text. Chem. Lab.	1 (0,3)
Text 304 Fiber Processing IV	3 (2,3)
Text 312 Fabric Development II	3 (2,3)
Text 322 Prop. of Text. Struct.	3 (2,3)

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SENIOR YEAR

IM 408 Motion & Time Study	3 (2,3)
TC 315 Chem. of Fibers	3 (3,0)
TC 317 Syn. Fiber Lab.	1 (0,3)
Text 411 Fabric Development III	4 (3,3)
Text 414 Nonwoven & Knit. Struct.	3 (3,0)
Text 421 Text. Costing	3 (2,3)

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Engl 304 Adv. Composition	3 (3,0)
Text 412 Fabric Dev. IV	4 (3,3)
Text 426 Instrumentation	3 (3,0)
Text 440 Spectrophotometry	3 (3,0)
Elective	5

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* Effective 1969-1970.

DESCRIPTION OF COURSES

This list of courses includes for each course the catalog number, title of course, credit in semester hours, class laboratory hours per week, and the description of the course. In general, courses numbered 100-199 are freshman courses, 200-299 sophomore courses, 300-399 junior courses, and 400-499 senior courses. Courses numbered 600 or above are graduate courses and are open only to students admitted to the Graduate School, except that seniors with exceptional records may be enrolled with special permission. Where courses are offered on a schedule, there is a designation F, S, or SS following the title of each course, indicating whether it is customarily offered in the fall, spring, or summer school.

ACCOUNTING

Professor: C. C. DAVIS

Assistant Professor: J. M. WANNAMAKER

Visiting Lecturer: F. R. GRAY

ACCT 201—PRINCIPLES OF ACCOUNTING—3 cr. (3 and 0)

Practice in handling real and nominal accounts, together with an introduction to the use of various types of books of original entry, statements of profit and loss, and balance sheets.

ACCT 202—PRINCIPLES OF ACCOUNTING—3 cr. (3 and 0)

Continuation of Acct 201 with special attention to corporation and partnership accounting with emphasis on adjustment procedures and the analysis of financial statements. *Prerequisite:* Acct 201.

ACCT 301—INTERMEDIATE ACCOUNTING—3 cr. (3 and 0)

A course in the theory of accountancy designed to follow introductory theory presented in the basic principles courses. Intermediate accounting seeks to broaden the students knowledge of financial accounting theory and practice. *Prerequisite:* Acct 201 and 202.

ACCT 302—INTERMEDIATE ACCOUNTING—3 cr. (3 and 0)

A continuation of Accounting 301 with emphasis on managerial accounting. *Prerequisite:* Acct 201 and 202.

ACCT 303—COST ACCOUNTING—3 cr. (3 and 0)

The application of cost analysis to manufacturing and distributing problems. Analysis of the behavior characteristics of business costs and a study of principles involved in standard cost systems. Lectures and problems. *Prerequisite:* Acct 201 and 202.

ACCT 410—BUDGETING AND EXECUTIVE CONTROL—3 cr. (3 and 0)

The study and application of selected techniques used in the planning and control functions of business organizations. *Prerequisite:* Acct 303.

ACCT 710—EXECUTIVE BUDGETING AND CONTROL—3 cr. (3 and 0)

AEROSPACE STUDIES

Professor: COLONEL E. N. TYNDALL, *Head*

Assistant Professors: MAJ. R. P. BURNETT, MAJ. J. N. CALHOUN, MAJ. B. K. MURRAY, MAJ. C. D. PARKER, CAPT. S. S. BIGGS, CAPT. R. M. CARTER, CAPT. W. L. WILSON

GENERAL MILITARY EDUCATION PROGRAM

AS 109—WORLD MILITARY SYSTEMS—1 cr. (2 and 1)

An introductory course exploring the present world conflict and the relationship of the military to that conflict. The course begins with a brief study of war: Next, the factors of national power are examined. The instruments that a nation uses to pursue their objectives are related to varying intensities of conflict. The course develops a broad view of the United States military establishment and shows the mission and relationship of the three military services within the Department of Defense. Corps Training period provides training in drill fundamentals and leadership.

AS 110—WORLD MILITARY SYSTEMS—1 cr. (2 and 1)

The course as a continuation of AS 109 describes the basic missions imposed upon the total military establishment by the realities of the modern world power situation. The U. S. Strategic Offensive Forces and U. S. Defensive Forces are examined in depth in regards to their employment concepts, equipment, roles and missions in war and the deterrence of war. Corps Training.

AS 209—WORLD MILITARY SYSTEMS—1 cr. (2 and 1)

A continuation of the study of world military forces placing special emphasis on the General Purposes forces of the Air Force, Army and Navy and their role throughout the entire spectrum of warfare. Also included are the roles of the aerospace support forces which enable the combat forces to carry out their primary missions. Corps Training.

AS 210—WORLD MILITARY SYSTEMS—1 cr. (2 and 1)

A study of the trends and implications in international affairs highlighting the struggle, the search and the prospects for peace. Special emphasis is given the conflict between democracy and communism, the alliances and collective security agreements of the United States to preserve peace and some of the specific problems and solutions involved in the search for peace. Corps Training.

PROFESSIONAL OFFICER EDUCATION PROGRAM

AS 309—GROWTH AND DEVELOPMENT OF AEROSPACE POWER—3 cr. (3 and 1)

A comprehensive study of the development of the United States Air Force, its mission and organization. The three basic subject matter areas are: the development of air power, aerospace power today, and the future of manned aircraft. Primary consideration is given to the four fundamental themes underlying the development of aerospace power, namely, doctrine, technology, organization and employment. Course objectives are accomplished through a student centered program with emphasis on all phases of communicative skills development. Corps Training.

AS 310—GROWTH AND DEVELOPMENT OF AEROSPACE POWER—3 cr. (3 and 1)

Introduction to the characteristics of the solar system and how they affect space exploration and operations. A survey of types of orbits and trajectories, along with the operating principles, characteristics, and problems associated with space vehicle systems. Corps Training.

AS 409—THE PROFESSIONAL OFFICER—3 cr. (3 and 1)

A study of military professionalism, leadership and management. Covers leadership theory function and practice as employed at all staff levels. Compares leadership in the military with that in private enterprise. Flight instruction ground school training consisting of 30 hours of navigation and meteorology for FIP students. Corps Training is designed to provide advance cadets in this phase with staff experience in the guidance, direction and control of an Air Force unit.

AS 410—THE PROFESSIONAL OFFICER—3 cr. (3 and 1)

A continuation in the study of professionalism with the stress in the management area. This covers management principles and functions as well as the tools, practices and controls employed in management. Problem solving is a major portion of this course wherein principles and practices in problem solving are used in the classroom. This course concludes with a block of instruction designed to facilitate the adjustment of these members in the transition from cadet to officer on entry into active duty in the United States Air Force. Corps Training.

AGRICULTURAL ECONOMICS

Professors: W. J. LANHAM, *Head*; J. M. STEPP

Associate Professors: L. M. BAUKNIGHT, JR., J. W. HUBBARD, H. C. SPURLOCK, G. R. VON TUNGELN

Assistant Professors: B. L. DILLMAN, J. C. HITE, J. S. LYTLE

AG EC 202—AGRICULTURAL ECONOMICS—3 cr. (3 and 0) F, S

An analytical survey of the various subdivisions of agricultural economics, to include farm organization, enterprise analysis, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy. *Prerequisite:* Econ 201.

AG EC 302—AGRICULTURAL FIRM MANAGEMENT—3 cr. (2 and 3) F, S

Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is directed to management aspects of the farm as a production unit. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 305—FARM ACCOUNTING—3 cr. (2 and 3)

Double-entry bookkeeping is stressed. Study is made of special journals, simplifications for farm record keeping, farm inventories, farm budgets, interpretation of financial statements, and the factor method of farm business analysis.

AG EC 309—INTRODUCTION TO MARKETING—3 cr. (3 and 0) F, S

A general introduction to the field of agricultural marketing functions and institutions. Attention is also given to the marketing of specific agricultural commodities. *Prerequisite:* Econ 201.

AG EC 351—ADVERTISING AND MERCHANDISING—3 cr. (3 and 0) F, S

A general introduction to advertising and merchandising theories and some practice with basic techniques. A partial list of subjects covered includes: function of advertising, propriety in advertising, institutions, media, market research, consumer appeals, loss leaders, mass displays, trade marks and brands, writing copy, color, layout, agencies and integrated advertising campaigns. *Prerequisite:* Junior standing.

AG EC 352—PUBLIC FINANCE—3 cr. (3 and 0) F, S, SS

Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy.

AG EC 357—CONSERVATION OF NATURAL RESOURCES—3 cr. (3 and 0) F, S, SS

The principles and problems involved in the conservation of soil, water, and mineral resources, with special emphasis on economic aspects of various methods of resource utilization and on the costs and benefits of various conservation practices. *Prerequisite:* Econ 201.

AG EC 402—ECONOMICS OF AGRICULTURAL PRODUCTION—3 cr. (3 and 0) F

An economic analysis of agricultural production involving (a) the concept of the farm as a firm, (b) principles for decision making, (c) the quantitative nature and use of production and cost functions and their interrelations and application of these principles to resource allocation on farms and among areas. *Prerequisite:* Permission of instructor.

AG EC 403—LAND ECONOMICS—3 cr. (3 and 0)

A study of the characteristics of land and of the physical, legal, social and economic principles and problems relating to the control and use of land resources. *Prerequisite:* Permission of instructor.

AG EC 405—SEMINAR—1 cr. (1 and 0) F

An examination of the relation of economics and sociology to specific problems. *Prerequisite:* Major in Agricultural Economics.

AG EC 406—SEMINAR—1 cr. (1 and 0) S

A continuation of Ag Ec 405.

AG EC 451—AGRICULTURAL COOPERATION—2 cr. (2 and 0) F

The principles and practices of business organization and management governing the successful operation of cooperative business enterprises. Major emphasis is placed upon cooperative selling, processing, purchasing, and service enterprises that serve farm people. *Prerequisite:* Econ 201.

AG EC 452—AGRICULTURAL POLICY—3 cr. (3 and 0) F, S

A review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Included are economic considerations as related to past and current farm price and income problems. *Prerequisite:* Ag Ec 202 or Econ 202.

AG EC 456—PRICES—3 cr. (3 and 0) F, S

A review of the basic theory of price under competitive conditions and various modifications; nature, measurement and causes of daily, seasonal and cyclical price fluctuations; geographical price relationships; nature, function

and behavior of futures markets; government price programs. *Prerequisite:* Ag Ec 202 or Econ 202.

Ag Ec 460—AGRICULTURAL FINANCE—2 cr. (2 and 0) F, S

The financial needs of agriculture and of the organization, functions and interrelationships of agencies developed to meet these needs. *Prerequisite:* Econ 201.

Ag Ec 702—ECONOMICS OF AGRICULTURAL PRODUCTION—3 cr. (3 and 0)

Ag Ec 703—LAND ECONOMICS—3 cr. (3 and 0)

Ag Ec 751—AGRICULTURAL COOPERATION—2 cr. (2 and 0)

Ag Ec 752—AGRICULTURAL POLICY—3 cr. (3 and 0)

Ag Ec 756—PRICES—3 cr. (3 and 0)

Ag Ec 760—AGRICULTURAL FINANCE—2 cr. (2 and 0)

Ag Ec 802—AGRICULTURAL PRODUCTION ECONOMICS PROBLEMS—3 cr. (3 and 0)

Ag Ec 804—WATER RESOURCE POLICIES—3 cr. (3 and 0)

Ag Ec 806—ECONOMIC DEVELOPMENT IN AGRICULTURAL AREAS—3 cr. (3 and 0)

Ag Ec 807—MARKET STRUCTURE IN AGRICULTURAL INDUSTRIES—3 cr. (3 and 0)

Ag Ec 808—APPLIED QUANTIFICATIONS IN AGRICULTURAL ECONOMICS—3 cr (3 and 0)

Ag Ec 814—CONTEMPORARY ECONOMIC PROBLEMS—3 cr. (3 and 0)

Ag Ec 851—SEMINAR IN RESEARCH METHODOLOGY—1 cr. (1 and 0)

Ag Ec 891—THESIS RESEARCH—Credit to be arranged.

Ag Ec 904—SEMINAR IN RESOURCE ECONOMICS—3 cr. (3 and 0)

Ag Ec 906—SEMINAR IN AREA ECONOMIC DEVELOPMENT—3 cr. (3 and 0)

Ag Ec 907—AGRICULTURAL MARKETING PROBLEMS—3 cr. (3 and 0)

Ag Ec 991—DOCTORAL RESEARCH—Credit to be arranged.

AGRICULTURAL EDUCATION*

Professor: L. H. DAVIS, *Head*

Associate Professors: W. C. BOWEN, F. E. KIRKLEY

Assistant Professor: J. A. HASH

Ag Ed 201—INTRODUCTION TO AGRICULTURAL EDUCATION—3 cr. (2 and 3)

Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of farm people.

Ag Ed 401—METHODS IN AGRICULTURAL EDUCATION—3 cr. (2 and 3)

Appropriate methods of teaching vocational agriculture in high schools. The course includes procedures for organizing teaching programs, teaching high school students, and directing F.F.A. activities.

* Jointly administered by the School of Education and the College of Agriculture and Biological Sciences.

AG ED 406—DIRECTED TEACHING—6 cr. (0 and 18)

Guided participation in the professional responsibilities of a teacher of vocational agriculture including an intensive study of the problems encountered and the competencies developed. A half semester of directed teaching in selected schools is required. *Prerequisite:* Ag Ed 401 and Ag Ed 422.

AG ED 422—INTRODUCTION TO ADULT EDUCATION—3 cr. (2 and 3)

History and nature of adult education in the United States, with emphasis on adult education for rural people.

AG ED 431—METHODS IN CONSERVATION EDUCATION—3 cr. (3 and 0)

A study of various techniques appropriate to teaching conservation. Instruction is applicable to both elementary and high school teachers. (Offered in Summer School only.)

AG ED 463—ADVANCED CONSERVATION EDUCATION—3 cr. (3 and 0)

The broader aspects of conservation education. The course includes historical, geographical, and national conservation problems. (Offered in Summer School only.)

AG ED 465—PROGRAM DEVELOPMENT IN AGRICULTURAL EDUCATION—3 cr. (3 and 0)

Each student will determine needs and resources in a specific community and plan a program to meet these needs.

AG ED 467—ADULT EDUCATION IN AGRICULTURE—3 cr. (2 and 3)

Principles and practices appropriate to the solution of problems encountered in instructional programs for adult farmers.

AG ED 701—METHODS IN AGRICULTURAL EDUCATION—3 cr. (2 and 3)

AG ED 763—ADVANCED CONSERVATION EDUCATION—3 cr. (3 and 0)

AG ED 765—PROGRAM PLANNING IN AGRICULTURAL EDUCATION—3 cr. (3 and 0)

AG ED 767—ADULT EDUCATION IN AGRICULTURE—3 cr. (2 and 3)

AG ED 803—EVALUATION IN AGRICULTURAL EDUCATION—3 cr. (2 and 3)

AG ED 804—SPECIAL PROBLEMS—3 cr. (2 and 3)

AG ED 805—ADMINISTRATION AND SUPERVISION IN AGRICULTURAL EDUCATION—3 cr. (3 and 0)

AG ED 815—ADVANCED METHODS OF TEACHING FARM MECHANICS—3 cr. (2 and 3)

AG ED 820—TEACHING YOUNG FARMERS—3 cr. (3 and 0)

AG ED 825—SUPERVISION OF STUDENT TEACHING—3 cr. (3 and 0)

AG ED 869—SEMINAR—1-3 cr. (1-3 and 0)

AG ED 891—INTRODUCTION TO RESEARCH IN EDUCATION—3 cr.

AGRICULTURAL ENGINEERING*

Professors: A. W. SNELL, *Head*; T. V. WILSON

Associate Professors: L. O. DREW, T. H. GARNER, J. T. LIGON, E. B. ROGERS, JR.

Assistant Professors: J. T. CRAIG, C. E. HOOD, JR., J. R. LAMBERT

Instructor: R. H. RAMSEY

AgE 205—FARM SHOP—3 cr. (2 and 3) S

Correct methods and underlying reasons in proper use and maintenance of hand and power tools are emphasized. Principal topics include: carpentry, painting and finishing, soldering and sheet metal work, farm concrete, pipe fitting and plumbing, and farm and home water supply systems.

AgE 206—AGRICULTURAL MECHANIZATION—3 cr. (2 and 3) F, S

The agricultural student is taught to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Planning efficient operational systems and wise selection of equipment, based on function and economic suitability, are stressed. *Prerequisite:* Math 103, 104, Phys 201 and 203.

AgE 209—AGRICULTURAL ENGINEERING TECHNOLOGY—2 cr. (1 and 3) F

The basic technology and functional utility of machines, equipment and construction methods needed to facilitate the attainment of major objectives in engineering research, development and operations. *Prerequisite:* EG 109.

AgE 299—DIGITAL COMPUTATION—1 cr. (0 and 3) S

An introduction to digital computer programming for students majoring in Agricultural Engineering. Emphasis is placed on computer languages and their application to the solution of simple problems in agricultural engineering. *Prerequisite:* Sophomore standing.

AgE 301—SOIL AND WATER CONSERVATION—3 cr. (2 and 3) F

Engineering and agronomic principles are applied to water management in agriculture. Elementary surveying, mathematics, crops and soil fundamentals are embodied into principles and practices of erosion control, drainage, water conservation and irrigation. *Prerequisite:* Math 103, 104.

AgE 352—FARM POWER—3 cr. (2 and 3) S, '70 and alternate years and SS, '69 and alternate years.

Farm tractors and stationary power units. Principles of operation, preventive maintenance, adjustment and general repair are emphasized. *Prerequisite:* AgE 206.

AgE 355—ENGINEERING ANALYSIS AND CREATIVITY—3 cr. (2 and 3) F, '68 and alternate years.

The principles of professional creativity and engineering analysis are applied to the solution of engineering problems involving the dynamics of particles and bodies and the flow of electricity, heat and fluids are studied. *Prerequisite:* Math 208 and Phys 221.

AgE 360—FARM AND HOME UTILITIES—3 cr. (2 and 3) SS, '68 and alternate years and S, '69 and alternate years.

A course for seniors and graduate students in agriculture curriculums, involving a study of electric and other utilities on the farm and in the home. Selection,

* Jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.

installation and maintenance of wiring systems, motors and controls, home water systems and sewage disposal systems are emphasized. *Prerequisite:* Junior standing.

AGE 362—ENERGY CONVERSION IN AGRICULTURAL SYSTEMS—3 cr. (2 and 3) S, '69 and alternate years.

The energy requirements of agricultural systems with emphasis upon energy conversion methods. Characteristics of various sources of energy will be considered including economic aspects. The present energy conversion mechanisms used in agriculture will be studied and their limitations considered. *Prerequisite:* EM 202, ME 311.

AGE 416—AGRICULTURAL MACHINERY—4 cr. (3 and 3) S, '70 and alternate years.

Engineering analysis of machines and of basic agricultural operations and systems requiring machine functions. Static and dynamic force analyses, energy transfer, functional analysis, elements of machine design, machine and system efficiency, and economic considerations are emphasized. *Prerequisite:* EM 304.

AGE 422—SOIL AND WATER CONSERVATION ENGINEERING—4 cr. (3 and 3) S

Physical relationships of factors governing rainfall disposition are used as bases for defining the hydrology of agricultural watersheds, which in turn serves as a basis for analysis and design of water-control structures and other conservation methods. Basic soil-water-plant relationships are used to establish criteria for determining the need of drainage and irrigation. Engineering relationships involved in the design of drainage and irrigation facilities are studied. *Prerequisite:* EM 320, CE 200, Agron 202.

AGE 431—AGRICULTURAL STRUCTURES DESIGN—3 cr. (2 and 3) F, '69 and alternate years.

Analytic and synthetic design of building components, including fastening devices, as determined by both live and dead loads with emphasis on statically determinate members and their positions and utilization in frames and trusses. Major materials considered are wood, steel and concrete. *Corequisite:* EM 304.

AGE 442—AGRICULTURAL PROCESS ENGINEERING—4 cr. (3 and 3) S, '70 and alternate years.

Design of unit operations components used in agricultural processing installations. Engineering principles and instrumentation as applied to control systems, heat transfer, materials handling, storage and related subjects are emphasized. *Prerequisite:* ME 311, EE 308.

AGE 465—ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS—3 cr. (2 and 3) S, '69 and alternate years.

The thermal, electrical, mechanical, and chemical characteristics of biological materials, organisms, and metabolic processes are studied in relationship to engineering analysis and synthesis. The effects of environmental factors imposed by engineering processes are evaluated. *Prerequisite:* Math 208, EM 304. *Corequisite:* Bot 352, Zool 101, 103.

AGE 471—UNDERGRADUATE RESEARCH—1 cr. (0 and 3) F

A course to acquaint senior students in Agricultural Engineering with the scientific method. Literature investigations, planning, and executing of an experiment are integral parts of the course. *Prerequisite:* Senior standing in Agricultural Engineering.

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AcE 473—SPECIAL TOPICS IN AGRICULTURAL ENGINEERING—3 cr. (3 and 0)

A comprehensive study of special topics in the field of agricultural engineering not covered in other courses. Special emphasis will be placed on independent pursuit of detailed investigations.

AcE 481—FUNDAMENTALS OF GINNING ENGINEERING—3 cr. (2 and 3)
S, '70 and alternate years.

An analysis of the engineering requirements and associated problems in all phases of ginning, such as handling, storage, drying, separating lint, cleaning, pressing, disposing of foreign matter, quarantine treatment, power requirements and safety precautions. *Prerequisite:* EM 304 or equivalent.

AcE 652—FARM POWER—3 cr. (2 and 3)

AcE 660—FARM AND HOME UTILITIES—3 cr. (2 and 3)

AcE 716—AGRICULTURAL MACHINERY—3 cr. (2 and 3)

AcE 722—SOIL AND WATER CONSERVATION ENGINEERING—4 cr. (3 and 3)

AcE 731—AGRICULTURAL STRUCTURAL DESIGN—3 cr (2 and 3)

AcE 742—AGRICULTURAL PROCESS ENGINEERING—3 cr. (2 and 3)

AcE 765—ENGINEERING PROPERTIES OF BIOLOGICAL MATERIALS—3 cr.
(2 and 3)

AcE 801—SPECIAL PROBLEMS IN AGRICULTURAL ENGINEERING—3 cr.
(3 and 0)

AcE 804—ENGINEERING APPLICATION TO AGRICULTURAL PROCESSING—3 cr.
(2 and 3)

AcE 806—INSTRUMENTATION IN AGRICULTURAL AND BIOLOGICAL
RESEARCH—3 cr. (2 and 3)

AcE 811—TILLAGE AND SOIL DYNAMICS—3 cr. (3 and 0)

AcE 822—WATER MOVEMENT IN SOILS—3 cr. (3 and 0)

AcE 873—RADIOLOGICAL HEALTH—3 cr. (2 and 3)

AcE 874—RADIOLOGICAL HEALTH ENGINEERING—3 cr. (2 and 3)

AcE 882—SYSTEMS ENGINEERING—3 cr. (2 and 3)

AcE 891—RESEARCH—Credit to be arranged.

AcE 991—DOCTORAL RESEARCH—Credit to be arranged.

AGRICULTURE AND BIOLOGICAL SCIENCES

Professor: J. W. JONES

AcBio 101—INTRODUCTION TO AGRICULTURE AND BIOLOGICAL SCIENCES—
1 cr. (1 and 0) F, S

Guides to effectively study; agriculture and biological sciences; scope of the agricultural industry; agriculture of South Carolina and the United States; organizations and function of the land-grant institution and other agencies serving agriculture; career opportunities.

AGRONOMY

Professors: G. R. CRADDOCK, C. M. JONES, U. S. JONES, *Head*; T. C. PEELE
Associate Professors: C. E. BARDSLEY, E. B. ESKEW, K. S. LAFLEUR, B. J. GOSSETT

Assistant Professors: W. D. GRAHAM, M. W. JUTRAS, J. R. WOODRUFF

AGRON 102—CROP SCIENCE—3 cr. (2 and 3) F, S

A fundamental course in crop science, including crops of the major agricultural areas of the United States and emphasizing the crops of South Carolina.
Prerequisite: Bot 101.

AGRON 202—SOILS—3 cr. (2 and 3) F, S

A basic foundation in soil science is presented with emphasis on the chemical and physical properties of soil, the activities of the living soil organisms, and the origin and classification of soils. *Prerequisite:* Ch 101 and 102.

AGRON 301—FERTILIZERS—3 cr. (3 and 0) F

Sources, mining and manufacture, composition, physical characteristics, and use of fertilizers. A detailed study is made of crop responses to fertilizer use.
Prerequisite: Agron 202.

AGRON 308—SOIL AND PLANT ANALYSIS—3 cr. (1 and 6) S

A laboratory study of the physical and chemical properties of soils and methods of their determination. The relation of these properties to the potential fertility and management of soils is emphasized. Methods of plant analysis and the use of plant analysis data as a diagnostic tool in plant nutrition is also studied. *Prerequisite:* Agron 202.

AGRON 310—FORAGE AND PASTURE CROPS—3 cr. (3 and 0) S

The characteristics, establishment, utilization and maintenance of crops for hay, silage, and pasture. Crops valuable in South Carolina are emphasized.
Prerequisite: Agron 102.

AGRON 312—FORAGE CROPS LABORATORY—1 cr. (0 and 3) S

Identification, rating, and management of the important forage and pasture species of the Southeast. *Prerequisite:* Agron 102.

AGRON 403—SOIL GENESIS AND CLASSIFICATION—2 cr. (1 and 3) F

Theoretical and practical phases of soil survey, formation and classification in relation to land usage and plant adaptability. *Prerequisite:* Agron 202 or consent of instructor.

AGRON 405—PLANT BREEDING—3 cr. (2 and 3) S

The application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. *Prerequisite:* Gen 302.

AGRON 407—PRINCIPLES OF WEED CONTROL—3 cr. (2 and 3) F

Weeds, their introduction, ecology, methods of reproduction, dissemination, and control; chemistry and mode of action of herbicides, equipment and techniques of application; a characterization of the common weeds of the Southeast. *Prerequisite:* Agron 102, Ch 220 or equivalent.

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ACRON 410—COTTON AND OTHER FIBER CROPS—2 cr. (2 and 0)
F, '69 and alternate years.

History, morphology, physiology, and fundamental principles and practices of production, harvesting, marketing, processing, and utilization of cotton and certain other fiber crops. Emphasis will be placed on the effect of environmental and production factors as they affect fiber quality and subsequent utilization. *Prerequisite:* Agron 102.

ACRON 411—GRAIN CROPS—2 cr. (2 and 0) F, '68 and alternate years.

A fundamental study involving principles of production, harvesting, processing, marketing, and utilization of soybeans, corn, sorghum, and the small grains. Emphasis will be placed on factors affecting grain quality as related to utilization of grain. *Prerequisite:* Agron 102.

ACRON 412—TOBACCO AND SPECIAL USE CROPS—2 cr. (2 and 0)
S, '70 and alternate years.

Principles involved in the production, harvesting, curing, grading, and marketing of high quality flue-cured tobacco. Brief coverage of special use crops, such as peanuts, sugar cane, etc. *Prerequisite:* Agron 102.

ACRON 452—SOIL FERTILITY AND MANAGEMENT—2 cr. (2 and 0) S

Principles of crop rotations, soil fertility, soil management, and other factors necessary for the practical utilization of soils. *Prerequisite:* Agron 202 or consent of instructor.

ACRON 455—SEMINAR—1 cr. (1 and 0) F

Student presentation of current agronomic topics of special interest in crop production appearing in recent scientific journals and other publications.

ACRON 456—SEMINAR—1 cr. (1 and 0) S

Student presentation of current topics of special interest in the field of soil science appearing in recent scientific journals and other publications.

ACRON 601—FERTILIZERS—3 cr. (3 and 0)

ACRON 608—SOIL AND PLANT ANALYSIS—3 cr. (1 and 6)

ACRON 610—FORAGE AND PASTURE CROPS—3 cr. (3 and 0)

ACRON 612—FORAGE CROPS LABORATORY—1 cr. (0 and 3)

ACRON 703—SOIL CLASSIFICATION—2 cr. (1 and 3)

ACRON 705—PLANT BREEDING—3 cr. (2 and 3)

ACRON 707—PRINCIPLES OF WEED CONTROL—3 cr. (2 and 3)

ACRON 710—COTTON AND OTHER FIBER CROPS—2 cr. (2 and 0)

ACRON 711—GRAIN CROPS—2 cr. (2 and 0)

ACRON 712—TOBACCO AND SPECIAL USE CROPS—2 cr. (2 and 0)

ACRON 752—SOIL FERTILITY AND MANAGEMENT—2 cr. (2 and 0)

ACRON 755—SEMINAR—1 cr. (1 and 0)

ACRON 756—SEMINAR—1 cr. (1 and 0)

ACRON 801—CROP PHYSIOLOGY AND NUTRITION—3 cr. (3 and 0)

ACRON 802—PEDOLOGY AND SOIL CLASSIFICATION—3 cr. (2 and 3)

- AGRON 804—THEORY AND METHOD OF PLANT BREEDING—3 cr. (3 and 0)
 AGRON 805—SOIL FERTILITY—3 cr. (3 and 0)
 AGRON 806—SPECIAL PROBLEMS—2 cr. (2 and 0)
 AGRON 807—SOIL PHYSICS—3 cr. (2 and 3)
 AGRON 808—SOIL CHEMISTRY—3 cr. (2 and 3)
 AGRON 812—CROP ECOLOGY AND LAND USE—3 cr. (3 and 0)
 AGRON 820—PESTICIDE RESIDUES IN SOILS AND WATER—3 cr. (3 and 0)
 AGRON 825—SEMINAR—1 cr. (1 and 0)
 AGRON 891—RESEARCH—Credit to be arranged.
 AGRON 991—DOCTORAL RESEARCH AND THESIS—Credit to be arranged.

ANIMAL PHYSIOLOGY

Professors: B. D. BARNETT, M. A. BOONE, J. H. COCHRAN, V. HURST, W. A. KING, R. F. WHEELER

Associate Professors: T. R. ADKINS, JR., R. F. BORGMAN, J. R. HILL, JR., A. S. TOMBES

Assistant Professors: J. F. DICKEY, RUTH L. HAYS, S. B. HAYS

(See courses listed under Animal Science, Dairy Science, Poultry Science, and Zoology)

- AN PH 802—VERTEBRATE PHYSIOLOGY—3 cr. (2 and 3)
 AN PH 803—ANIMAL PHYSIOLOGY—4 cr. (3 and 3)
 AN PH 804—ANIMAL PHYSIOLOGY—4 cr. (3 and 3)
 AN PH 805—PHARMACOLOGY—3 cr. (2 and 3)
 AN PH 851—ANIMAL PHYSIOLOGY SEMINAR I—1 cr. (1 and 0)
 AN PH 852—ANIMAL PHYSIOLOGY SEMINAR II—1 cr. (1 and 0)
 AN PH 991—DOCTORAL RESEARCH—Credit to be arranged.

ANIMAL SCIENCE

Professors: W. C. GODLEY, R. R. RITCHIE, R. F. WHEELER, *Head*

Associate Professors: R. L. EDWARDS, J. R. HILL, JR., G. C. SKELLEY

Assistant Professor: D. L. HANDLIN

- AN SC 102—ANIMAL SCIENCE—2 cr. (2 and 0) F, S

An introductory course in Animal Science to include beef cattle, swine, poultry, dairying, horses and sheep.

- AN SC 104—ANIMAL SCIENCE LABORATORY—1 cr. (0 and 3) F, S

The judging, grading, selection and management of farm animals is given considerable emphasis. Two laboratory periods are devoted to dairy production and manufacturing and two periods to poultry.

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AN SC 301—FEEDS AND FEEDING—3 cr. (3 and 0) F, S

Feed nutrients, digestion, metabolism of feed stuffs, nutritive ratios, feeding standards, and the balancing of rations. *Prerequisite:* An Sc 102, 104 and Ch 220.

AN SC 303—FEEDS AND FEEDING LABORATORY—1 cr. (0 and 3) S

Practical work in mixing and balancing rations and identifying feed stuffs. *Prerequisite:* An Sc 102, 104 and Ch 220 or consent of instructor.

AN SC 305—MEAT GRADING AND SELECTION—2 cr. (1 and 3)

F, '68 and alternate years.

Classification, grading and selection of beef, lamb and pork carcasses and wholesale cuts. Factors influencing quality and value. Students enrolled in this course are eligible to compete in Intercollegiate Meat Judging Contests. *Prerequisite:* An Sc 102, 104.

AN SC 306—LIVESTOCK SELECTION AND EVALUATION—2 cr. (1 and 3) S

Selection, breed characteristics and grading of beef cattle, sheep and swine. Students enrolled in this course are eligible to compete in the Southeastern Intercollegiate Livestock Judging Contest. *Prerequisite:* An Sc 102, 104.

AN SC 353—MEATS—2 cr. (2 and 0) F

The chemical and physical composition of meat, meat hygiene; nutritive value; curing; freezing; and meat by-products. *Prerequisite:* An Sc 102, 104.

AN SC 355—MEATS LABORATORY—1 cr. (0 and 3) F

The selection and grading of meat animals and carcasses. Practical work in slaughtering of animals and in the cutting, curing and freezing of meats. Emphasis is placed on the identification of wholesale and retail cuts. *Prerequisite:* An Sc 102, 104.

AN SC 401—BEEF PRODUCTION—3 cr. (3 and 0) F

Breeding, feeding, management and grading of beef cattle. Emphasis is placed on year-round grazing. *Prerequisite:* An Sc 301.

AN SC 403—BEEF PRODUCTION LABORATORY—1 cr. (0 and 3) F

Practical application of beef production practices. *Prerequisite:* An Sc 301.

AN SC 405—ADVANCED LIVESTOCK SELECTION AND EVALUATION—1 cr.

(0 and 3) F, '69 and alternate years.

A continuation of An Sc 306 for students who are interested in participating in judging contests or in receiving special training in the selection of breeding cattle, sheep and swine. Judging and grading of market classes are considered. *Prerequisite:* An Sc 306.

AN SC 406—SEMINAR—2 cr. (2 and 0) S

Special problems in animal production. Each student is given a subject on which he makes weekly reports before a seminar group. *Prerequisite:* An Sc 301.

AN SC 407—HORSE AND SHEEP PRODUCTION—2 cr. (2 and 0)

F, '68 and alternate years.

The breeding, feeding and care of horses and sheep; the shearing and marketing of sheep and wool; the adaptability of breeds; and parasite and disease control. *Prerequisite:* An Sc 301.

AN SC 408—PORK PRODUCTION—3 cr. (3 and 0) S

Feeding, breeding, management, and marketing of hogs. Emphasis is placed on winter and summer forages, protein supplements, mineral mixtures, and sanitation practices. In laboratory grading, selection, feeding, management and care of swine is given attention. *Prerequisite:* An Sc 301.

AN SC 409—HORSE AND SHEEP PRODUCTION LABORATORY—1 cr. (0 and 3) F, '68 and alternate years.

Horse and sheep production practices. *Prerequisite:* An Sc 301.

AN SC 410—PORK PRODUCTION LABORATORY—1 cr. (0 and 3) S

Practical application of swine production practices. *Prerequisite:* An Sc 301.

AN SC 452—ANIMAL BREEDING—3 cr. (3 and 0) S

The fundamental principles relating to the breeding and improvement of livestock including variation, heredity, selection, linebreeding, inbreeding, crossbreeding and other related subjects. *Prerequisite:* Gen 302.

AN SC 701—BEEF PRODUCTION—3 cr. (3 and 0)

AN SC 703—BEEF PRODUCTION LABORATORY—1 cr. (0 and 3)

AN SC 708—PORK PRODUCTION—3 cr. (3 and 0)

AN SC 710—PORK PRODUCTION LABORATORY—1 cr. (0 and 3)

AN SC 752—ANIMAL BREEDING—3 cr. (3 and 0)

AN SC 802—TOPICAL PROBLEMS—1-3 cr. (1-3 and 0)

AN SC 803—MEAT TECHNOLOGY—3 cr. (3 and 0)

AN SC 804—METHODS IN ANIMAL BREEDING—3 cr. (3 and 0)

AN SC 805—NUTRITION OF MEAT ANIMALS—3 cr. (3 and 0)

AN SC 891—RESEARCH—Credit to be arranged.

ARCHITECTURE

Professors: H. N. COOLEGE,* E. A. GUNNIN, R. E. KNOWLAND, H. E. McCLURE, G. C. MEANS, J. L. YOUNG

Associate Professors: J. T. ACORN, L. H. BROWN, V. S. HODGES, R. H. HUNTER, J. E. PINCKNEY, R. T. REEF, I. G. REGNIER, J. W. WELLS, H. H. WILLIAMSON

Assistant Professors: K. E. CARPENTER, Z. KAPELIS, A. J. KAUFMANN, W. F. NAHORY, K. RUSSO, S. WANG, J. R. WASHBURN

Instructor: MARJORIE S. SCHREIBER

Lecturers: K. R. CRAIG, F. P. MORRIS

Visiting Professor: C. D. FERA

ARCH 101—INTRODUCTORY ART AND ARCHITECTURE—3 cr. (1 and 6)

Introductory studies of architecture and the visual arts with adjunct studio exercises in graphics, drawing and painting, and photography.

* On leave.

222 *Description of Courses*

ARCH 102—INTRODUCTORY ART AND ARCHITECTURE—3 cr. (1 and 6)

Introductory studies of architecture and the visual arts with adjunct studio exercises in graphics, drawing and painting, and photography. *Prerequisite:* Arch 101.

ARCH CONST 141—ELEMENTS OF BUILDING I—4 cr. (2 and 6)

An introduction to the principles of building construction. Emphasis is placed on fundamental types, materials, and methods of building construction.

ARCH CONST 142—ELEMENTS OF BUILDING II—4 cr. (2 and 6)

A continuation of Arch Const 141. *Prerequisite:* Arch Const 141.

ARCH CONST 241—ELEMENTS OF BUILDING III—4 cr. (2 and 6)

Interpretation and analysis of working drawings and specifications of selected building projects. Principles of estimating procedures with emphasis on quantity survey techniques. Lectures employed for building projects studied. *Prerequisite:* Arch Const 142.

ARCH CONST 242—ELEMENTS OF BUILDING IV—4 cr. (2 and 6)

Continuation of Arch Const 241. *Prerequisite:* Arch Const 241.

ARCH 253—BASIC DESIGN I—4 cr. (1 and 9)

Studio problems in visual fundamentals, including graphic representation and adjunct lectures in visual theory. *Prerequisite:* Arch 102.

ARCH 254—ARCHITECTURAL DESIGN II—4 cr. (1 and 9)

Studio problems in the elements of architecture, basic site development, and three-dimensional representation. *Prerequisite:* Arch 253.

ARCH 315—ARCHITECTURAL HISTORY—3 cr. (3 and 0)

The architectural history of Western man from 1500 B.C. to A.D. 323, with particular attention to Mesopotamia, Egypt, Greece, and the Roman Empire.

ARCH 316—ARCHITECTURAL HISTORY—3 cr. (3 and 0)

The architectural history of Europe and the Near East from A.D. 323 to 1453, with particular attention to the Byzantine, pre-Romanesque, Romanesque, and Gothic schools of Western Europe. *Prerequisite:* Arch 315.

ARCH CONST 341—BUILDING CONSTRUCTION I—4 cr. (2 and 6)

A study of building projects of intermediate size and complexity with emphasis on job planning and control, problems of superintendence and scheduling. *Prerequisite:* Arch Const 242.

ARCH CONST 342—BUILDING CONSTRUCTION II—4 cr. (2 and 6)

A continuation of Arch Const 341 with emphasis on construction equipment, contractor's plant and maintenance program. *Prerequisite:* Arch Const 341.

ARCH 353—ARCHITECTURAL DESIGN III—5 cr. (1 and 12)

Intermediate architectural design problems involving programming and considerations of function, structure and aesthetics. *Prerequisite:* Arch 254.

ARCH 354—ARCHITECTURAL DESIGN IV—5 cr. (1 and 12)

Continuation of Arch 353. *Prerequisite:* Arch 353.

ARCH 403—INTRODUCTION TO THE VISUAL ARTS—3 cr. (3 and 0)

A consideration of man's necessity for and production of the Visual Arts with particular attention to the environmental factors in society which demand

art and a study of the techniques employed by artists. Illustrated lectures and collateral reading. Not open, except by special permission, to students in the School of Architecture. Sections will be limited to 40 students. Preference to students in Education. *Prerequisite:* Junior standing.

ARCH 415—ARCHITECTURAL HISTORY III—3 cr. (3 and 0)

The architectural history of Western Europe and the Americas from 1453 to 1775, with particular attention to the Renaissance, Baroque, and Revivalist schools. *Prerequisite:* Arch 316.

ARCH 416—ARCHITECTURAL HISTORY IV—3 cr. (3 and 0)

The architectural history of Western Europe and the Americas from 1775 to 1915 with particular attention to the architecture of the Industrial Revolution and the development of the academies. *Prerequisite:* Arch 415.

ARCH CONST 432—CONCRETE FORMWORK—2 cr. (2 and 0)

The study of materials, methods, design and estimating of formwork for concrete structures. *Prerequisite:* CE 416.

ARCH CONST 441—BUILDING CONSTRUCTION III—4 cr. (2 and 6)

A study of contractor organization and administration including contracts, insurance, bonds, financing, equipment, office procedures, and records. *Prerequisite:* Arch Const 342.

ARCH CONST 442—BUILDING CONSTRUCTION IV—4 cr. (2 and 6)

A continuation of Arch Const 441. *Prerequisite:* Arch Const 441.

ARCH 453—ARCHITECTURAL DESIGN V—5 cr. (1 and 12)

Consideration of design problems involving programming of urban structures with adjunct lectures in design principles, construction and theory. *Prerequisite:* Arch 354.

ARCH 454—ARCHITECTURAL DESIGN VI—5 cr. (1 and 12)

Continuation of Arch 453. *Prerequisite:* Arch 453.

ARCH 511—HISTORY OF ARTS—3 cr. (3 and 0)

Seminar in Arts History and criticism limited to some particular movement or period. Open to students in the School of Architecture with third-year standing and to other students of the University who have completed Arch 403 with a grade of "B" or better.

ARCH 512—HISTORY OF ARTS—3 cr. (3 and 0)

Continuation of Arch 511. *Prerequisite:* Arch 511.

ARCH 515—STRUCTURAL METHODS—2 cr. (2 and 0)

A lecture course relating concrete and steel structural systems to contemporary considerations of function, aesthetics and economics. A special study is made of building codes and other regulations. *Prerequisite:* Fourth-year standing.

ARCH 553—ADVANCED ARCHITECTURAL CONSTRUCTION—4 cr. (1 and 9)

The methods, materials, and details involved in the construction of a complex multi-storied building. *Prerequisite:* Fourth-year standing.

ARCH 575—MECHANICAL PLANT—2 cr. (2 and 0)

The water supply, plumbing, heating and ventilating systems of present-day buildings.

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ARCH 576—MECHANICAL PLANT—2 cr. (2 and 0)

Air-conditioning, electrical systems, lighting, mechanical transportation and acoustics as applied to contemporary buildings. *Prerequisite:* Arch 575.

ARCH 581—ARCHITECTURAL OFFICE PRACTICE—2 cr. (2 and 0)

General consideration of architectural office procedure. Study of the professional relationship of the architect to client and contractor, including problems of ethics, law, and business.

ARCH 582—ARCHITECTURAL OFFICE PRACTICE—2 cr. (2 and 0)

A continuation of Arch 581. *Prerequisite:* Arch 581.

ARCH 591—ARCHITECTURAL AND TOWN PLANNING DESIGN—11 cr. (5 and 18)

Lectures and studio problems in advanced architectural design and Town Planning. Course content will include pre-thesis studies. *Prerequisite:* Arch 454 with C standing.

ARCH 592—ARCHITECTURAL THESIS—11 cr. (5 and 18)

The student working individually will carefully program an environmental problem of appropriate scope, and conduct his own comprehensive research. He will make a complete oral, written and visual presentation of his solution. *Prerequisite:* Arch 591.

ARCH 593—STRUCTURAL THESIS RESEARCH—5 cr. (0 and 15)

Studio and laboratory research studies preliminary to undertaking a thesis in Architectural Structures. *Prerequisite:* Arch 553.

ARCH 594—THESIS IN ARCHITECTURAL STRUCTURES—11 cr. (5 and 18)

The student working individually with laboratory and lecture support will prepare and present a structural thesis of appropriate scope and complexity. *Prerequisite:* Arch 593.

ARCH 611—HISTORY OF ARTS—3 cr. (3 and 0)

ARCH 612—HISTORY OF ARTS—3 cr. (3 and 0)

ARCH 615—STRUCTURAL METHODS—2 cr. (2 and 0)

ARCH 653—ADVANCED ARCHITECTURAL CONSTRUCTION—4 cr. (1 and 9)

ARCH 811—TOWN PLANNING THEORY—3 cr. (3 and 0)

ARCH 812—TOWN PLANNING THEORY—3 cr. (3 and 0)

ARCH 853—GRADUATE DESIGN—8 cr. (0 and 24)

ARCH 854—GRADUATE DESIGN—8 cr. (0 and 24)

ARCH 855—THESIS RESEARCH—2 cr. (0 and 6)

ARCH 857—GRADUATE DESIGN—10 cr. (4 and 18)

ARCH 858—ARCHITECTURAL THESIS—17 cr. (5 and 36)

ARCH 861—ECONOMICS SEMINAR—3 cr. (3 and 0)

ARCH 875—MECHANICAL PLANT—2 cr. (2 and 0)

ARCH 876—MECHANICAL PLANT—2 cr. (2 and 0)

ARCH 881—OFFICE PRACTICE—2 cr. (2 and 0)

ARCH 882—OFFICE PRACTICE—2 cr. (2 and 0)

ARCH 891—ARCHITECTURAL STRUCTURAL SEMINAR—2 cr. (2 and 0)

ARCH 892—ARCHITECTURAL STRUCTURAL SEMINAR—2 cr. (2 and 0)

ARCH 893—ARCHITECTURAL STRUCTURAL SEMINAR—2 cr. (2 and 0)

BACTERIOLOGY

Professors: W. M. EPPS, *Head*; J. M. RUSH

Associate Professor: J. H. BOND

Assistant Professor: ANN W. BAXTER

BACT 301—GENERAL BACTERIOLOGY—4 cr. (3 and 3) F, S, SS

Morphology, physiology, classification, distribution, and cultivation of microorganisms; effects of organisms on their environment; microorganisms and health. *Prerequisite:* Bot 101 or Zool 101 and 103; Ch 101; Ch 102.

BACT 312—FOOD MICROBIOLOGY—3 cr. (2 and 3) S, '69 and alternate years.

The microbiology of natural and processed foods. The nature of microorganisms involved in food processing, food spoilage, and food poisoning. Methods of isolating, enumerating and identifying these organisms are conducted in the laboratory. *Prerequisite:* Bact 301.

BACT 401—ADVANCED BACTERIOLOGY—4 cr. (2 and 6) F

Metabolism, nutrition, growth, and death of bacteria; microbiological assays and industrial fermentation; emphasis on laboratory procedures for the identification of the more common taxonomic groups. *Prerequisite:* Bact 301; Ch 220 or 223 and 227.

BACT 402—DAIRY BACTERIOLOGY—3 cr. (2 and 3) S, '70 and alternate years.

Morphology, physiology and culturing of microorganisms of importance in dairy products; standard methods for the determination of numbers of bacteria, yeasts, and molds in various dairy products. *Prerequisite:* Bact 301.

BACT 406—SANITARY BACTERIOLOGY—3 cr. (2 and 3) F, '69 and alternate years.

The relation of bacteria to water purification and sewage disposal. Methods of water analysis, water purification, and sewage disposal are investigated in the laboratory. Public health aspects are stressed. *Prerequisite:* Bact 301.

BACT 410—SOIL MICROBIOLOGY—3 cr. (2 and 3) S, '70 and alternate years.

The role of microorganisms in the decomposition of organic substances; transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and soil microorganisms; importance of microorganisms in soil fertility. *Prerequisite:* Bact 301.

BACT 411—PATHOGENIC BACTERIOLOGY—3 cr. (2 and 3) S

A study of pathogenic bacteria, their morphology, cultural requirements and classification; diagnostic tests, methods of differentiation, and the diseases caused. *Prerequisite:* Bact 301.

BACT 601—GENERAL BACTERIOLOGY—4 cr. (3 and 3)

BACT 612—FOOD MICROBIOLOGY—3 cr. (2 and 3)

BACT 701—ADVANCED BACTERIOLOGY—4 cr. (2 and 6)

BACT 702—DAIRY BACTERIOLOGY—3 cr. (2 and 3)

- BACT 706—SANITARY BACTERIOLOGY—3 cr. (2 and 3)
 BACT 710—SOIL MICROBIOLOGY—3 cr. (2 and 3)
 BACT 711—PATHOGENIC BACTERIOLOGY—3 cr. (2 and 3)
 BACT 801—BACTERIAL TAXONOMY—3 cr. (2 and 3)
 BACT 802—BACTERIOLOGY TECHNIC—4 cr. (2 and 6)
 BACT 803—SPECIAL PROBLEMS IN BACTERIOLOGY—2 cr.
 BACT 805—PHYSIOLOGY OF BACTERIA—3 cr. (2 and 3)
 BACT 810—SOIL MICROBIOLOGY—3 cr. (2 and 3)
 BACT 891—RESEARCH—Credit to be arranged.

BIOCHEMISTRY

Professor: J. H. MITCHELL

Associate Professors: R. F. BORGMAN, W. P. WILLIAMS, *Head*

Assistant Professors: L. CROOK, D. E. TURK

(See biochemistry courses listed under Chemistry)

BIOCH 406—PHYSIOLOGICAL CHEMISTRY—4 cr. (3 and 3)
 S, '69 and alternate years.

Chemistry of the physiological processes of respiration, digestion, membrane transport, blood and tissue homeostasis, and kidney function is studied. Current literature on these processes is studied and interpretations discussed. *Prerequisite:* Ch 310 or Ch 423.

- BIOCH 706—PHYSIOLOGICAL CHEMISTRY—4 cr. (3 and 3)
 BIOCH 810—ADVANCED BIOCHEMICAL TECHNIQUES—3 cr. (1 and 6)
 BIOCH 812—NUTRITIONAL BIOCHEMISTRY—3 cr. (3 and 0)
 BIOCH 814—LABORATORY METHODS IN NUTRITION—1 cr. (0 and 3)
 BIOCH 815—LIPIDS—2 cr. (2 and 0)
 BIOCH 816—PROTEINS AND NUCLEIC ACIDS—3 cr. (3 and 0)
 BIOCH 817—CHEMISTRY AND METABOLISM OF HORMONES—2 cr. (2 and 0)
 BIOCH 818—VITAMINS AND MINERALS—3 cr. (3 and 0)
 BIOCH 819—INTERMEDIARY METABOLISM—3 cr. (3 and 0)
 BIOCH 851—BIOCHEMISTRY SEMINAR—1 cr. (1 and 0)
 BIOCH 852—BIOCHEMISTRY SEMINAR—1 cr. (1 and 0)
 BIOCH 891—RESEARCH—Credit to be arranged.

BIO-ENGINEERING

- BIOE 846—ELEMENTS OF BIO-ENGINEERING I—3 cr. (3 and 0)
 BIOE 847—ELEMENTS OF BIO-ENGINEERING II—3 cr. (3 and 0)
 BIOE 991—DOCTORAL RESEARCH—Credit to be arranged.

BIOLOGY

(See *Biology Curriculum*)

BIOL 450—BIOLOGY FOR HIGH SCHOOL TEACHERS—3 cr. (3 and 0) SS

The fundamental principles of biological processes are reviewed and expanded. Demonstrations, preparations, illustrations, and experiments suitable for use in high school teaching are emphasized. Expressly designed for biology teachers in the secondary schools.

BIOL 750—BIOLOGY FOR HIGH SCHOOL TEACHERS—3 cr. (3 and 0)

BIOL 800—PRINCIPLES OF BIOLOGY—3 cr. (2 and 3)

BOTANY

Professors: R. P. ASHWORTH, W. M. EPPS, *Head*; A. C. MATHEWS, R. W. RUTLEDGE, J. B. WHITNEY, JR.

Associate Professors: L. W. BAXTER, J. E. HALPIN, G. C. KINGSLAND, W. WITCHER

Assistant Professors: N. D. CAMPER, G. E. DILLARD

Lecturers: E. G. BEINHART, JR.,^{*} W. M. DOWLER

BOT 101—GENERAL BOTANY—4 cr. (3 and 3) F, S, SS

The form, structure and physiology of the higher plants, followed by the algae, bacteria, fungi, liverworts, mosses and ferns, with the application of the biological laws. Descriptions, life histories and adaptation of representative organisms.

BOT 202—SURVEY OF THE PLANT KINGDOM—4 cr. (3 and 3) S

A survey of the major groups of plants, their structure, development, and reproduction. Evolutionary relationships as exemplified by comparisons of body organization and life cycles will be emphasized. *Prerequisite:* Bot 101.

BOT 352—PLANT PHYSIOLOGY—4 cr. (3 and 3) F, S

The relations and processes which have to do with the maintenance, growth and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy. *Prerequisite:* Bot 101; Ch 101 and 102; Phys 201 and 203 or Phys 211 and 213.

BOT 355—HISTOLOGY—2 cr. (0 and 6)

The principles of fixing, cutting and staining plant tissues and the various other processes of micro-technique and their application to specific forms of plants. *Prerequisite:* Bot 101; Ch 101 and 102.

BOT 356—TAXONOMY OF VASCULAR PLANTS—3 cr. (1 and 6) S

The identification, classification, distribution and interrelationship of vascular plants with emphasis on the flora of South Carolina. *Prerequisite:* Bot 101.

BOT 401—PLANT PATHOLOGY—3 cr. (2 and 3) F, S

The major plant diseases of the South, their symptoms and control and the nature of the causal agents or factors. *Prerequisite:* Bot 101.

BOT 402—ECONOMIC BOTANY—3 cr. (2 and 3)

Plants and plant products and their relationship to human history and contemporary life. Sources of plant products, especially those outside the scope

^{*} On leave.

of courses in Agronomy and Horticulture. *Prerequisite:* Bot 101 or permission of the instructor.

BOT 404—CYTOLOGY—4 cr. (3 and 3) F, '69 and alternate years.

A detailed consideration of the morphology and ultrastructures of cells. *Prerequisite:* Bot 352, Zool 101, 103, or permission of instructor.

BOT 405—FOREST PATHOLOGY—3 cr. (2 and 3) F

Symptoms and causative agents of forest tree diseases; their prevention and control; their relation to silviculture, management, and utilization of forests. *Prerequisite:* Bot 352 or permission of instructor.

BOT 406—PLANT ANATOMY—3 cr. (2 and 3) F, '68 and alternate years.

The origin and development of the organs and tissue systems of vascular plants and a comparative study of the structure of roots, stems, leaves, flowers, and fruits. *Prerequisite:* Bot 101.

BOT 451—MORPHOLOGY OF THE FUNGI—3 cr. (2 and 3)
F, '68 and alternate years.

The morphology and taxonomy of the fungi, with special emphasis on species of economic importance. *Prerequisite:* Bot 101.

BOT 452—PLANT ECOLOGY—3 cr. (3 and 0) S, '70 and alternate years.

The fundamental principles of the relations between plants and their environment. *Prerequisite:* Bot 101.

BOT 455—PLANT MORPHOLOGY—4 cr. (2 and 6)

The structure of vegetative and reproductive parts of plants representing the major plant groups except bacteria and fungi. *Prerequisite:* Bot 101.

BOT 456—PLANT VIROLOGY—3 cr. (3 and 0) S, '70 and alternate years.

Plant viruses with emphasis on their morphology, biochemistry, purification, and transmission; symptoms resulting from virus infections; virus-vector relationships; and serological procedures. The importance and control of virus diseases of plants will be discussed. *Prerequisite:* Bot 101.

BOT 457—PHYCOLOGY—3 cr. (2 and 3) S, '69 and alternate years.

The taxonomy, morphology, and ecology of freshwater algae with emphasis on the local flora. *Prerequisite:* Bot 101 or permission of instructor.

BOT 458—PLANT PARASITIC NEMATODES—3 cr. (2 and 3)
F, '68 and alternate years.

Morphology and taxonomy of stylet-bearing nematodes and their relationship with plant diseases. *Prerequisite:* Bot 101 and Zool 101 and 103.

BOT 652—PLANT PHYSIOLOGY—4 cr. (3 and 3)

BOT 656—TAXONOMY OF VASCULAR PLANTS—3 cr. (1 and 6)

BOT 701—PLANT PATHOLOGY—3 cr. (2 and 3)

BOT 704—CYTOLOGY—4 cr. (3 and 3)

BOT 705—FOREST PATHOLOGY—3 cr. (2 and 3)

BOT 706—PLANT ANATOMY—3 cr. (2 and 3)

BOT 751—MORPHOLOGY OF THE FUNGI—3 cr. (2 and 3)

BOT 752—PLANT ECOLOGY—3 cr. (3 and 0)

- BOT 755—PLANT MORPHOLOGY—4 cr. (2 and 6)
- BOT 756—PLANT VIROLOGY—3 cr. (3 and 0)
- BOT 757—PHYCOLOGY—3 cr. (2 and 3)
- BOT 802—MYCOLOGY—4 cr. (3 and 3)
- BOT 803—PLANT PATHOLOGY—4 cr. (3 and 3)
- BOT 804—PHYSIOLOGY OF PARASITISM IN PLANTS—3 cr. (3 and 0)
- BOT 805—SPECIAL PROBLEMS IN BOTANY—Credit to be arranged.
- BOT 806—CONTROL OF PLANT DISEASES—3 cr. (3 and 0)
- BOT 807—SEMINAR—1 cr. (1 and 0)
- BOT 811—INORGANIC PLANT METABOLISM—4 cr. (3 and 3)
- BOT 812—ORGANIC PLANT METABOLISM—3 cr. (3 and 0)
- BOT 813—PLANT GROWTH AND DEVELOPMENT—3 cr. (3 and 0)
- BOT 814—MICROBIAL PHYSIOLOGY—3 cr. (3 and 0)
- BOT 821—PLANT TAXONOMY I—4 cr. (2 and 6)
- BOT 822—PLANT TAXONOMY II—4 cr. (2 and 6)
- BOT 891—RESEARCH—Credit to be arranged.
- BOT 991—DOCTORAL RESEARCH—Credit to be arranged.

CERAMIC ARTS

Professor: G. C. ROBINSON

CR AR 101—POTTERY MATERIALS—3 cr. (2 and 3)

The occurrence and properties of pottery raw materials. Attention is devoted to the occurrence of natural pottery materials in South Carolina, and the methods and equipment used in preparing these materials.

CR AR 102—POTTERY DRYING AND FIRING—3 cr. (3 and 0)

The drying and firing processes used in pottery making. A discussion is included on the design and construction of simple pottery kilns and the student is required to build and operate a small outdoor kiln. The laboratory work demonstrates the drying and firing behavior of pottery.

CR AR 301—POTTERY GLAZES—3 cr. (3 and 0)

The materials and methods used in preparing glazes and a study of the methods used in decorating pottery products. *Prerequisite:* Cr Ar 101 and 102.

CR AR 401—ADVANCED POTTERY—3 cr. (2 and 3)

The student is given advanced training in pottery techniques and pottery equipment. *Prerequisite:* Cr Ar 101 and 102.

CERAMIC ENGINEERING

Professors: G. C. ROBINSON, *Head*; H. H. WILSON

Assistant Professors: C. C. FAIN, S. F. HULBERT, H. G. LEFORT

CRE 201—INTRODUCTION TO CERAMIC ENGINEERING—2 cr. (2 and 0)

An introduction to ceramic engineering together with a study of ceramic forming operation. Exercises are provided in the analysis of processing problems, the evaluation of background information and the creation of new solutions to processing problems.

CRE 202—CERAMIC MATERIALS—3 cr. (3 and 0)

The properties and uses of commonly used ceramic materials. Equilibrium diagrams are used to gain an understanding of the effect of heat on the materials.

CRE 204—LABORATORY PROCEDURES—1 cr. (0 and 3)

An introduction to ceramic laboratory procedures. Primary consideration will be given to the evaluation of sources of error and significance of measurement in the major ceramic test procedures.

CRE 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

An introduction to digital computer programming for students majoring in Ceramic Engineering. Emphasis is placed on the computer languages in use at Clemson University, and their application to the solution of simple problems in ceramic engineering. *Prerequisite:* Sophomore standing.

CRE 302—THERMO-CHEMICAL CERAMICS—3 cr. (3 and 0)

High-temperature equilibrium using the laws of physical chemistry as applied to ceramic systems in both solid and liquid states. An introduction to the crystal chemistry of ceramic raw materials, and the effect of crystalline form on their high-temperature behavior.

CRE 303—CERAMIC PRODUCTS—2 cr. (2 and 0)

The application of ceramic products to a variety of use environments. Refractories, structural ceramics, coated metals and corrosion resistant products are included. The course is for both engineering and non-engineering majors.

CRE 304—EXPERIMENT DESIGN—1 cr. (0 and 3)

An exercise in the planning and organization of experiments in the ceramic field.

CRE 306—FUELS COMBUSTION AND HEAT TRANSFER—1 cr. (0 and 3)

Combustion devices, the calculation of combustion problems and heat transfer.

CRE 307—THERMAL PROCESSING OF CERAMICS—3 cr. (3 and 0)

The accomplishment of changes in structure and composition through the application of thermal energy. The course includes a study of simultaneous transfer of heat and mass, fluid flow, determinants of rates in a variety of reactions and calculation of the energy requirements to accomplish change in structure or composition.

CRE 309—RESEARCH METHODS—2 cr. (0 and 6)

The planning and solution of selected research problems.

CrE 310—INTRODUCTION TO MATERIAL SCIENCE—3 cr. (3 and 0)

A beginning course in material science designed primarily for engineering students. The course is a study of the relation between the electrical, mechanical and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structures easily visible to the eye through electronic structure of atoms.

CrE 402—SOLID STATE CERAMICS—3 cr. (3 and 0)

The effects of the composition, form, and shape of ceramic raw materials on the manufacturing processes and final properties of ceramic products. Included are fundamental studies of such phenomena as deflocculation, plasticity, sintering and the behavior of ceramic products in electrical circuits. *Prerequisite:* Junior standing.

CrE 403—GLASSES—3 cr. (3 and 0)

Glass structure and composition and their relation to the properties of glasses. Consideration is given to the processing variables which control the properties of glasses including glass products, enamels, glazes and vitreous bonds.

CrE 404—ENAMELS—3 cr. (3 and 0)

The raw materials, methods of manufacture, and properties of porcelain enamel coatings for metals. *Prerequisite:* CrE 302.

CrE 406—CERAMIC PROJECT—2 cr. (0 and 6)

The completion of an original research into a ceramic problem. *Prerequisite:* CrE 302.

CrE 407—PLANT DESIGN—3 cr. (1 and 6)

The application of the fundamentals of ceramic engineering to problems in plant design. *Prerequisite:* Senior standing in Ceramic Engineering.

CrE 410—ANALYTICAL PROCESSES—3 cr. (2 and 3)

An introductory course on the theory and use of X-ray diffraction and spectroscopic methods. *Prerequisite:* Junior standing.

CrE 412—RAW MATERIAL PREPARATION—3 cr. (3 and 0)

The equipment and processes used in the crushing and grinding of raw materials, the separation and classification of particle sizes, and the separation and purification of minerals by mineral dressing methods.

CrE 416—ELECTRONIC CERAMICS—3 cr. (3 and 0)

The theory and measurement of the electronic properties of ceramic products.

CrE 418—PROCESS CONTROL—3 cr. (3 and 0)

Process control techniques and apparatus with particular emphasis on temperature measurement and control systems. The application of laboratory techniques to the control of product quality and process efficiency is included. *Prerequisite:* Junior standing.

CrE 419—SCIENCE OF ENGINEERING MATERIALS—3 cr. (3 and 0)

This course is planned to acquaint engineers with the thermal, electrical, and chemical characteristics of engineering materials. It emphasizes fundamental consideration of the structure of matter in the solid and glassy states, solid state reactions, and the influence of particle and aggregate structure to speed of reaction and product properties. The reasons for the properties of materials at elevated temperatures and room temperatures are related to these fundamentals.

CrE 420—SCIENCE OF ENGINEERING MATERIALS—3 cr. (3 and 0)

A continuation of CrE 419 with emphasis on applications of fundamentals in nuclear reactors and nuclear power plants. Consideration is given to the development of ceramics for fuel elements, moderator materials, control rods, shielding and in radioactive waste disposal.

CrE 702—SOLID STATE CERAMICS—3 cr. (3 and 0)

CrE 703—GLASSES—3 cr. (3 and 0)

CrE 704—SOLID STATE CERAMICS—3 cr. (3 and 0)

CrE 710—ANALYTICAL PROCESSES—3 cr. (3 and 0)

CrE 712—RAW MATERIAL PREPARATION—3 cr. (3 and 0)

CrE 716—ELECTRONIC CERAMICS—3 cr. (3 and 0)

CrE 718—PROCESS CONTROL—3 cr. (3 and 0)

CrE 719—SCIENCE OF ENGINEERING MATERIALS—3 cr. (3 and 0)

CrE 720—SCIENCE OF ENGINEERING MATERIALS—3 cr. (3 and 0)

CrE 807—SPECIALIZED CERAMICS—3 cr. (3 and 0)

CrE 809—HIGH-TEMPERATURE MATERIALS—3 cr. (3 and 0)

CrE 810—CERAMIC ENGINEERING THERMODYNAMICS—3 cr. (3 and 0)

CrE 811—CERAMIC ENGINEERING KINETICS—3 cr. (3 and 0)

CrE 812—CURRENT TOPICS IN CERAMIC ENGINEERING—1 cr. (1 and 0)

CrE 813—NUCLEAR CERAMICS—3 cr. (3 and 0)

CrE 814—CERAMIC PHYSICAL PROCESSING—3 cr. (3 and 0)

CrE 815—COLLOIDAL AND SURFACE SCIENCE—3 cr. (3 and 0)

CrE 816—CONSTITUTION AND STRUCTURE OF GLASSES—3 cr. (3 and 0)

CrE 821—ANALYTICAL PROCEDURES AND EQUIPMENT I—3 cr. (2 and 3)

CrE 822—ANALYTICAL PROCEDURES AND EQUIPMENT II—3 cr. (2 and 3)

CrE 823—THERMAL PROPERTIES OF CERAMIC MATERIALS—3 cr. (3 and 0)

CrE 824—MECHANICAL PROPERTIES OF CERAMIC MATERIALS—3 cr.
(3 and 0)

CrE 825—MAGNETIC AND ELECTRICAL CERAMIC MATERIAL—3 cr. (3 and 0)

CrE 826—CERAMIC COATINGS—3 cr. (3 and 0)

CrE 828—SOLID STATE CERAMIC SCIENCE—3 cr. (3 and 0)

CrE 891—RESEARCH—Credit to be arranged.

CHEMICAL ENGINEERING

Professors: C. E. LITTLEJOHN, *Head*; G. F. MEENAGHAN

Associate Professors: F. C. ALLEY, W. B. BARLAGE, D. F. BRULEY, J. W. HALL, R. C. HARSHMAN

Assistant Professors: W. F. BECKWITH, J. C. MULLINS

ChE 204—INTRODUCTION TO CHEMICAL ENGINEERING I—2 cr. (1 and 3)

Designed to acquaint students with the profession of Chemical Engineering and to introduce them to certain basic concepts and methods used by the chemical engineer. Topics include the chemical engineering literature, graphical methods of presenting data, graphical solutions to problems, fundamental units and dimensions, process variables, stoichiometry, and PVT relations for gases. *Prerequisite:* Ch 102 and Math 205.

ChE 205—INTRODUCTION TO CHEMICAL ENGINEERING II—3 cr. (2 and 3)

A continuation of ChE 204. Topics include properties of mixtures of gases and vapors, material and energy balances, equilibria in chemical systems, dimensional analysis, economic considerations, and an introduction to stagewise calculations involving solvent extraction. *Prerequisite:* ChE 204, Math 206, and Phys 221.

ChE 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

An introduction to machine computation with the digital computer. The student is exposed to basic programming using problems from chemical engineering.

ChE 301—UNIT OPERATIONS THEORY I—3 cr. (3 and 0)

The general principles of Chemical Engineering and a study of the following unit operations: Fluid Flow, Fluid Transportation, Heat Transmission and Evaporation. Special emphasis is placed on theory and its practical application to design. *Prerequisite:* ChE 205, and Junior standing.

ChE 302—UNIT OPERATIONS THEORY II—3 cr. (3 and 0)

A study of selected unit operations based on diffusion. Both stagewise and differential contacts are studied for gas absorption, distillation, and gas-liquid contact operations. *Prerequisite:* ChE 301 and Junior standing.

ChE 306—UNIT OPERATIONS LABORATORY I—1 cr. (0 and 3)

Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is laid on the relation between theory and experimental results and on report writing. *Prerequisite:* ChE 301 and Junior standing.

ChE 307—ANALOG COMPUTATION—1 cr. (0 and 3)

An introduction to the theory and application of electronic analog computers. *Prerequisite:* Math 208.

ChE 331—CHEMICAL ENGINEERING THERMODYNAMICS I—3 cr. (3 and 0)

A first basic course in static equilibria. Topics include the First and Second Law of Thermodynamics, real and ideal gases, thermodynamic properties of fluids, phase changes, and heats of reaction. *Prerequisite:* Ch 331, Math 208, and Junior standing; or permission of the Department Head.

ChE 401—TRANSPORT PHENOMENA—3 cr. (3 and 0)

Heat, mass, and momentum transport with emphasis being laid on how the three processes are related. A firmer theoretical foundation is laid for the previous work in unit operations. *Prerequisite:* ChE 302 and Senior standing.

ChE 407—UNIT OPERATIONS LABORATORY II—2 cr. (0 and 6)

Laboratory work for the diffusional unit operations. Competent technical reports are required. *Prerequisite:* Enrollment in ChE 401 and Senior standing.

ChE 408—CHEMICAL ENGINEERING DESIGN I—1 cr. (0 and 3)

An introduction to equipment and plant design with emphasis being placed on economic considerations. *Prerequisite:* ChE 302 and Senior standing.

ChE 409—CHEMICAL ENGINEERING DESIGN II—2 cr. (0 and 6)

Study of the design of a chemical plant involving such factors as process to be employed, equipment selection, specification writing and cost accounting, and plant location. *Prerequisite:* ChE 401, 408, and 430; Senior standing, or permission of the Department Head.

ChE 410—UNIT OPERATIONS THEORY III—3 cr. (3 and 0)

The theory of flow through porous media, mixing, particle mechanics, and comminution. *Prerequisite:* Senior standing in Chemical Engineering.

ChE 412—DEVELOPMENT LABORATORY—2 cr. (0 and 6)

The investigation of a research or development project in Chemical Engineering. Competent reports are required. *Prerequisite:* ChE 401, 407, 430, and Senior standing or permission of the Department Head.

ChE 415—INTRODUCTION TO NUCLEAR ENGINEERING—3 cr. (3 and 0)

Designed to acquaint the non-nuclear engineer with some of the engineering aspects of nuclear science. Topics include a brief survey of particle physics; nuclear reactions; energy transformations; nuclear reactors, their design, construction and use; radiation damage to materials of construction; and special problems in nuclear engineering peculiar to the basic engineering disciplines. *Prerequisite:* Junior or Senior standing in Engineering, Chemistry or Physics.

ChE 416—INTRODUCTION TO NUCLEAR ENGINEERING—3 cr. (3 and 0)

A continuation of ChE 415; topics to include reactor principles, plutonium production, reactor types, materials of reactor construction, control instruments, and waste disposal. *Prerequisite:* ChE 415.

ChE 423—THEORY OF BIO-OXIDATION PROCESSES—2 cr. (2 and 0)

Designed to cover the basic biochemical principles underlying bio-oxidation and their applications in activated sludge and trickling filter processes; basic theory of oxygen transfer and its application to the design of aeration equipment; and the design and operation of typical industrial waste treatment processes. *Prerequisite:* Ch 331 or permission of instructor.

ChE 425—CHEMICAL PROCESS ENGINEERING—3 cr. (3 and 0)

An advanced treatment of chemical engineering unit operations and unit processes. The course is designed to give the undergraduate more depth in these areas. *Prerequisite:* Permission of the instructor.

ChE 430—CHEMICAL ENGINEERING THERMODYNAMICS II—3 cr. (3 and 0)

A continuation of ChE 331. Subjects include heat engines, compressors, refrigeration, phase equilibria and chemical reaction equilibria. *Prerequisite:* ChE 331 and Senior standing.

ChE 450—CHEMICAL ENGINEERING KINETICS—3 cr. (3 and 0)

An introduction to the kinetics of chemical reactions. Topics include homogeneous and heterogeneous reactions, batch and flow reaction systems, catalysis, and design of industrial reactors. *Prerequisite:* ChE 430 or permission of the Department Head.

ChE 452—MOLECULAR AND TURBULENT TRANSPORT—3 cr. (3 and 0)

A theoretical treatment of the fundamental mechanisms of molecular and turbulent heat, mass, and momentum transport with the major emphasis given to the interrelation of all three mechanisms. Evaluation and correlation of transport properties and both steady state and unsteady state processes are considered. An elective course for non-chemical engineering students. *Prerequisite:* Senior standing in Chemistry, Engineering, or Physics, and Math 208.

ChE 453—ANALYSIS OF AUTOMATIC PROCESS CONTROL—3 cr. (3 and 0)

Basic process control and the effect of feedback in various systems. The mathematical analysis of the dynamic response of process systems to step and sinusoidal changes. Determination of the optimum settings for various combinations of proportional, reset and derivative control. *Prerequisite:* Junior or Senior standing in Engineering, Physics, or Chemistry, and Math 309 or permission of department head.

ChE 701—TRANSPORT PHENOMENA—3 cr. (3 and 0)**ChE 707—UNIT OPERATIONS LABORATORY II—2 cr. (0 and 6)****ChE 708—CHEMICAL ENGINEERING DESIGN I—1 cr. (0 and 3)****ChE 709—CHEMICAL ENGINEERING DESIGN II—2 cr. (0 and 6)****ChE 715—INTRODUCTION TO NUCLEAR ENGINEERING I—3 cr. (3 and 0)****ChE 716—INTRODUCTION TO NUCLEAR ENGINEERING II—3 cr. (3 and 0)****ChE 723—THEORY OF BIO-OXIDATION PROCESSES—2 cr. (2 and 0)****ChE 730—CHEMICAL ENGINEERING THERMODYNAMICS II—3 cr. (3 and 0)****ChE 750—CHEMICAL ENGINEERING KINETICS—3 cr. (3 and 0)****ChE 802—PROCESS DYNAMICS AND CONTROL—3 cr. (3 and 0)****ChE 803—HEAT, MASS, AND MOMENTUM TRANSFER—3 cr. (3 and 0)****ChE 804—CHEMICAL ENGINEERING THERMODYNAMICS—3 cr. (3 and 0)****ChE 805—CHEMICAL ENGINEERING KINETICS—3 cr. (3 and 0)****ChE 806—CHEMICAL ENGINEERING CALCULATIONS I—3 cr. (3 and 0)****ChE 807—CHEMICAL ENGINEERING CALCULATIONS II—3 cr. (3 and 0)****ChE 808—CHEMICAL ENGINEERING DESIGN AND ANALYSIS—3 cr. (1 and 6)****ChE 809—WASTE TREATMENT—3 cr. (3 and 0)****ChE 810—BIOCHEMICAL ENGINEERING—3 cr. (3 and 0)****ChE 820—FLUID MECHANICS—3 cr. (3 and 0)**

CHE 821—HEAT TRANSPORT—3 cr. (3 and 0)

CHE 822—MASS TRANSFER AND DIFFERENTIAL CONTACT OPERATIONS—
3 cr. (3 and 0)

CHE 823—MASS TRANSFER AND STAGewise CONTACT OPERATIONS—
3 cr. (3 and 0)

CHE 830—CHEMICAL TECHNOLOGY—3 cr. (3 and 0)

CHE 840—GRADUATE LABORATORY—Credit to be arranged.

CHE 845—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 846—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 847—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 852—AIR POLLUTION CONTROL PROCESSES—3 cr. (3 and 0)

CHE 853—INDUSTRIAL AIR HYGIENE—3 cr. (3 and 0)

CHE 854—ENVIRONMENTAL INSTRUMENTATION AND MEASUREMENTS—3 cr.
(2 and 3)

CHE 891—RESEARCH—Credit to be arranged.

CHE 902—PROCESS DYNAMICS AND CONTROL—3 cr. (3 and 0)

CHE 903—TRANSPORT PHENOMENA—3 cr. (3 and 0)

CHE 904—CHEMICAL ENGINEERING THERMODYNAMICS—3 cr. (3 and 0)

CHE 905—CHEMICAL ENGINEERING KINETICS—3 cr. (3 and 0)

CHE 945—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 946—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 947—SELECTED TOPICS IN CHEMICAL ENGINEERING—3 cr. (3 and 0)

CHE 954—ENVIRONMENTAL SYSTEMS DESIGN—3 cr. (3 and 0)

CHE 991—DOCTORAL RESEARCH—Credit to be arranged.

CHEMISTRY

Professors: F. I. BROWNLEY, JR., J. G. DINWIDDIE, JR., J. H. HOBSON, J. W. HUFFMAN, H. L. HUNTER, A. R. PINDER, H. T. POLK

Associate Professors: F. B. BROWN, J. C. FANNING, F. J. LINDSTROM, N. P. MARULLO, J. R. SALLEY, JR., G. B. SAVITSKY, H. G. SPENCER, *Head*

Assistant Professors: J. F. ALLEN, R. H. BAILEY, JR., A. L. BEYERLEIN, C. B. BISHOP, MURIEL B. BISHOP, J. F. GELDARD, K. S. LANDERS, J. L. VON ROSENBERG, JR.

CH 101—GENERAL CHEMISTRY—4 cr. (3 and 3)

Gives the student a general knowledge of the fundamentals of the science of chemistry through lectures, lecture experiments, and laboratory exercises. Consideration is given to the common substances.

CH 102—GENERAL CHEMISTRY—4 cr. (3 and 3)

A continuation of Ch 101.

CH H102—GENERAL CHEMISTRY—4 cr. (3 and 3)

Same as Ch 102 except that this honors section is open to students by invitation only.

CH 219—CHEMICAL PRINCIPLES—2 cr. (2 and 0)

The fundamental laws and theories pertaining to water and its solutions. The nature of chemical equilibria present in aqueous solutions is emphasized. *Prerequisite:* Ch 101 and 102.

CH 220—ELEMENTARY ORGANIC CHEMISTRY—4 cr. (3 and 3)

A one semester course in organic chemistry. Typical classes of organic compounds, both aliphatic and aromatic, are studied. *Prerequisite:* Ch 101 and 102.

CH 223—ORGANIC CHEMISTRY—3 cr. (3 and 0)

An introductory course covering the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. *Prerequisite:* Ch 101 and 102.

CH 224—ORGANIC CHEMISTRY—3 cr. (3 and 0)

A continuation of Ch 223.

CH 225—ORGANIC CHEMISTRY LABORATORY—2 cr. (0 and 6)

The laboratory techniques involved in the synthesis, separation and purification, and characterization of typical examples of the classes of organic compounds. *Prerequisite:* Registration in Ch 223.

CH 226—ORGANIC CHEMISTRY LABORATORY—2 cr. (0 and 6)

A continuation of Ch 225. *Prerequisite:* Registration in Ch 224.

CH 227—ORGANIC CHEMISTRY LABORATORY—1 cr. (0 and 3)

The synthesis and properties of typical examples of the classes of organic compounds. *Prerequisite:* Registration in Ch 223.

CH 228—ORGANIC CHEMISTRY LABORATORY—1 cr. (0 and 3)

A continuation of Ch 227. *Prerequisite:* Registration in Ch 224.

CH 310—ELEMENTARY BIOCHEMISTRY—4 cr. (3 and 3)

An introductory course consisting of a review of equilibrium reactions; a study of the chemistry of carbohydrates, proteins, and lipids, and their role in cell metabolism. The laboratory work parallels classroom study. *Prerequisite:* Organic Chemistry.

CH 313—QUANTITATIVE ANALYSIS—3 cr. (3 and 0)

The fundamental principles of volumetric, gravimetric and certain elementary instrumental chemical analyses. *Prerequisite:* Organic Chemistry.

CH 315—QUANTITATIVE ANALYSIS LABORATORY—2 cr. (0 and 6)

The laboratory techniques of volumetric, gravimetric, and elementary instrumental analysis.

CH 317—QUANTITATIVE ANALYSIS LABORATORY—1 cr. (0 and 3)

The standard techniques of analytical chemistry—gravimetric, volumetric, and instrumental.

CH 331—PHYSICAL CHEMISTRY—3 cr. (3 and 0)

Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view.

Prerequisite: Math 206 and Physics.

CH 332—PHYSICAL CHEMISTRY—3 cr. (3 and 0)

Continuation of Ch 331 including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces.

CH 333—PHYSICAL CHEMISTRY LABORATORY—2 cr. (0 and 6)

Experiments designed to illustrate the physical chemistry theory studied in Ch 331. *Prerequisite:* Registration in Ch 331.

CH 334—PHYSICAL CHEMISTRY LABORATORY—2 cr. (0 and 6)

A continuation of Ch 333. *Prerequisite:* Registration in Ch 332.

CH 339—PHYSICAL CHEMISTRY LABORATORY—1 cr. (0 and 3)

Experiments are selected to be of maximum value to Chemical Engineering majors. *Prerequisite:* Registration in Ch 331.

CH 340—PHYSICAL CHEMISTRY LABORATORY—1 cr. (0 and 3)

A continuation of Ch 339. *Prerequisite:* Registration in Ch 332.

CH 402—INORGANIC CHEMISTRY—3 cr. (3 and 0)

A comprehensive survey of the field of inorganic chemistry through lectures and lecture experiments. Development of modern theories of atomic structure and valence, and a detailed study of the elements and their compounds, based on the periodic system and including both well-known and rarer elements. *Prerequisite:* Ch 331 and 332.

CH 411—INSTRUMENTAL ANALYSIS—4 cr. (2 and 6)

Demonstration and operation of modern optical and electronic precision measuring devices as they apply to the processes and analytical, physical and organic chemistry. *Prerequisite:* Physical Chemistry.

CH 421—QUALITATIVE ORGANIC ANALYSIS—4 cr. (2 and 6)

Systematic identification of pure organic compounds and mixtures. *Prerequisite:* Ch 223 and 224.

CH 423—PRINCIPLES OF BIOCHEMISTRY—3 cr. (3 and 0)

A review of the basic organic chemistry of the amino acids, saccharides, and fatty acids; relations of these acids to the chemistry of proteins, polysaccharides, and lipids. Study of kinetics of enzymes and nucleic acids. Metabolic pathways of amino acids, carbohydrates, fats, phospholipids, and nucleic acids; hormonal control of metabolism, vitamins, and growth factors. *Prerequisite:* Ch 223 and 224.

CH 424—PRINCIPLES OF BIOCHEMISTRY—3 cr. (3 and 0)

A continuation of Ch 423.

CH 425—GENERAL BIOCHEMISTRY LABORATORY—1 cr. (0 and 3)

Experiments selected to illustrate current methods used in biochemical research.

CH 426—GENERAL BIOCHEMISTRY LABORATORY—1 cr. (0 and 3)

A continuation of Ch 425.

CH 431—ATOMIC AND MOLECULAR STRUCTURE—3 cr. (3 and 0)

An introductory study of the principles of wave mechanics, hydrogen atom structure, approximate methods, molecular orbital and valence bond treatments of bonding, hybridization, ligand-field theory, and relationships of structure to physical and chemical properties.

CH 441—GLASS MANIPULATION—2 cr. (0 and 6)

A course designed to teach the fundamentals of glass manipulation and its application to the construction and repair of simple laboratory apparatus. *Prerequisite:* Senior standing.

CH 442—CHEMICAL LITERATURE—1 cr. (1 and 0)

This course is designed to give the student practice in the use of chemical literature, the writing of technical reports and the presentation of same before the faculty of the Department of Chemistry. *Prerequisite:* Junior standing in Chemistry.

CH 443—RESEARCH PROBLEMS—3 cr. (0 and 9)

Original investigation of an assigned problem in a fundamental branch of Chemistry. This work must be carried out under the supervision of a member of the staff. *Prerequisite:* Senior standing in Chemistry.

CH 444—RESEARCH PROBLEMS—3 cr. (0 and 9)

A continuation of Ch 443.

CH 450—REVIEW OF GENERAL CHEMISTRY I—3 cr. (3 and 0)

A lecture course designed to deal with the basic principles generally presented in a general chemistry course. Emphasis will be placed upon the explanation of observed facts in terms of modern atomic and molecular structure. Enrollment limited to secondary school teachers.

CH 454—INORGANIC SYNTHESIS—2 cr. (0 and 6)

A laboratory course designed to acquaint the student with various methods and techniques employed in the preparation and handling of inorganic compounds.

CH 472—ORGANIC SYNTHESIS—4 cr. (2 and 6)

A course designed to teach the student techniques and principles as applied in a research laboratory. Both macro and semi-micro methods are used in the preparation of several organic compounds. *Prerequisite:* Organic Chemistry.

CH 491—INTRODUCTION TO RADIOCHEMISTRY—3 cr. (2 and 3)

The natural and synthetic radioisotopes, including the consideration of atomic and nuclear structure, properties of radiation and tracer techniques and their application. The laboratory is concerned with the methods of detection and measurement of the various types of radiation and the various applications of tracer techniques. *Prerequisite:* Senior or Graduate standing and permission of instructor.

CH 613—QUANTITATIVE ANALYSIS—3 cr. (3 and 0)

CH 615—QUANTITATIVE ANALYSIS LABORATORY—2 cr. (0 and 6)

CH 617—QUANTITATIVE ANALYSIS LABORATORY—1 cr. (0 and 3)

CH 631—PHYSICAL CHEMISTRY—3 cr. (3 and 0)

CH 632—PHYSICAL CHEMISTRY—3 cr. (3 and 0)

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- CH 639—PHYSICAL CHEMISTRY LABORATORY—1 cr. (0 and 3)
CH 640—PHYSICAL CHEMISTRY LABORATORY—1 cr. (0 and 3)
CH 702—INORGANIC CHEMISTRY—3 cr. (3 and 0)
CH 711—INSTRUMENTAL ANALYSIS—4 cr. (2 and 6)
CH 721—QUALITATIVE ORGANIC ANALYSIS—4 cr. (2 and 6)
CH 723—PRINCIPLES OF BIOCHEMISTRY—3 cr. (3 and 0)
CH 724—PRINCIPLES OF BIOCHEMISTRY—3 cr. (3 and 0)
CH 725—GENERAL BIOCHEMISTRY LABORATORY—1 cr. (0 and 3)
CH 726—GENERAL BIOCHEMISTRY LABORATORY—1 cr. (0 and 3)
CH 731—ATOMIC AND MOLECULAR STRUCTURE—3 cr. (3 and 0)
CH 750—REVIEW OF GENERAL CHEMISTRY I—3 cr. (3 and 0)
CH 754—INORGANIC SYNTHESIS—2 cr. (0 and 6)
CH 772—ORGANIC SYNTHESIS—4 cr. (2 and 6)
CH 791—INTRODUCTION TO RADIOCHEMISTRY—3 cr. (2 and 3)
CH 805—THEORETICAL INORGANIC CHEMISTRY—3 cr. (3 and 0)
CH 806—SPECIAL TOPICS IN INORGANIC CHEMISTRY—1 to 4 cr.
CH 807—CHEMISTRY OF THE TRANSITION ELEMENTS—3 cr. (3 and 0)
CH 808—CHEMISTRY OF THE NON-METALLIC ELEMENTS—3 cr. (3 and 0)
CH 811—ANALYTICAL CHEMISTRY—3 cr. (3 and 0)
CH 812—CHEMICAL SPECTROSCOPIC METHODS—3 cr. (2 and 3)
CH 821—ORGANIC CHEMISTRY I—3 cr. (3 and 0)
CH 822—ORGANIC CHEMISTRY II—3 cr. (3 and 0)
CH 823—ORGANIC REACTION MECHANISMS—3 cr. (3 and 0)
CH 824—FUNDAMENTAL PRINCIPLES OF POLYMER CHEMISTRY—3 cr.
(3 and 0)
CH 825—CURRENT TOPICS IN ORGANIC CHEMISTRY—1 cr. (1 and 0)
CH 826—CHEMISTRY OF ENZYMES—3 cr. (3 and 0)
CH 829—CHEMISTRY AND METABOLISM OF CARBOHYDRATES—2 cr. (2 and 0)
CH 831—CHEMICAL THERMODYNAMICS—3 cr. (3 and 0)
CH 832—STATES OF MATTER—3 cr. (3 and 0)
CH 834—STATISTICAL THERMODYNAMICS—3 cr. (3 and 0)
CH 835—CHEMICAL KINETICS—3 cr. (3 and 0)
CH 836—TOPICS IN COLLOID SCIENCE—3 cr. (3 and 0)
CH 837—QUANTUM CHEMISTRY—3 cr. (3 and 0)
CH 841—MATHEMATICAL ASPECTS OF CHEMICAL SPECTROSCOPY—3 cr.
(3 and 0)
CH 850—A REVIEW OF GENERAL CHEMISTRY II—3 cr. (2 and 3)

- CH 851—CHEMISTRY SEMINAR—0 to 2 cr.
 CH 891—RESEARCH—Credit to be arranged.
 CH 921—HETEROCYCLIC COMPOUNDS—3 cr. (3 and 0)
 CH 922—STEREOCHEMISTRY—3 cr. (3 and 0)
 CH 923—CHEMISTRY OF NATURAL PRODUCTS—3 cr. (3 and 0)
 CH 924—CHEMISTRY OF NATURAL PRODUCTS—3 cr. (3 and 0)
 CH 930—ADVANCED TOPICS IN PHYSICAL CHEMISTRY—3 cr. (3 and 0)
 CH 950—MICROANALYTICAL TECHNIQUES—3 cr. (1 and 6)
 CH 991—DOCTORAL RESEARCH—Credit to be arranged.

CIVIL ENGINEERING

Professors: L. G. RICH, I. A. TRIVELY

Associate Professors: J. D. ANTRIM, J. M. FORD, J. C. McCORMAC, A. J. McCUTCHEN, J. P. ROSTRON, A. E. SCHWARTZ, *Head*

Assistant Professors: H. W. BUSCHING, R. E. ELLING, W. A. WELSH, JR.

CE 201—TERRESTRIAL MEASUREMENTS I—3 cr. (2 and 3)

Introduction to instruments; theory and practical work in plane surveying; differential leveling; chaining; stadia; Latitudes and Departures; areas, partition of land; computation of missing sides; contours; topographic mapping; plane table; astronomical observations. *Prerequisite:* Math 106 or permission of instructor.

CE 202—TERRESTRIAL MEASUREMENTS II—3 cr. (2 and 3)

Vertical and Horizontal curves; borrow pit volumes; route surveying; earthwork; triangulation; by-passing obstacles; introduction to photogrammetry and use of electronic methods of measuring distances. *Prerequisite:* CE 201.

CE 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

The fundamental operations and writing of detailed programs for digital electronic computers, with applications to Civil Engineering areas. The course is elementary and not designed for just a single or particular computer, although emphasis is placed on the computer languages applicable to the computers present in the computer laboratory. *Prerequisite:* Enrollment in or credit for CE 201.

CE 308—STRUCTURAL ANALYSIS—4 cr. (3 and 2)

Analytical analysis of statically determinate beams, trusses, and frames, including the construction of shear and moment diagrams, influence lines, and thorough discussion of moving loads. Computation of slopes and deflections of beams by area-moment and conjugate beam methods. Analysis of statically indeterminate beams and one-story frames by moment distribution and slope deflection. *Prerequisite:* EM 304.

CE 309—STRUCTURAL DESIGN—4 cr. (3 and 2)

Design and detail of components and connections for timber and metal structures. *Prerequisite:* CE 308.

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CE 311—TRANSPORTATION ENGINEERING—3 cr. (3 and 0)

Planning, location, design, operation, and administration of highways, railroads, airports, and other transportation facilities, including economic considerations, pavement design, and earthwork operations. *Prerequisite or Concurrent:* CE 331, and CE 320.

CE 320—CONCRETE AND BITUMINOUS MATERIALS—2 cr. (1 and 3)

Investigation and selection of aggregates for Portland cement concrete and asphaltic concrete; latest methods of design of Portland cement mixes and asphaltic concrete mixes; field control and adjustments; field trips to nearby construction jobs. *Prerequisite:* EM 304 and Junior standing.

CE 331—SOIL MECHANICS—3 cr. (2 and 2)

Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, consolidation, stress distribution and bearing capacity of soils. *Prerequisite:* EM 304 and Junior standing.

CE 341—ENVIRONMENTAL ENGINEERING—3 cr. (3 and 0)

An evaluation of the effects of the environment on man with special consideration given to air and water contacts. The analysis and review of engineering systems used in Environmental Control. *Prerequisite or Concurrent:* EM 320, EM 322.

CE 399—SIMULATION TECHNIQUES—1 cr. (0 and 3)

Modeling of civil engineering problems with the electronic analog computer, with conductive sheet methods and by digital analog simulation. The emphasis is in use rather than the theory of the methods. *Prerequisite:* Math 208.

CE 404—CONCRETE STRUCTURES—4 cr. (3 and 2)

Design and detail of reinforced concrete members using the elastic and ultimate strength theories. Introduction to prestressed concrete. *Prerequisite:* CE 308 and Senior standing.

CE 408—MATERIALS AND METHODS OF CONSTRUCTION—3 cr. (3 and 0)

A survey of the principal materials, methods and equipment used in the construction industry. *Prerequisite:* Senior standing.

CE 412—URBAN TRANSPORTATION PLANNING—3 cr. (3 and 0) F

Urban travel characteristics; characteristics of transportation systems; transportation and land-use studies; trip distribution and trip assignment models; city patterns and subdivision layout. *Prerequisite:* CE 311.

CE 416—STRUCTURAL DESIGN—4 cr. (3 and 2)

Design and detail of the components of wood, steel and concrete structures. For non-Civil Engineering students only. *Prerequisite:* CE 308.

CE 419—GENERAL PHOTOGRAMMETRY—3 cr. (2 and 3) S

Fundamentals of mapping by the use of aerial photographs; characteristics, production and use of aerial photographs; study of the operation of popular photogrammetric instruments including aerial cameras, stereoscopic viewing and plotting equipment; practice in the use of stereocomparagraph and multiplex plotting instruments; scale, tilt, and coordinate calculations; construction of photomosaics. *Prerequisite:* CE 202 and Junior standing.

CE 422—ENGINEERING RELATIONS—3 cr. (3 and 0)

Business, legal and ethical relations in engineering practice. *Prerequisite:* Econ 201 and Senior standing.

CE 431—APPLIED SOIL MECHANICS—3 cr. (2 and 2) S

Relationship of local geology to soil formations, ground water, planning of site investigation, sampling procedures, laboratory determination of design parameters, foundation design and settlement analysis. *Prerequisite:* CE 331, Geol 406.

CE 434—CONSTRUCTION COSTS AND ESTIMATES—3 cr. (2 and 2) F

Interpretation of specifications and plan reading necessary for the proper estimation of quantities of materials and costs of engineering structures. The course is presented from both the designer's and the constructor's viewpoint in order to fit the young engineer with the essential details an inspector or a construction engineer should have at his command. *Prerequisite:* Senior standing.

CE 435—ENGINEERING PROJECT ANALYSIS—3 cr. (2 and 2) S

Advanced analysis of engineering projects. Theory of economic, financial, and intangible analysis of large-scale construction projects. Practical exercises in cost-benefit studies and construction decisions. *Prerequisite:* Permission of instructor.

CE 441—WATER RESOURCES ENGINEERING—3 cr. (2 and 3)

The hydrologic and economic considerations involved in the control and utilization of water; analysis and design of water and waste water collection systems and water distribution systems. *Prerequisite:* CE 341, EM 320 and EM 322.

CE 443—ENVIRONMENTAL ENGINEERING CHEMISTRY I—2 cr. (2 and 0) S

Theory and control of the chemical processes employed in treatment of water and waste water. The principles of analytical and physical chemistry are applied to problems in environmental engineering. *Prerequisite:* CE 341.

CE 444—ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY—2 cr. (0 and 6) S

Theoretical relationships considered in CE 443 are applied to actual problems of analysis and control of water and waste treatment processes. *Prerequisite or concurrent:* CE 443.

CE 453—ADVANCED STRUCTURAL ANALYSIS—3 cr. (3 and 0) F

Slopes and deflections of beams and trusses by energy methods. Analysis of statically indeterminate structures and construction of influence lines by virtual-work method. Application of moment distribution and slope deflection methods to haunched beams. *Prerequisite:* CE 308 and Senior standing.

CE 490—SPECIAL PROJECTS—1-3 cr. (1-3 and 0-0)

Studies or laboratory investigations on special topics in the Civil Engineering field which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. *Prerequisite:* Senior standing.

CE 631—INTRODUCTORY SOIL MECHANICS—3 cr. (2 and 2) (Non-Civil Engineering Students only.)

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- CE 699—SIMULATION TECHNIQUES—1 cr. (0 and 3)
- CE 712—URBAN TRANSPORTATION PLANNING—3 cr. (3 and 0)
- CE 719—GENERAL PHOTOGRAMMETRY—3 cr. (2 and 3)
- CE 731—APPLIED SOIL MECHANICS—3 cr. (2 and 3)
- CE 734—CONSTRUCTION COSTS AND ESTIMATES—3 cr. (2 and 3)
- CE 735—ENGINEERING PROJECT ANALYSIS—3 cr. (2 and 3)
- CE 743—ENVIRONMENTAL ENGINEERING CHEMISTRY I—2 cr. (2 and 0)
- CE 744—ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY I—2 cr. (0 and 6)
- CE 753—ADVANCED STRUCTURAL ANALYSIS—3 cr. (3 and 0)
- CE 790—SPECIAL PROJECTS—1-3 cr. (1-3 and 0-0)
- CE 801—STRUCTURAL ENGINEERING I—3 cr. (3 and 0)
- CE 802—STRUCTURAL ENGINEERING II—3 cr. (3 and 0)
- CE 804—THEORY AND DESIGN OF THIN PLATES—3 cr. (3 and 0)
- CE 805—THEORY AND DESIGN OF THIN SHELLS—3 cr. (3 and 0)
- CE 806—STRUCTURAL VIBRATION—3 cr. (3 and 0)
- CE 807—NUMERICAL AND APPROXIMATE METHODS OF STRUCTURAL ANALYSIS—3 cr. (3 and 0)
- CE 810—TRAFFIC ENGINEERING: OPERATIONS—3 cr. (3 and 0)
- CE 811—TRAFFIC ENGINEERING: GEOMETRIC DESIGN—3 cr. (2 and 3)
- CE 813—HIGHWAY AND AIRPORT PAVEMENT DESIGN—3 cr. (3 and 0)
- CE 819—HIGHWAY RESEARCH—2 to 4 cr.
- CE 820—CEMENT AND CONCRETE—3 cr. (2 and 3)
- CE 821—BITUMINOUS PAVING MATERIALS—3 cr. (2 and 3)
- CE 822—AGGREGATES AS CONSTRUCTION MATERIALS—3 cr. (2 and 3)
- CE 823—INELASTIC BEHAVIOUR OF ENGINEERING MATERIALS—3 cr. (3 and 0)
- CE 831—FOUNDATION ENGINEERING—3 cr. (2 and 3)
- CE 832—ADVANCED SOIL MECHANICS—3 cr. (3 and 0)
- CE 833—PHYSICAL AND PHYSIO-CHEMICAL PROPERTIES OF SOILS—3 cr. (2 and 3)
- CE 834—AIR PHOTO INTERPRETATION OF SOILS—3 cr. (2 and 3)
- CE 835—DESIGN OF EARTH STRUCTURES—3 cr. (3 and 0)
- CE 889—SPECIAL PROBLEMS I—1-3 cr.
- CE 890—SPECIAL PROBLEMS II—1-3 cr.
- CE 891—RESEARCH—3 cr.
- CE 991—DOCTORAL RESEARCH—Credit to be arranged.

COMPUTER SCIENCE

Professor: A. T. HIND, JR.

Associate Professors: C. E. KIRKWOOD, JR., M. C. PALMER, *Director*

Instructor: EUGENIE V. BARTMESS

COMP SC 310—INTRODUCTION TO ALGORITHMIC PROCESSES—3 cr. (2 and 3)

Concept and properties of an algorithm, language and notations for describing algorithms, analysis of computational problems, and development of algorithms for their solution, and application of a specific procedure-oriented language to solve simple numerical and non-numerical problems using a computer. *Prerequisite:* Math 206 or consent of instructor.

COMP SC 311—COMPUTER ORGANIZATION AND PROGRAMMING—3 cr. (3 and 0)

Logical basis of computer structure, machine representation of numbers and characters, flow of control, instruction codes, arithmetic and logical operations, indexing, input-output, subroutines, linkages, macros, interpretive and assembly systems, and storage organization. *Prerequisite:* Comp Sc 310.

COMP SC 312—NUMERICAL ALGORITHMS FOR ENGINEERS—3 cr. (3 and 0)

Further discussion of algorithmic language, includes errors in computation, polynomial interpolation, zeros of function, quadrature, and numerical solution of ordinary differential equations and systems of differential equations. *Prerequisite:* CE, EE, or ME 299.

COMP SC 409—NUMERICAL CALCULUS—3 cr. (3 and 0)

An introduction to numerical methods, including elementary discussion of errors, polynomial interpolation, matrix methods, linear systems of equations, solution of non-linear equations, and numerical solution of ordinary differential equations, and systems of differential equations. *Prerequisite:* Comp Sc 310, Math 306 or equivalent.

COMP SC 427—COMPUTER PRINCIPLES—3 cr. (3 and 0)

Symbolic logic and Boolean algebra for description and analysis of switching circuits, simplification of switching circuits, error detecting and correcting codes, digital systems design principles. *Prerequisite:* Math 305 or equivalent and Comp Sc 310.

COMP SC 428—ALGORITHMIC LANGUAGES AND COMPILERS—3 cr. (3 and 0)

Formal description of algorithmic languages and the techniques used in their compilation, study of syntax, semantics, procedures, replication, iteration, and recursion in these languages, including comparisons of commonly used languages. *Prerequisite:* Comp Sc 310, Math 305 or equivalent.

COMP SC 610—INTRODUCTION TO ALGORITHMIC PROCESSES—3 cr. (2 and 3)

COMP SC 611—COMPUTER ORGANIZATION AND PROGRAMMING—3 cr. (3 and 0)

COMP SC 612—NUMERICAL ALGORITHMS FOR ENGINEERS—3 cr. (3 and 0)

COMP SC 709—NUMERICAL CALCULUS—3 cr. (3 and 0)

COMP SC 727—COMPUTER PRINCIPLES—3 cr. (3 and 0)

COMP SC 728—ALGORITHMIC LANGUAGES AND COMPILERS—3 cr. (3 and 0)

DAIRY SCIENCE

Professors: R. W. HENNINGSON, V. HURST, W. A. KING, *Head*; J. T. LAZAR, JR.

Associate Professors: C. C. BRANNON, W. V. CHALUPA, J. J. JANZEN

Assistant Professor: J. F. DICKEY

DY SC 201—INTRODUCTORY DAIRYING—3 cr. (2 and 3) F, S

Designed to give a working knowledge of Dairy husbandry and dairy products. Studies include history of dairying, dairy breeds, feeds and feeding, judging dairy animals, dairy farm buildings, quality milk production, testing milk and some of its products, the manufacture of milk products and the value of milk and milk products.

DY SC 304—SENSORY EVALUATION TECHNIQUES—2 cr. (1 and 3) S, '69 and alternate years.

Fundamental aspects of sensory techniques employed in the quality evaluation of food products. A survey of methods employed in product evaluation and acceptance. A concept of quality is formed through examination of various grades of each product. Actual practice in the selection and operation of taste panels illustrates their use in the food industry.

DY SC 305—DAIRY TECHNOLOGY AND ENGINEERING—3 cr. (2 and 3) F

Major subjects covered are physical and chemical properties of milk, power transmission, electrical power and equipment, hydraulics and pumping, heat measurement and control, steam and its use in the dairy, principles of refrigeration, insulation and cold storage rooms, heaters and coolers, storage tanks, ice cream freezers, homogenizers, pasteurizers, concentrators, equipment maintenance and plant design.

DY SC 306—THE CHEMICAL AND PHYSICAL NATURE OF MILK—3 cr. (2 and 3) S

The nature and properties of the major and minor constituents of milk, the effect of chemical and physical treatment on milk constituents, and analytical methods necessary to determine the composition and properties of milk and its constituents. The philosophy and development of quality control.

DY SC 307—MARKET MILK—3 cr. (2 and 3) F, '68 and alternate years.

Composition, procurement, processing, distribution, quality control, public health aspects, basis chemistry and bacteriology of industrial milk supplies and cultured products.

DY SC 310—DAIRY CATTLE SELECTION—1 cr. (0 and 3) S, '70 and alternate years.

Emphasis is placed upon the selection of dairy cattle for profitable herd operations. Evaluations of herd classifications, fitting, showing, and true type are made.

DY SC 402—DAIRY MANUFACTURES—4 cr. (3 and 3) S, '70 and alternate years.

The principles and practice of the manufacture of ice cream and related dairy products, the principles of the manufacture of condensed and evaporated milks and milk powders, and the physical, chemical and biological factors involved.

DY SC 403—ANIMAL NUTRITION—3 cr. (3 and 0) F

A basic understanding of the chemistry and physiology of digestion and metabolism of carbohydrates, lipids, proteins, minerals and vitamins by farm animals. The effects of antibiotics and other additives are included. Maintenance, growth, reproduction and lactation are studied in relation to the physiological requirements. *Prerequisite:* Ch 220.

DY SC 404—DAIRY PLANT MANAGEMENT—3 cr. (2 and 3)

S, '69 and alternate years.

The functions and operations of the dairy and food processing plant including the application of labor relations, business management, business law and plant efficiency.

DY SC 407—CHEESE AND BUTTER MANUFACTURE—3 cr. (2 and 3)

F, '69 and alternate years.

Theory and practice of the manufacture, curing and marketing of Blue, Cheddar, Swiss and other cured cheeses. Principles and practices of creamery buttermaking with emphasis on butter plant management. Students will become familiar with grading, neutralizing, pasteurizing, and churning cream.

DY SC 409—DAIRY SCIENCE SEMINAR—2 cr. (2 and 0)

F, '69 and alternate years.

Special research problems in production and manufactures are studied. Individual topics not fully covered in class work are assigned for special report before class and members of Dairy Science Staff.

DY SC 410—DAIRY SCIENCE SEMINAR—2 cr. (2 and 0)

S, '70 and alternate years.

A continuation of Dy Sc 409 with emphasis on current research literature and research methods.

DY SC 452—DAIRY CATTLE FEEDING AND MANAGEMENT—3 cr. (2 and 3)

S, '69 and alternate years.

Fundamental principles in the care, feeding, and management of dairy cattle of all ages. Topics include general considerations in selecting a breed and the individual cow, calf raising, growth and development of dairy heifers, care and management of the milking herd and feeding for milk production.

DY SC 453—ANIMAL REPRODUCTION—3 cr. (3 and 0) F

Basic reproductive physiology in cattle, sheep, and swine. Emphasis will be placed on factors affecting fertility and sterility.

DY SC 455—ANIMAL REPRODUCTION LABORATORY—1 cr. (0 and 3) F

This course will supplement Dy Sc 453. Practical work will include the collection, evaluation, and processing of semen; artificial insemination of animals; and the completion of a breeding project with rats. *Prerequisite:* To be taken concurrently or to follow Dy Sc 453.

DY SC 606—CHEMICAL AND PHYSICAL NATURE OF MILK—3 cr. (2 and 3)**DY SC 607—MARKET MILK—3 cr. (2 and 3)****DY SC 702—DAIRY MANUFACTURES—4 cr. (3 and 3)****DY SC 703—ANIMAL NUTRITION—3 cr. (3 and 0)****DY SC 704—DAIRY PLANT MANAGEMENT—3 cr. (2 and 3)**

DY SC 752—DAIRY CATTLE FEEDING AND MANAGEMENT—3 cr. (2 and 3)

DY SC 753—ANIMAL REPRODUCTION—3 cr. (3 and 0)

DY SC 755—ANIMAL REPRODUCTION LABORATORY—1 cr. (0 and 3)

DY SC 801—TOPICAL PROBLEMS—1 to 3 cr.

DY SC 802—GENETICS OF DAIRY CATTLE IMPROVEMENT—3 cr. (3 and 0)

DY SC 803—PHYSIOLOGY OF REPRODUCTION AND MILK SECRETION—3 cr.
(3 and 0)

DY SC 804—ENDOCRINOLOGY—3 cr. (3 and 0)

DY SC 805—NEWER KNOWLEDGE OF DAIRY NUTRITION—3 cr. (3 and 0)

DY SC 807—FERMENTED DAIRY PRODUCTS—3 cr. (2 and 3)

DY SC 808—INDUSTRIAL DAIRY SCIENCE—3 cr. (3 and 0)

DY SC 809—RUMEN METABOLISM—3 cr. (2 and 3)

DY SC 891—RESEARCH—Credit to be arranged.

ECONOMICS

Professor: H. H. MACAULAY, JR.

Associate Professors: J. F. PEARCE, B. R. SKELTON, H. J. WHEELER, *Head*;
W. C. WHITTEN, JR.

Assistant Professors: J. R. BARFIELD, R. D. SHANNON

Instructors: MARGO M. THORNING, HOLLEY H. ULBRICH,* M. E. WHITEHEAD

Lecturer: C. L. JOINER*

ECON 201—PRINCIPLES OF ECONOMICS—3 cr. (3 and 0)

The fundamental principles of pricing, stabilization and growth in a modern economy. Topics include supply and demand, employment theory and fiscal policy, the banking system and monetary policy, and the economics of growth.

ECON 202—PRINCIPLES OF ECONOMICS—3 cr. (3 and 0)

Continuation of Econ 201 with an intensive study of the economics of the firm, the pricing of resources, and international economic relations. The theory is given relevance through the analysis of current economic problems. *Prerequisite:* Econ 201.

ECON 301—ECONOMICS OF LABOR—3 cr. (3 and 0)

The economics of the labor market, the problems of the industrial worker, and the methods of adjusting labor-management disputes. *Prerequisite:* Econ 201.

ECON 302—MONEY AND BANKING—3 cr. (3 and 0)

Considers the function of money and banking in both the product and financial markets. Special emphasis is placed on monetary theory and current problems of monetary policy. *Prerequisite:* Econ 201 and 202.

ECON 305—INVESTMENT ANALYSIS—3 cr. (3 and 0)

A study of technique useful in analyzing alternative investment opportunities, with emphasis on corporate securities. Investment planning and portfolio management are considered. *Prerequisite:* Econ 201.

* Part-time.

ECON 306—RISK AND INSURANCE—3 cr. (3 and 0)

Studies the nature of risk and the role of insurance in risk management from individual and business viewpoints by considering insurance carriers, contracts, underwriting and regulation. *Prerequisite:* Econ 201.

ECON 308—COLLECTIVE BARGAINING—3 cr. (3 and 0)

The practices, procedures, legal foundations, and legal structure associated with collective bargaining. The form and content of the labor contract, the grievance machinery, and the mediation and arbitration institutions will also be studied. *Prerequisite:* Econ 201.

ECON 309—GOVERNMENT AND BUSINESS—3 cr. (3 and 0)

The relationships between government and business, including, among other topics, governmental efforts to enforce competition, to regulate public utilities, and to protect the special interests of laborers, farmers, and consumers. *Prerequisite:* Econ 201.

ECON 314—INTERMEDIATE ECONOMIC THEORY—3 cr. (3 and 0)

An analytical study of the basic concepts of value and distribution under alternative market conditions. *Prerequisite:* Econ 201 and 202.

ECON 403—DEVELOPMENT OF ECONOMIC THOUGHT—3 cr. (3 and 0)

A study of the origin and evolution ideas with some emphasis on the historical context, the problems which inspired these ideas, and the nature of the solutions which they provided: from ancient days to the present. *Prerequisite:* Econ 201 and 202.

ECON 404—COMPARATIVE ECONOMIC SYSTEMS—3 cr. (3 and 0)

A comparative analytical and historical study of the principal economic systems which have been important in the modern world including, among others, capitalism and socialism. *Prerequisite:* Econ 201 and 202.

ECON 407—NATIONAL INCOME AND EMPLOYMENT ANALYSIS—3 cr. (3 and 0)

An intensive study of selected economic theories with special emphasis on income and employment. Part of the course is devoted to the analysis of national income accounts and income. *Prerequisite:* Econ 201 and 202.

ECON 410—ECONOMIC DEVELOPMENT—3 cr. (3 and 0)

Consideration and analysis of economic and related problems of the underdeveloped countries. Attention will be given to national and international programs designed to accelerate solution of these problems. *Prerequisite:* Econ 201 and 202.

ECON 412—INTERNATIONAL TRADE—3 cr. (3 and 0)

A study of economic principles particularly applicable to trade between nations. Topics covered include the balance of payments, determination of foreign exchange rates, price and income effects on the composition and level of trade, and commercial policy. *Prerequisite:* Econ 314.

ECON 413—INTERNATIONAL FINANCE—3 cr. (3 and 0)

With primary emphasis upon international monetary relation, the course surveys history and theory. Topics covered include exchange-rate determination, exchange-stability conditions, the purchasing-power-parity doctrine, the effects of devaluation and exchange speculation. (Not open to students who have taken Econ 412.) *Prerequisite:* Econ 302.

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ECON 416—DEVELOPMENT OF THE MODERN ECONOMY—3 cr. (3 and 0)

An analysis of the historical forces and influences which have contributed to the emergence and development of the modern economy. *Prerequisite:* Econ 201 and 202.

ECON 420—THE ECONOMICS OF TAXATION—3 cr. (3 and 0)

An intensive study of a limited number of problems in taxation with particular emphasis on the economic effects that cause and result from certain taxes. Topics include averaging, incentives to work, incidence, concepts of equity, excess burden, definitions of income, depletion, and capital gains. *Prerequisite:* Econ 314.

ECON 422—MONETARY THEORY AND POLICY—3 cr. (3 and 0)

An intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. *Prerequisite:* Econ 302 or permission of the instructor.

ECON 703—DEVELOPMENT OF ECONOMIC THOUGHT—3 cr. (3 and 0)

ECON 704—COMPARATIVE ECONOMIC SYSTEMS—3 cr. (3 and 0)

ECON 707—NATIONAL INCOME AND EMPLOYMENT ANALYSIS—3 cr. (3 and 0)

ECON 710—ECONOMIC DEVELOPMENT—3 cr. (3 and 0)

ECON 712—INTERNATIONAL TRADE—3 cr. (3 and 0)

ECON 716—DEVELOPMENT OF THE MODERN ECONOMY—3 cr. (3 and 0)

ECON 720—ECONOMICS OF TAXATION—3 cr. (3 and 0)

ECON 722—MONETARY THEORY AND POLICY—3 cr. (3 and 0)

ECON 800—ADVANCED ECONOMIC ANALYSIS—3 cr. (3 and 0)

ECON 810—SEMINAR IN ECONOMIC ANALYSIS—3 cr. (3 and 0)

ECON 811—SEMINAR IN LABOR ECONOMICS—3 cr. (3 and 0)

ECON 812—SEMINAR IN THE DEVELOPMENT OF ECONOMIC THOUGHT—3 cr. (3 and 0)

ECON 821—ECONOMIC THEORY I—3 cr. (3 and 0)

ECON 822—ECONOMIC THEORY II—3 cr. (3 and 0)

ECON 891—RESEARCH—Credit to be arranged.

ECON 900—SEMINAR IN ADVANCED ECONOMIC THEORY—3 cr. (3 and 0)

EDUCATION

Professors: L. H. DAVIS, H. F. LANDRITH

Associate Professors: C. R. FREEZE, M. A. PACKER, R. E. WARE

Assistant Professors: L. L. BYRD, J. A. HASH, BARBARA W. MORGAN, T. H. PARRY

ED 100—ORIENTATION—0 cr. (1 and 0)

Series of lectures and discussions on teaching and careers in education; personal and professional guidance. Required of all students in Elementary Education, Secondary Education, and Science Teaching.

ED 101—READING IMPROVEMENT—0 cr. (0 and 2)

Developmental reading for University students who desire to improve reading skills; open to any University student, but priority given to referrals.

ED 301—HISTORY OF AMERICAN EDUCATION—3 cr. (3 and 0)

Development of educational systems, theories and practices against a background of American social and intellectual history. *Prerequisite*: Junior standing or permission of the instructor.

ED 302—EDUCATIONAL PSYCHOLOGY—3 cr. (3 and 0)

The nature, capacities, equipment, growth and development of the learner.

ED 334—CHILD GROWTH AND DEVELOPMENT—3 cr. (3 and 0)

A study of the physical and emotional growth and development of the child. *Prerequisite*: Ed 302 and Psych 201

ED 335—ADOLESCENT GROWTH AND DEVELOPMENT—3 cr. (3 and 0)

The physical and emotional growth and development of the adolescent. *Prerequisite*: Ed 302 or Psych 201.

ED 401—THE COMMUNITY COLLEGE—3 cr. (3 and 0)

History and philosophy of the junior college, its functions, organization and administration.

ED 405—PRINCIPLES OF GUIDANCE—3 cr. (3 and 0)

Principles, procedures, and policies of the guidance services. For all personnel workers. *Prerequisite*: 6 semester hours in Education or Psychology.

ED 406—HISTORY AND PHILOSOPHY OF EDUCATION—3 cr. (3 and 0)

An analysis of the development of modern education practices and philosophies with emphasis upon the historical and philosophical development in the United States.

ED 412—DIRECTED TEACHING IN SECONDARY SCHOOL SUBJECTS—6 cr. (1 and 15)

A program of supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for prospective teachers to obtain experiences in the subject area. Students to be sectioned according to teaching fields: English, History and Social Sciences, Mathematics, Modern Languages, Science. (Enrollment is subject to individual approval of instructor in charge and is limited to seniors or graduates who have completed prerequisite courses and who have the accumulated grade-point ratio necessary for graduation.)

ED 424—METHODS AND MATERIALS IN SECONDARY SCHOOL INSTRUCTION—3 cr. (3 and 0)

Development of instructional practices and materials appropriate for the secondary school; familiarization with curriculum materials. Students to be sectioned according to teaching area: English, History and Social Science, Mathematics, Modern Languages, Science.

ED 458—HEALTH EDUCATION—3 cr. (3 and 0)

A study of the information needed for effective cooperation with parents, physicians and public health agencies in the promotion and improvement of community health, including problems of personal hygiene, health records, immunization, and control of communicable disease.

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ED 459—FUNDAMENTALS OF BASIC READING—3 cr. (3 and 0)

Study of reading skills in relation to the psychological bases; developmental principles; historical and current issues in reading practices.

ED 460—CURRICULUM DEVELOPMENT IN THE ELEMENTARY SCHOOL—3 cr. (3 and 0)

An analysis and evaluation of newer practices in curriculum planning in the elementary school.

ED 461—TEACHING READING IN THE ELEMENTARY SCHOOL—3 cr. (3 and 0)

Study of the various phases of reading and their relation to the elementary program. Emphasis on modern practices in the classroom teaching of reading.

ED 462—READING DIAGNOSIS AND REMEDIATION—3 cr. (2 and 3)

A clinical course in diagnostic and remedial procedures in the teaching of reading. Practice in the use of diagnostic instruments, interpretation of results, and case studies, with recommended remediation. Laboratory hours to be arranged with each individual. *Prerequisite*: 3 semester hours in reading or permission of the Instructor.

ED 471—THE EXCEPTIONAL CHILD—3 cr. (3 and 0)

Survey of exceptionality including handicapped and gifted children; nature, cause, and treatment of difficulties; educational problems.

ED 472—PSYCHOLOGY OF MENTAL RETARDATION—3 cr. (3 and 0)

Psychological aspects of mental retardation; learning, motivation, and personality development.

ED 473—TEACHING THE MENTALLY RETARDED—3 cr. (3 and 0)

Study, selection, and preparation of curricular materials; methods of teaching retarded children within the pre-adolescent and adolescent range. *Prerequisite*: Ed 472 or equivalent.

ED 480—METHODS AND MATERIALS IN THE ELEMENTARY SCHOOL—3 cr. (3 and 0)

Study of the elementary program with emphasis upon materials, curriculum and methodology.

ED 481—DIRECTED TEACHING IN THE ELEMENTARY SCHOOL—6 cr. (1 and 15)

Supervised observation and teaching experiences in cooperation with selected elementary schools. (Enrollment is subject to individual approval of the instructor and is limited to seniors or graduate schools who have completed prerequisite courses and who have the accumulated grade-point ratio for graduation.)

ED 491—DESCRIPTIVE STATISTICS—3 cr. (3 and 0)

Basic descriptive statistics and research methodology applicable to education, psychology and other social sciences.

ED 494—SCHOOL AND COMMUNITY RELATIONSHIPS—3 cr. (3 and 0)

A study of the interdependence of the school and community, with emphasis on educational implications.

ED 497—AUDIO-VISUAL AIDS IN EDUCATION—3 cr. (3 and 0)

The techniques and uses of audio-visual aids in improving teaching effectiveness.

ED 498—TEACHING SECONDARY SCHOOL READING—3 cr. (3 and 0)
Methods and materials of teaching basic and developmental reading skills; programming special services in reading instruction. Demonstrations of tests and devices.

ED 701—THE COMMUNITY COLLEGE—3 cr. (3 and 0)

ED 705—PRINCIPLES OF GUIDANCE—3 cr. (3 and 0)

ED 706—HISTORY AND PHILOSOPHY OF EDUCATION—3 cr. (3 and 0)

ED 760—CURRICULUM DEVELOPMENT IN THE ELEMENTARY SCHOOL—3 cr. (3 and 0)

ED 762—READING DIAGNOSIS AND REMEDIATION—3 cr. (2 and 3)

ED 771—THE EXCEPTIONAL CHILD—3 cr. (3 and 0)

ED 772—PSYCHOLOGY OF MENTAL RETARDATION—3 cr. (3 and 0)

ED 773—TEACHING THE MENTALLY RETARDED—3 cr. (3 and 0)

ED 794—SCHOOL AND COMMUNITY RELATIONSHIPS—3 cr. (3 and 0)

ED 797—AUDIO-VISUAL AIDS IN EDUCATION—3 cr. (3 and 0)

ED 798—TEACHING SECONDARY SCHOOL READING—3 cr. (3 and 0)

ED 801—SEMINAR IN HUMAN GROWTH AND DEVELOPMENT—3 cr. (3 and 0)

ED 802—HUMAN DEVELOPMENT: PSYCHOLOGY OF LEARNING—3 cr. (3 and 0)

ED 803—ADVANCED METHODS IN TEACHING—3 cr. (3 and 0)

ED 808—EDUCATIONAL TESTS AND MEASUREMENTS—3 cr. (3 and 0)

ED 809—ANALYSIS OF THE INDIVIDUAL—3 cr. (3 and 0)

ED 810—TECHNIQUES OF COUNSELING—3 cr. (3 and 0)

ED 811—PUBLIC SCHOOL ADMINISTRATION (FINANCE)—3 cr. (3 and 0)

ED 813—EDUCATIONAL AND VOCATIONAL INFORMATIONAL SERVICES AND PLACEMENT—3 cr. (3 and 0)

ED 814—FIELD EXPERIENCES IN ELEMENTARY SCHOOL GUIDANCE—3 cr. (2 and 3)

ED 815—FIELD EXPERIENCES IN SECONDARY SCHOOL GUIDANCE—3 cr. (2 and 3)

ED 816—FIELD EXPERIENCES IN PERSONNEL SERVICES IN HIGHER EDUCATION—3 cr. (2 and 3)

ED 817—CLINICAL STUDIES IN COUNSELING AND GUIDANCE—1 to 3 cr.

ED 830—TECHNIQUES OF SUPERVISION—THE PUBLIC SCHOOLS—3 cr. (3 and 0)

ED 831—EVALUATION OF SECONDARY SCHOOL INSTRUCTION—3 cr. (3 and 0)
(Offered in Summer Sessions only.)

ED 861—ORGANIZATION AND SUPERVISION OF READING PROGRAMS—3 cr. (3 and 0)

ED 862—CLINICAL RESEARCH IN READING—3 cr. (3 and 0)

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ED 863—PRACTICUM IN READING—3 cr. (2 and 2)

ED 890—INTRODUCTION TO RESEARCH IN EDUCATION—3 cr. (3 and 0)

ELECTRICAL ENGINEERING

Professors: J. C. MARTIN, J. N. THURSTON

Associate Professors: W. L. BALL, H. E. BROYLES, C. P. GOODIN, R. N. KERSEY, JR., J. T. LONG, H. V. POE, R. W. SNELSHIRE, L. C. WILCOX,
Head; M. L. WOLLA, W. T. ZINK

Assistant Professors: T. L. DRAKE, B. E. GILLILAND

Instructors: A. O. BISHOP, JR., D. W. NALLEY

EE 205—ELECTRIC CIRCUITS I—3 cr. (3 and 0)

The fundamental laws of circuit theory utilizing the lumped-parameter concept to include such topics as network topology, conventional circuit solution methods, network response—both natural and forced—and singularity functions in signal analysis. *Prerequisite:* Enrollment in Math 206 and Phys 221.

EE 206—ELECTRIC CIRCUITS II—3 cr. (3 and 0)

A continuation of EE 205 to include steady state A.C. circuit theory, magnetically coupled circuits and an introduction to complex frequency domain analysis. *Prerequisite:* EE 205 and enrollment in Math 208 and Phys 222.

EE 208—ELECTRICAL ENGINEERING LABORATORY I—1 cr. (0 and 2)

The first of a series of coordinated laboratory courses. Basic types of instruments, with accuracies and limitations examined. Good laboratory procedures are stressed, with experiments in electric circuits. *Prerequisite:* EE 205 and enrollment in EE 206.

EE 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

An introduction to digital computer programming for students majoring in Electrical Engineering. Emphasis is placed on the computer languages in use at Clemson University, and their application to the solution of simple problems in Electrical Engineering is placed on PL-1 and Fortran languages and their application to the solution of simple problems in Electrical Engineering. *Prerequisite:* Enrollment in EE 205.

EE 303—INTRODUCTION TO ELECTRICAL ENGINEERING—3 cr. (3 and 0)

Electric and magnetic circuits, phasor algebra as applied to A.C. circuits, machinery, electronics. For students in Industrial Education and Industrial Management. *Prerequisite:* Math 106, Phys 202 and 204.

EE 307—BASIC ELECTRICAL ENGINEERING—3 cr. (3 and 0)

Electrical engineering for students who need a strong background in the subject, but who are not planning to specialize in the field. A firm foundation in circuit theory is provided in this course. *Prerequisite:* Math 206, Phys 222 and 224.

EE 308—BASIC ELECTRICAL ENGINEERING—3 cr. (3 and 0)

A continuation of EE 307, with emphasis on electronics, instrumentation, and basic electromechanics. *Prerequisite:* EE 307.

EE 309—ELECTRICAL ENGINEERING LABORATORY—1 cr. (0 and 2)

A laboratory course designed to accompany EE 307. *Prerequisite:* EE 307 or enrollment in EE 307.

EE 310—ELECTRICAL ENGINEERING LABORATORY—1 cr. (0 and 2)

A laboratory course designed to accompany EE 308. *Prerequisite:* EE 308 or enrollment in EE 308.

EE 312—ELECTROMECHANICS—3 cr. (3 and 0)

A first course in electromechanical energy conversion with emphasis on similarities, basic ideas, and systems concepts of such devices. Consideration is given to both steady state and dynamic operation. *Prerequisite:* EE 208 and EE 323.

EE 314—ELECTRICAL ENGINEERING LABORATORY III—1 cr. (0 and 2)

More advanced laboratory work, with emphasis on electromechanics and network theory. *Prerequisite:* EE 325 and enrollment in EE 312 and EE 328.

EE 320—ELECTRONICS I—3 cr. (3 and 0)

Basic electronics. Includes principles of solid state and high-vacuum electronic devices, with some discussion of the physics involved as well as the circuitry. *Prerequisite:* EE 308, EE 310, or EE 206 and EE 208.

EE 323—ELECTRIC AND MAGNETIC FIELDS—3 cr. (3 and 0)

An introduction to classical electromagnetics, including potential theory, electrical properties of isotropic media, and Maxwell's equations. *Prerequisite:* Math 208, Phys 222, EM 101.

EE 324—ELECTRONICS II—3 cr. (3 and 0)

A continuation of EE 320. Small-signal amplifiers, large-signal amplifiers, amplifiers with negative feedback, oscillators, modulation and detection. *Prerequisite:* EE 320.

EE 325—ELECTRICAL ENGINEERING LABORATORY II—1 cr. (0 and 2)

Further laboratory problems, with examples chosen from the areas of circuits, fields and basic electronics. The analog computer is used as a tool by each student. *Prerequisite:* EE 206 and enrollment in EE 320, EE 323 and EE 327.

EE 326—ELECTRICAL ENGINEERING LABORATORY IV—1 cr. (0 and 2)

Laboratory problems associated with electronics and network theory. *Prerequisite:* EE 325 and enrollment in EE 324 and EE 328.

EE 327—NETWORK THEORY I—3 cr. (3 and 0)

Continuation of EE 206. Topics covered include signal analysis using Fourier series and integral methods, as well as Laplace transforms; polyphase circuits. *Prerequisite:* EE 206 and Junior standing.

EE 328—NETWORK THEORY II—3 cr. (3 and 0)

Continuation of EE 327. Some concepts of network synthesis are included along with a study of filters and transmission lines. Both lumped and distributed-constant systems are discussed. *Prerequisite:* EE 327.

EE 401—SEMINAR—1 cr. (1 and 0)

Discussions on topics from current scientific periodicals and on research and developments in industry. A library research paper is prepared as part of the course work. *Prerequisite:* Senior standing.

EE 402—ENGINEERING ANALYSIS—1 cr. (1 and 0)

The application of engineering principles and methods to the study of typical problems that arise in the various fields of electrical engineering. *Prerequisite:* EE 401 and Senior standing.

EE 403—ENERGY CONVERSION—3 cr. (3 and 0)

Various methods of energy conversion, both mechanical and non-mechanical. Fuel cells, magnetohydrodynamics, and other methods are discussed along with more conventional systems. *Prerequisite:* Approval of department head.

EE 405—SPECIAL PROBLEMS—Variable credit; maximum—3 cr.

Electrical Engineering problems assigned to the student according to his needs and capabilities. The purpose is to give students a chance to do projects, either theoretical or experimental, on subjects not covered thoroughly in other courses. *Prerequisite:* Approval of department head.

EE 409—ELECTRICAL ENGINEERING LABORATORY V—1 cr. (0 and 2)

A project-type laboratory with topics chosen from the fields of energy conversion, control systems, circuits and electronics. *Prerequisite:* Enrollment in EE 403 and EE 410.

EE 410—FEEDBACK CONTROL SYSTEMS—3 cr. (3 and 0)

Closed-loop control systems by use of the Laplace transform and transfer function methods. Root-locus, Nyquist, Bode, and Nichols diagrams are used. *Prerequisite:* EE 312 and Senior standing.

EE 419—ELECTRICAL MACHINERY LABORATORY—1 cr. (0 and 2)

A laboratory course designed to accompany EE 421. *Prerequisite:* Enrollment in EE 421.

EE 420—POWER SYSTEMS ANALYSIS—3 cr. (3 and 0)

Study of electric power system operation. Subjects covered include transmission lines, load-flow studies, economic dispatching, symmetrical components, fault calculations, and introduction to power system stability. *Prerequisite:* EE 312.

EE 421—ELECTRICAL MACHINERY—3 cr. (3 and 0)

Characteristics of D.C. and A.C. motors and generators, with emphasis on an understanding of the physical principles involved. *Prerequisite:* EE 312 and EE 314.

EE 425—INTRODUCTION TO THEORY AND DESIGN OF DIGITAL COMPUTERS—3 cr. (3 and 0)

A study of Boolean algebra and its application to the design of relay networks. Various logic circuits such as AND, OR, NOT, NAND and NOR are discussed along with the electronic devices used to perform these operations. Other topics include systematic minimization, codes, Boolean matrices, iterated and cascaded networks. *Prerequisite:* Senior standing in Electrical Engineering or permission of instructor.

EE 428—COMMUNICATIONS THEORY—3 cr. (3 and 0)

Basic theory of information and its time domain and frequency domain interpretations of AM, FM, and pulse modulation techniques. Introduction to noise and statistical techniques in communications systems. *Prerequisite:* EE 316 and EE 320.

EE 431—ELECTRONICS III—3 cr. (3 and 0)

Active and passive wave-shaping, memory, and switching circuits. *Prerequisite:* EE 324 and concurrent registration in EE 433.

EE 433—ELECTRONICS III LABORATORY—1 cr. (0 and 2)

A laboratory course designed to accompany EE 431. *Prerequisite:* Concurrent registration in EE 431.

EE 436—RADIATION AND WAVE PROPAGATION—3 cr. (3 and 0)

Electromagnetic waves, waveguides, and antennas. *Prerequisite:* EE 328.

EE 450—ANALOG, DIGITAL AND HYBRID COMPUTATION—3 cr. (3 and 0)

Formulation of problems for solution on analog and digital computers. Continuous and discrete variable systems are treated. Nonlinear problems are emphasized. Applications of operational amplifiers, logic networks and memory devices to instrumentation and data handling problems are also discussed. *Prerequisite:* EE 410 or approval of instructor.

EE 703—ENERGY CONVERSION—3 cr. (3 and 0)

EE 709—ELECTRICAL ENGINEERING LABORATORY V—1 cr. (0 and 2)

EE 710—FEEDBACK CONTROL SYSTEMS—3 cr. (3 and 0)

EE 719—ELECTRICAL MACHINERY LABORATORY—1 cr. (0 and 2)

EE 720—POWER SYSTEM ANALYSIS—3 cr. (3 and 0)

EE 721—ELECTRICAL MACHINERY—3 cr. (3 and 0)

EE 725—INTRODUCTION TO THEORY AND DESIGN OF DIGITAL SYSTEMS—3 cr. (3 and 0)

EE 728—COMMUNICATIONS THEORY—3 cr. (3 and 0)

EE 731—ELECTRONICS III—3 cr. (3 and 0)

EE 733—ELECTRONICS III LABORATORY—1 cr. (0 and 2)

EE 736—RADIATION AND WAVE PROPAGATION—3 cr. (3 and 0)

EE 750—ANALOG, DIGITAL AND HYBRID COMPUTATION—3 cr. (3 and 0)

EE 801—INTRODUCTION TO LINEAR SYSTEMS ANALYSIS I—3 cr. (3 and 0)

EE 802—ANALYSIS OF LINEAR SYSTEMS II—3 cr. (3 and 0)

EE 803—SEMINAR—1 cr. (1 and 0)

EE 804—NETWORK ANALYSIS AND SYNTHESIS I—3 cr. (3 and 0)

EE 805—NETWORK ANALYSIS AND SYNTHESIS II—3 cr. (3 and 0)

EE 806—NONLINEAR NETWORKS AND SYSTEMS I—3 cr. (3 and 0)

EE 807—POWER SYSTEM STABILITY—3 cr. (3 and 0)

EE 810—MODERN CONTROL THEORY I—3 cr. (3 and 0)

EE 811—MODERN CONTROL THEORY II—3 cr. (3 and 0)

EE 812—SAMPLED DATA SYSTEMS—3 cr. (3 and 0)

EE 814—NONLINEAR AUTOMATIC CONTROLS—3 cr. (3 and 0)

EE 815—RANDOM DATA MEASUREMENTS AND ANALYSIS—3 cr. (3 and 0)

EE 820—THEORY OF COMMUNICATIONS I—3 cr. (3 and 0)

- EE 821—THEORY OF COMMUNICATIONS II—3 cr. (3 and 0)
- EE 822—INFORMATION THEORY—3 cr. (3 and 0)
- EE 823—ELECTRONIC CIRCUITS—3 cr. (3 and 0)
- EE 824—ELECTRONIC CIRCUITS LABORATORY—1 cr. (0 and 2)
- EE 825—SOLID-STATE ELECTRONICS—3 cr. (3 and 0)
- EE 826—INTEGRATED CIRCUIT DESIGN—3 cr. (3 and 0)
- EE 827—INSTRUMENTATION AND MEASUREMENTS—3 cr. (3 and 0)
- EE 828—PULSE TECHNIQUES—3 cr. (3 and 0)
- EE 829—PULSE TECHNIQUES LABORATORY—1 cr. (0 and 2)
- EE 830—ELECTROMAGNETICS I—3 cr. (3 and 0)
- EE 831—ELECTROMAGNETICS II—3 cr. (3 and 0)
- EE 832—ANTENNA THEORY I—3 cr. (3 and 0)
- EE 833—ANTENNA THEORY II—3 cr. (3 and 0)
- EE 834—MICROWAVE ELECTRONICS—3 cr. (3 and 0)
- EE 836—OPTICAL ELECTROMAGNETICS AND QUANTUM ELECTRONICS—3 cr. (3 and 0)
- EE 845—SELECTED TOPICS IN ELECTRICAL ENGINEERING—3 cr. (3 and 0)
- EE 850—COMPUTATION AND SIMULATION—3 cr. (3 and 0)
- EE 851—THEORY AND DESIGN OF DIGITAL-ANALOG-MACHINES—3 cr. (3 and 0)
- EE 852—DIGITAL COMPUTERS AND INFORMATION PROCESSING—3 cr. (3 and 0)
- EE 860—ENGINEERING APPLICATION OF OPTIMIZATION—3 cr. (3 and 0)
- EE 861—FOUNDATION AND METHODOLOGY OF SYSTEMS ENGINEERING—3 cr. (3 and 0)
- EE 863—ADVANCED PHYSICAL SYSTEMS ANALYSIS I—3 cr. (3 and 0)
- EE 864—ADVANCED PHYSICAL SYSTEMS ANALYSIS II—3 cr. (3 and 0)
- EE 870—BIOSYSTEMS ANALYSIS—3 cr. (3 and 0)
- EE 890—SELECTED TOPICS IN ELECTRICAL ENGINEERING—3 cr. (3 and 0)
- EE 891—RESEARCH—3 cr.

ENGINEERING

ENGR 101—ENGINEERING SYSTEMS—Non-Credit (1 and 0)

A series of lectures outlining the role and scope of engineering in service to mankind. Emphasis is placed on the difference between science and engineering, the emerging role of engineering in new technology, the important technological needs of mankind, and the importance of the humanities and social studies to the engineer.

ENGINEERING GRAPHICS

Professor: E. LAITALA, *Head*

Associate Professors: B. E. DUNKLE, A. F. HAMMOND, L. H. JAMESON, C. M. McHUGH, R. L. PERRY

Assistant Professors: C. W. CARTER, C. D. MEEKS

Instructor: D. A. RIGGS

EG 101—FREEHAND SKETCHING—1 cr. (0 and 3)

Principles of technical sketching, including the development of skills in technical lettering and freehand orthographic and pictorial drawing.

EG 103—ENGINEERING COMMUNICATIONS—3 cr. (1 and 6)

The role of engineering communication in engineering and management. Graphic communication includes lettering, sketching, orthographic projection, auxiliary projection, sections and conventional practices, dimensioning, working drawings. Architectural drawing, charts and graphs, presentation techniques. Manufacturing philosophy; interrelation between product design and production processes. For Industrial Management majors.

EG 104—ENGINEERING COMMUNICATION AND DESIGN—2 cr. (0 and 6)

The role of engineering communication from the manager's point of view. Working drawings relating product design and production processes. Architectural drawing, nomography, charts and graphs, presentation techniques. *Prerequisite:* EG 109 or consent of instructor.

EG 105—ENGINEERING GRAPHICS—2 cr. (0 and 6)

A course in graphical communication. Freehand sketching, orthographic and auxiliary projection, sectional views, and conventional practices, dimensioning, reading drawings.

EG 109—ENGINEERING COMMUNICATION AND DESIGN—3 cr. (1 and 6)

Graphical, written, and verbal means of communicating ideas and information in engineering with emphasis on graphical methods of developing and transmitting ideas. The role of graphics in the conceptualization and evolution of a design.

EG 201—ENGINEERING GRAPHICS FOR INDUSTRIAL EDUCATION—3 cr. (1 and 6)

A comprehensive study of Engineering Graphics fundamentals. The course includes lettering, use of instruments, technical sketching, multi-viewing drawing, auxiliary projection, descriptive geometry, sectional views, dimensioning, fasteners, detail and assembly drawings.

EG 202—GRAPHICAL TECHNOLOGY FOR INDUSTRIAL EDUCATION—3 cr. (1 and 6)

Continuation of EG 201 with emphasis on depth in graphical communication. Working drawings to include detail and assembly drawings. Intersections and developments. Specifications, standards. Architectural drawings. Production illustration, pedagogy of graphics, pragmatic and creative design. *Prerequisite:* EG 201.

EG 302—GRAPHICAL COMPUTATION—2 cr. (1 and 3)

Graphic layouts of empirical equations. The application of graphical solution of equations, nomography, and the graphical calculus to the solution of problems in engineering and science. Graphical solution of differential equations. *Prerequisite:* EG 109, Math 106 or equivalent.

ENGINEERING MANAGEMENT

Professors: C. C. DAVIS, W. D. TREVILLIAN

Associate Professors: S. O. PARK, B. J. TODD, C. H. WHITEHURST, JR.

Assistant Professors: N. K. KWAK, C. O. SHULER, J. M. WANNAMAKER

Visiting Lecturer: F. R. GRAY

EMGT 910—SEMINAR IN PRODUCTION MANAGEMENT—2 cr. (2 and 0)

EMGT 911—SEMINAR IN DECISION THEORY—2 cr. (2 and 0)

EMGT 912—SEMINAR IN FINANCE—3 cr. (3 and 0)

EMGT 913—SYSTEMS ANALYSIS—3 cr. (3 and 0)

EMGT 991—DOCTORAL RESEARCH—Credit to be arranged.

ENGINEERING MECHANICS

Professor: R. W. MOORMAN, *Head*

Associate Professors: N. R. BAULD, JR., A. G. LAW, R. F. NOWACK, M. K. RICHARDSON

Assistant Professors: W. E. CASTRO, J. G. GOREE, C. R. MITCHELL, P. B. ZIELINSKI

Part-Time Instructor: J. D. HARLEY

EM 201—ENGINEERING MECHANICS (STATICS)—3 cr. (3 and 0)

Forces and force systems and their external effect on bodies; principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. *Prerequisite:* Phys 122 or Phys 211, concurrent registration in Math 206.

EM 202—ENGINEERING MECHANICS (DYNAMICS)—3 cr. (3 and 0)

A continuation of EM 201. The principal topics are kinematics and kinetics of particles and bodies of finite size. Techniques of vector mathematics are employed. *Prerequisite:* EM 201, Math 206.

EM 304—MECHANICS OF MATERIALS—3 cr. (3 and 0)

The relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important physical properties of engineering materials. *Prerequisite:* EM 201 and Math 206.

EM 305—MECHANICS OF MATERIALS LABORATORY—1 cr. (0 and 3)

Theoretical relationships considered in EM 304 are verified. Students observe the behavior under load and the failure of engineering materials; identify and evaluate physical properties of materials important to design and manufacturing processes; and are acquainted with various testing methods, testing machines, and instruments. *Prerequisite:* Must be accompanied or preceded by EM 304.

EM 320—FLUID MECHANICS—3 cr. (3 and 0)

The behavior of fluids at rest or in motion. Emphasis is placed upon a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. *Prerequisite:* EM 202.

EM 322—FLUID MECHANICS LABORATORY—1 cr. (0 and 3)

The principles developed in EM 320 are verified and demonstrated. Familiarization with orderly techniques in organizing and reporting results of experimental investigations and with the use of instruments and equipment is afforded. *Prerequisite:* Must be accompanied or preceded by EM 320.

EM 420—HYDRAULIC ENGINEERING—3 cr. (3 and 0)

Elements of hydrology and the application of principles of fluid mechanics to engineering problems. Topics included are open channel flow; flow in conduits under pressure; hydraulic machinery; and the broad principles of planning reservoirs, water supply systems, dams, spillways, and other hydraulic works. *Prerequisite:* EM 320.

EM 450—MECHANICAL VIBRATIONS—3 cr. (3 and 0)

Basic theory of mechanical vibrations with applications to problems including those of free vibrations with and without damping; forced vibrations, systems of one, two, and many degrees of freedom. *Prerequisite:* EM 202, EM 304, and Math 306 or Math 208.

EM 470—EXPERIMENTAL STRESS ANALYSIS—3 cr. (2 and 3)

Experimental analysis of stress fields and determination of maximum principal stresses in deformable bodies. Emphasis is on the theoretical consideration in the reduction of data as well as the obtaining of data. Methods studied include photoelasticity, electrical resistance strain gages, brittle lacquer, and birefringent coatings. *Prerequisite:* EM 304 and permission of instructor.

EM 720—HYDRAULIC ENGINEERING—3 cr. (3 and 0)

EM 750—MECHANICAL VIBRATIONS—3 cr. (3 and 0)

EM 770—EXPERIMENTAL STRESS ANALYSIS—3 cr. (2 and 3)

EM 801—EXPERIMENTAL STRESS ANALYSIS—ADVANCED—3 cr. (2 and 3)

EM 821—CONTINUUM MECHANICS—3 cr. (3 and 0)

EM 823—DIMENSIONAL ANALYSIS AND DYNAMIC SIMILARITY—3 cr. (3 and 0)

EM 825—ADVANCED MECHANICS OF MATERIALS—3 cr. (3 and 0)

EM 827—TOPICS IN ANALYTICAL MECHANICS—3 cr. (3 and 0)

EM 829—ENERGY METHODS AND VARIATIONAL PRINCIPLES—3 cr. (3 and 0)

EM 831—THEORY OF ELASTICITY I—3 cr. (3 and 0)

EM 832—THEORY OF ELASTICITY II—3 cr. (3 and 0)

EM 834—THEORY OF ELASTIC STABILITY—3 cr. (3 and 0)

EM 845—INTERMEDIATE DYNAMICS—3 cr. (3 and 0)

EM 851—FLUID DYNAMICS—3 cr. (3 and 0)

EM 852—THEORY OF IDEAL FLUID FLOW—3 cr. (3 and 0)

EM 853—THEORY OF VISCOUS FLUID FLOW—3 cr. (3 and 0)

EM 856—FLOW IN OPEN CHANNELS—3 cr. (3 and 0)

EM 889—SEMINAR—0 or 1 cr. (1 and 0)

EM 890—SEMINAR—0 or 1 cr. (1 and 0)

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EM 891—RESEARCH—Credit to be arranged.

EM 932—THEORY OF PLASTICITY—3 cr. (3 and 0)

EM 980—SPECIAL TOPICS IN MECHANICS—3 cr. (3 and 0)

EM 981—SPECIAL TOPICS IN MECHANICS—3 cr. (3 and 0)

EM 982—SPECIAL TOPICS IN MECHANICS—3 cr. (3 and 0)

EM 983—SPECIAL TOPICS IN MECHANICS—3 cr. (3 and 0)

EM 991—DOCTORAL RESEARCH—Credit to be arranged.

ENGLISH

Professors: R. J. CALHOUN, H. M. COX, *Head*; C. B. GREEN, M. A. OWINGS

Associate Professors: C. O. CASKEY, A. J. FEAR, H. M. FELDER, JR., C. GUM, HARRIET R. HOLMAN, A. H. HOLT, C. M. MCGEE, JR., M. S. STEADMAN, JR., C. H. WATSON, M. B. WILSON, JR., J. P. WINTER

Assistant Professors: H. B. BRYANT, T. E. DOUGLASS, J. C. DUVAL, H. B. HANNAH, L. L. HENRY, J. L. IDOL, JR., C. W. JENNINGS, N. L. OLSEN, JR., CORRINE H. SAWYER, J. B. SIMMS, B. N. SKARDON, R. T. SORRELLS, M. O. USREY, E. P. WILLEY

Instructors: OTTIE W. ARRINGTON, MARIE I. BINSSE, W. V. BOST, JOAN T. CROSS, R. L. CROSS, VIRGINIA L. GANIM, D. N. GRIFFIN, R. B. HEATON, JR., R. W. HILL, C. M. ISRAEL

ENGL 101—ENGLISH COMPOSITION—3 cr. (3 and 0)

Training in correct and effective expression.

ENGL H101—ENGLISH COMPOSITION—3 cr. (3 and 0)

Honors section of Engl 101; admission by invitation.

ENGL 102—ENGLISH COMPOSITION—3 cr. (3 and 0)

Continued emphasis on correct and effective expression; training in the organization and writing of various types of expository and semi-technical papers, including the research report. *Prerequisite:* Engl 101.

ENGL H102—ENGLISH COMPOSITION—3 cr. (3 and 0)

Honors section of Engl 102; admission by invitation

ENGL 111—ENGLISH FOR FOREIGN STUDENTS—3 cr. (5 and 0)

A special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examinations in oral English.

ENGL 203—A SURVEY OF ENGLISH LITERATURE—3 cr. (3 and 0)

Chief British authors and works from Beowulf through the Romantic period; continued emphasis on composition. *Prerequisite:* Engl 102.

ENGL H203—SURVEY OF ENGLISH LITERATURE—3 cr. (3 and 0)

Honors section of Engl 203; admission by invitation.

ENGL 204—A SURVEY OF ENGLISH AND AMERICAN LITERATURE—3 cr.
(3 and 0)

Chief British authors and works from the Victorian period to the present time, and selected readings from American literature. Proficiency in composition must be demonstrated. *Prerequisite:* Engl 203.

ENGL H204—SURVEY OF ENGLISH AND AMERICAN LITERATURE—3 cr.
(3 and 0)

Honors section of Engl 204; admission by invitation.

ENGL 217—VOCABULARY BUILDING—3 cr. (3 and 0)

Development of a useful, discriminating vocabulary for writing, speaking, and reading. Student notebooks and proficiency quizzes. *Prerequisite:* Engl 101 and 102.

ENGL 221—THE CLASSICS IN TRANSLATION—3 cr. (3 and 0)

An examination of the whole of the *The Iliad*, *The Odyssey*, *Hesiod's Theogony*, *The Aeneid*, *The Metamorphoses*, Apuleius's *The Golden Ass*, and selections from Herodotus and Tacitus. *Prerequisite:* Engl 101, 102.

ENGL 223—CONTINENTAL FICTION IN TRANSLATION—3 cr. (3 and 0)

Selected fiction of the European masters, primarily Russian, French, German, and Spanish. *Prerequisite:* Engl 101, 102.

ENGL 231—INTRODUCTION TO JOURNALISM—3 cr. (3 and 0)

Instruction and practice in writing for mass media; editorial responsibilities. *Prerequisite:* Engl 102.

ENGL 300—JOURNALISM WORKSHOP—1 cr. (1 and 0)

Responsibilities and duties of students editing uncensored publications; criticism of student publications. Open only to members of publication staffs. *Prerequisite:* Engl 102.

ENGL 301—PUBLIC SPEAKING—3 cr. (3 and 0)

Practical training in public speaking; attention to diction, voice, and platform presence; an introduction to parliamentary procedure; practice in writing and delivering short speeches. *Prerequisite:* Engl 203 and 204.

ENGL 303—VOICE AND DICTION—3 cr. (3 and 0)

Practical training in speech, with emphasis on clarity, vocal variety, and tone quality.

ENGL 304—ADVANCED COMPOSITION—3 cr. (3 and 0)

Supervised writing for students of advanced standing, each student undertaking projects according to his interest; some attention to reports, business letters, research methods and materials. Weekly papers and some longer exercises. Limited enrollment. *Prerequisite:* Engl 203 and 204.

ENGL 305—ORAL INTERPRETATION OF LITERATURE—3 cr. (3 and 0)

Analysis and oral interpretation of selected poetry and prose; training in development of effective tone production. *Prerequisite:* Engl 101, 102.

ENGL 306—DEBATING—1 cr. (1 and 0)

The application of debating to contemporary problems. May be repeated until a maximum of three credits has been earned. *Prerequisite:* Permission of the instructor.

ENGL 311—THEATRE LABORATORY—1 cr. (0 and 3)

Participation in theatre production including stage management, direction, costume, makeup, lighting, sound, scenery, and business management. No formal class meetings. One credit. May be repeated for a total of three credits. *Prerequisite:* Sophomore standing and permission of the instructor.

ENGL 331—CREATIVE WRITING—3 cr. (3 and 0)

The technique of non-expository writing—narration, description, dramatization. *Prerequisite:* Permission of the instructor.

ENGL 332—CREATIVE WRITING—3 cr. (3 and 0)

A continuation of Engl 331.

ENGL 333—THE STRUCTURE OF FICTION—3 cr. (3 and 0)

A study of the short story, the novella, and the novel from the writer's point of view. *Prerequisite:* Permission of the instructor.

ENGL 351—CHILDREN'S LITERATURE—3 cr. (3 and 0)

Wide reading in prose and verse suitable for children. *Prerequisite:* Engl 203 and 204.

ENGL 402—THE ENGLISH LANGUAGE—3 cr. (3 and 0)

Studies in English usage and the historical development of the language. *Prerequisite:* Engl 203 and 204.

ENGL 405—SHAKESPEARE—3 cr. (3 and 0)

A selective study of Shakespeare's plays with attention to his development as a dramatist. *Prerequisite:* Engl 203 and 204.

ENGL 406—SHAKESPEARE—3 cr. (3 and 0)

A continuation of Engl 405. *Prerequisite:* Engl 203 and 204.

ENGL 409—CHAUCER—3 cr. (3 and 0)

Chaucer as an artist; the "Prologue" for historical and linguistic orientation; "The Canterbury Tales," "House of Fame," "Parliament of Fowls," and "Troilus and Criseyde" as art forms. *Prerequisite:* Engl 203 and 204.

ENGL 415—INTRODUCTION TO DRAMA—3 cr. (3 and 0)

Principles and progress of drama from Aeschylus to Ibsen, analysis of representative plays; critical reports; classroom reading of great scenes. *Prerequisite:* Engl 203 and 204.

ENGL 416—INTRODUCTION TO DRAMA—3 cr. (3 and 0)

Principles and progress of drama from Ibsen to the present; analysis of representative plays; critical reports; classroom reading of great scenes; discussion of important aspects of modern drama. *Prerequisite:* Engl 203 and 204.

ENGL 423—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)

The colonial period to the Civil War, with emphasis on major authors. *Prerequisite:* Engl 203 and 204.

ENGL 424—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)

From the Civil War to the present, with emphasis upon major authors. *Prerequisite:* Engl 203 and 204.

ENGL 425—THE ROMANTIC REVIVAL—3 cr. (3 and 0)

The eighteenth-century forerunners of Romanticism; Wordsworth, Coleridge, Byron, Shelley, Keats; the essayists. *Prerequisite:* Engl 203 and 204.

ENGL 427—VICTORIAN POETRY AND PROSE—3 cr. (3 and 0)

Representative works from the prose and poetry of Victorian writers; consideration of English intellectual, social, and political life of the period. *Prerequisite:* Engl 203 and 204.

ENGL 431—THE RESTORATION AND EIGHTEENTH CENTURY—3 cr. (3 and 0)

Readings in Dryden, Swift, Pope, and Dr. Johnson. *Prerequisite:* Engl 203 and 204.

ENGL 435—SOUTHERN LITERATURE—3 cr. (3 and 0)

The intellectual and literary achievement of the South from 1607 to the present, with emphasis upon the writers of the nineteenth century. *Prerequisite:* Engl 203 and 204.

ENGL 436—MILTON AND HIS AGE—3 cr. (3 and 0)

The development of Milton's thought and art in relation to his times and to the writings of his contemporaries. *Prerequisite:* Engl 203 and 204.

ENGL 437—THE ENGLISH NOVEL—3 cr. (3 and 0)

A critical and historical study of the English novel from Defoe to Jane Austen. *Prerequisite:* Engl 203 and 204.

ENGL 438—TWENTIETH CENTURY POETRY—3 cr. (3 and 0)

The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. *Prerequisite:* Engl 203 and 204.

ENGL 439—TWENTIETH CENTURY FICTION—3 cr. (3 and 0)

American and British novelists and short story writers of the twentieth century. *Prerequisite:* Engl 203 and 204.

ENGL 440—APPLIED LITERARY CRITICISM—3 cr. (3 and 0)

Major critical approaches to literature, in theory and practice, from Aristotle to the present. *Prerequisite:* Engl 203 and 204.

ENGL 441—A SURVEY OF WORLD LITERATURE I—3 cr. (3 and 0)

Translations from the Hellenic, Hebraic, and Oriental worlds, with emphasis on major authors. *Prerequisite:* Engl 203 and 204.

ENGL 442—A SURVEY OF WORLD LITERATURE II—3 cr. (3 and 0)

Translations from the Medieval, Renaissance and Modern worlds, with emphasis on major authors. *Prerequisite:* Engl 203 and 204.

ENGL 443—SEVENTEENTH CENTURY POETRY AND PROSE—3 cr. (3 and 0)

A survey of British authors of the seventeenth century other than Shakespeare and Milton.

ENGL 445—RENAISSANCE NON-DRAMATIC LITERATURE—3 cr. (3 and 0)

Tudor and Elizabethan poetry, prose fiction, translations, essays, and criticism. *Prerequisite:* Engl 204.

ENGL 447—THE AMERICAN NOVEL—3 cr. (3 and 0)

A survey of the most significant forms and themes of the American novel from its beginnings to 1920. *Prerequisite:* Engl 203 and 204.

ENGL H470—SENIOR DIVISION HONORS ENGLISH—3 cr. (3 and 0)

An intensive study of a period, topic, genre, or figure. Papers, reports, reading list, examination. *Prerequisite:* Engl 203, 204 or H203, H204 and

approval of the Honors Council. May be repeated by arrangement with the Department for a total of twelve credits.

ENGL 481—DIRECTED READING—1, 2, or 3 cr. (1, 2, or 3 and 0)

Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. May be repeated for a maximum of six credits. *Prerequisite:* Engl 203, 204 or H203, H204. and invitation of the department.

ENGL 651—CHILDREN'S LITERATURE—3 cr. (3 and 0)

ENGL 702—THE ENGLISH LANGUAGE—3 cr. (3 and 0)

ENGL 705—SHAKESPEARE—3 cr. (3 and 0)

ENGL 706—SHAKESPEARE—3 cr. (3 and 0)

ENGL 709—CHAUCER—3 cr. (3 and 0)

ENGL 715—DRAMA—3 cr. (3 and 0)

ENGL 716—DRAMA—3 cr. (3 and 0)

ENGL 723—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)

ENGL 724—A SURVEY OF AMERICAN LITERATURE—3 cr. (3 and 0)

ENGL 725—THE ROMANTIC REVIVAL—3 cr. (3 and 0)

ENGL 727—VICTORIAN POETRY AND PROSE—3 cr. (3 and 0)

ENGL 731—THE RESTORATION AND EIGHTEENTH CENTURY—3 cr. (3 and 0)

ENGL 735—SOUTHERN LITERATURE—3 cr. (3 and 0)

ENGL 736—MILTON AND HIS AGE—3 cr. (3 and 0)

ENGL 737—THE ENGLISH NOVEL—3 cr. (3 and 0)

ENGL 738—TWENTIETH CENTURY POETRY—3 cr. (3 and 0)

ENGL 739—TWENTIETH CENTURY FICTION—3 cr. (3 and 0)

ENGL 740—APPLIED LITERARY CRITICISM—3 cr. (3 and 0)

ENGL 741—A SURVEY OF WORLD LITERATURE—3 cr. (3 and 0)

ENGL 742—A SURVEY OF WORLD LITERATURE—3 cr. (3 and 0)

ENGL 743—SEVENTEENTH CENTURY POETRY AND PROSE—3 cr. (3 and 0)

ENGL 745—RENAISSANCE NON-DRAMATIC LITERATURE—3 cr. (3 and 0)

ENGL 747—THE AMERICAN NOVEL—3 cr. (3 and 0)

ENGL 803—SEMINAR—3 cr. (3 and 0)

ENGL 805—SEMINAR—3 cr. (3 and 0)

ENGL 890—INTRODUCTION TO RESEARCH—1 cr. (1 and 0)

ENGL 891—RESEARCH—Credit to be arranged.

ENTOMOLOGY

Professors: J. H. COCHRAN, *Head*; E. W. KING,* J. K. REED

Associate Professors: T. R. ADKINS, JR., R. C. FOX, A. S. TOMBES, R. E. WARE

Assistant Professors: S. B. HAYS, L. E. PRIESTER, JR.

Instructor: R. F. NASH

ENT 301—ELEMENTARY AND ECONOMIC ENTOMOLOGY—3 cr. (2 and 3) F, S

A general introduction to Entomology with emphasis on anatomy, metamorphosis, life-histories of our most important species and methods of control. *Prerequisite:* Zool 101 and 103.

ENT 305—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3)

F, '69 and alternate years.

Identification and life-histories of injurious insects; their damage, and control measures. Common pests of the following are studied: cotton, corn, small grains, legume field crops, tobacco, sugar cane, stored grain and seed, livestock and man. *Prerequisite:* Zool 101, 103 and Ent 301.

ENT 306—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3)

S, '70 and alternate years.

Insecticide and other control measures for insects. This is followed by detailed study of habits, life-histories and approved control measures for insect pests of all fruit and vegetable crops. *Prerequisite:* Zool 101, 103 and Ent 301.

ENT 307—FOREST ENTOMOLOGY—3 cr. (2 and 3) F

Insects of economic importance to forests, forest products and shade trees, and their role in the practice of good forest management as well as their significance in the natural environment.

ENT 308—APICULTURE—3 cr. (2 and 3)

A detailed study of the honey bee and its economic importance in pollination and honey production. Attention will be given to bee behavior, colony management, equipment, honey plant identification, and honey production and processing. *Prerequisite:* Zool 101, 103 and permission of the instructor.

ENT 405—INSECT MORPHOLOGY—4 cr. (3 and 3) F

A study of insect structure in relation to function and of the variation of form in insects. *Prerequisite:* Ent 301.

ENT 408—GENERAL AND TAXONOMIC ENTOMOLOGY—5 cr. (3 and 6)

S, '69 and alternate years.

Lecture material includes a review of the bionomics of the principal families of insects. Laboratory work consists of practice in the identification of adults of the principal families in the major orders. *Prerequisite:* Zool 101, 103, Ent 301; Ent 405 desirable.

ENT 455—MEDICAL AND VETERINARY ENTOMOLOGY—3 cr. (2 and 3) S

Insects and their arthropod relatives which are of considerable economic importance in their effect on man and animals.

* On leave.

ENT 461—SEMINAR—1 cr. (1 and 0) F

Students review the principal journals pertaining to insects and related animals; also review the lives and activities of prominent pioneer entomologists.
Prerequisite: Zool 101, 103; Ent 301.

ENT 462—SEMINAR—1 cr. (1 and 0) S

Continuation of Ent 461.

ENT 468—INTRODUCTION TO RESEARCH—2 cr. (1 and 3) S

Principles, developments and changes in research methods related to certain fields of biological and agricultural research. The students obtain practice in experimental techniques, scientific writing and the use and maintenance of various research instruments and equipment.

ENT 605—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3)

ENT 606—ECONOMIC ENTOMOLOGY—3 cr. (2 and 3)

ENT 705—INSECT MORPHOLOGY—4 cr. (3 and 3)

ENT 708—GENERAL AND TAXONOMIC ENTOMOLOGY—5 cr. (3 and 6)

ENT 755—MEDICAL AND VETERINARY ENTOMOLOGY—3 cr. (2 and 3)

ENT 761—SEMINAR—1 cr. (1 and 0)

ENT 762—SEMINAR—1 cr. (1 and 0)

ENT 768—INTRODUCTION TO RESEARCH—2 cr. (1 and 3)

ENT 808—TAXONOMY OF IMMATURE INSECTS—3 cr. (1 and 6)

ENT 856—MEDICAL ENTOMOLOGY—3 cr. (2 and 3)

ENT 860—PRINCIPLES OF INSECT CONTROL—3 cr. (3 and 0)

ENT 861—INSECT TOXICOLOGY—3 cr. (2 and 3)

ENT 862—INSECT PHYSIOLOGY—3 cr. (2 and 3)

ENT 863—SPECIAL PROBLEMS IN ENTOMOLOGY—3 to 6 cr.

ENT 890—RESEARCH TECHNIQUES IN AGRICULTURE—3 cr. (2 and 3)

ENT 891—RESEARCH—Credit to be arranged.

ENT 991—DOCTORAL RESEARCH—Credit to be arranged.

ENVIRONMENTAL HEALTH

Associate Professor: R. F. BORGMAN, *Program Director*

ENH 871—ENVIRONMENTAL HEALTH—3 cr. (3 and 0)

ENH 893—ENVIRONMENTAL HEALTH SEMINAR I—1 cr. (1 and 0)

ENH 894—ENVIRONMENTAL HEALTH SEMINAR II—1 cr. (1 and 0)

ENVIRONMENTAL SYSTEMS ENGINEERING

Professor: J. F. ANDREWS, *Program Director*

ESE 743—ENVIRONMENTAL ENGINEERING CHEMISTRY I—2 cr. (2 and 0)

ESE 744—ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY I—
2 cr. (0 and 6)

- ESE 842—SANITARY ENGINEERING PROCESSES—3 cr. (3 and 0)
 ESE 843—UNIT OPERATIONS OF SANITARY ENGINEERING—3 cr. (3 and 0)
 ESE 846—POLLUTION OF THE AQUATIC ENVIRONMENT—3 cr. (2 and 3)
 ESE 848—ENVIRONMENTAL ENGINEERING CHEMISTRY II—2 cr. (2 and 0)
 ESE 849—ENVIRONMENTAL ENGINEERING CHEMISTRY LABORATORY II—
 2 cr. (1 and 3)
 ESE 850—ENVIRONMENTAL ENGINEERING MICROBIOLOGY—3 cr. (2 and 3)
 ESE 851—UNIT OPERATIONS AND PROCESSES LABORATORY—2 cr. (1 and 3)
 ESE 852—WATER AND WASTE TREATMENT SYSTEMS—2 cr. (1 and 3)
 ESE 853—ADVANCED UNIT OPERATIONS AND PROCESSES—3 cr. (2 and 3)
 ESE 854—WATER AND WASTE TRANSPORT SYSTEMS—3 cr. (3 and 0)
 ESE 855—SOLID WASTES—3 cr. (3 and 0)
 ESE 861—ENVIRONMENTAL SYSTEMS ENGINEERING SEMINAR—0 cr.
 (1 and 0)
 ESE 873—RADIOLOGICAL HEALTH—3 cr. (2 and 3)
 ESE 874—RADIOLOGICAL HEALTH ENGINEERING—3 cr. (2 and 3)
 ESE 881—SPECIAL PROBLEMS—1 to 4 cr.
 ESE 883—SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING—3 cr.
 (3 and 0)
 ESE 884—SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING—3 cr.
 (3 and 0)
 ESE 891—RESEARCH—1-6 cr.
 ESE 991—DOCTORAL RESEARCH—1-18 cr.

EXPERIMENTAL STATISTICS

Professor: W. P. BYRD

Assistant Professors: W. E. JOHNSTON, J. S. LYTLE

Ex St 401—INTRODUCTORY STATISTICS—3 cr. (2 and 3) F, S, SS

An elementary course dealing with the basic concepts and methods of statistical inference; the organization and presentation of data, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. The role of statistics in interpreting research, and the general application of the methods are stressed.

Ex St 462—STATISTICS APPLIED TO ECONOMICS—3 cr. (3 and 0) S

Statistical methods used in the collection, analysis, presentation and interpretation of economic data. Special attention is given to time series analysis, the construction of index numbers and the designing of samples for surveys in the social science fields. *Prerequisite:* Ex St 401.

Ex St 701—INTRODUCTORY STATISTICS—3 cr. (2 and 3)

Ex St 762—STATISTICS APPLIED TO ECONOMICS—3 cr. (3 and 0)

Ex St 801—STATISTICAL METHODS—4 cr. (3 and 3)

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Ex St 803—REGRESSION AND LEAST SQUARES ANALYSIS—3 cr. (3 and 0)

Ex St 804—SAMPLING—3 cr. (3 and 0)

Ex St 805—DESIGN AND ANALYSIS OF EXPERIMENTS—3 cr. (3 and 0)

FOOD SCIENCE

Professors: J. H. MITCHELL, JR., A. L. SHEWELT

Associate Professors: W. C. MICKELBERRY, W. P. WILLIAMS, *Head*

Fd Sc 301—RAW MATERIALS FOR FOOD PROCESSING—3 cr. (2 and 3)
F, '69 and alternate years.

Lectures, reference reading, and laboratory work are devoted to fruits, vegetables, cereal grains, oil seeds, and sugar crops important to the food processing industry. Commercial growing areas, maturity characteristics, effects of harvesting and handling on quality, storage of raw materials, quality grading, and government standards are covered. *Prerequisite:* Bot 101.

Fd Sc 303—ELEMENTS OF FOOD SCIENCE—3 cr. (3 and 0)
F, '69 and alternate years.

Lectures and reference reading are devoted to the principles of such food preservation methods as refrigerated storage, freezing, canning, fermentation, pickling, concentration and food additives. *Prerequisite:* Ch 220 or 223 and 227 and Phys 201 and 203, or permission of instructor.

Fd Sc 304—FOOD PROCESSING—3 cr. (1 and 6) S, '70 and alternate years.

Lectures are devoted to the fundamentals and technology of canning, freezing, dehydration, and types of pack. The essentials of factory quality control are discussed. Laboratory work introduces the student to processing equipment. Canning, freezing, dehydration, and fermentation operations relating to fruits and vegetables are conducted. Subjective and objective quality tests are made, and quality grading is conducted according to government standards. *Prerequisite:* Fd Sc 303 or permission of instructor.

Fd Sc 401—ELEMENTS OF FOOD SCIENCE—3 cr. (3 and 0)
F, '68 and alternate years.

Lectures and reference reading are devoted to the principles of food preservation by dehydration, and to the processing of cereal grains, dairy products, meats, confectionary, tea, coffee, and spices. Some principles of sanitation, waste disposal, and quality control will be discussed. *Prerequisite:* Ch 220 or Ch 223 and 227 and Phys 201 and 203, or permission of instructor.

Fd Sc 403—BIOCHEMISTRY OF FOODS—3 cr. (2 and 3)
F, '69 and alternate years.

Biochemical and enzymatic phenomena in relation to the color, flavor, texture and nutritional value of foods. Biosynthesis of pectins, tannins, pigments, and essential oils as well as photosynthetic mechanisms in food production. Changes in biochemical patterns during processing and storage of food. Techniques for the isolation and quantitative determination of biochemical constituents of foods. *Prerequisite:* Ch 310 or permission of instructor.

Fd Sc 404—FOOD PROCESSING—3 cr. (1 and 6) S, '69 and alternate years.

Lectures are devoted to flexible packaging materials and applications, objective and subjective food evaluation, unit operations and processes, food dehydration, meat, poultry and egg processing, and the processing of emulsified

products. Students gain practical food processing experience by operating numerous pieces of processing and controlling equipment. Field trips to a variety of food processing plants give the students an opportunity to observe commercial processes. *Prerequisite:* Fd Sc 401 or permission of instructor.

FD SC 603—ELEMENTS OF FOOD SCIENCE—3 cr. (3 and 0)

FD SC 604—FOOD PROCESSING—3 cr. (1 and 6)

FD SC 701—ELEMENTS OF FOOD SCIENCE—3 cr. (3 and 0)

FD SC 703—BIOCHEMISTRY OF FOODS—3 cr. (2 and 3)

FD SC 704—FOOD PROCESSING—3 cr. (1 and 6)

FORESTRY

Professors: R. M. ALLEN, B. M. COOL, K. LEHOTSKY, *Head*; J. R. WARNER

Associate Professors: M. H. BRUNER, W. H. D. MCGREGOR, R. E. SCHOENIKE,
W. A. SHAIN

Assistant Professor: C. L. LANE

FOR 204—INTRODUCTION TO FORESTRY—1 cr. (1 and 0) S

An informative sketch of forestry, forests, and forestry tasks of the nation; education in career opportunities of foresters. *Prerequisite:* Bot 101.

FOR 205—DENDROLOGY—4 cr. (3 and 3) F

Identification and nomenclature of the principal forest trees of the United States; their geographical distribution and economic importance; identification of many forest shrubs and commonly planted exotics. *Prerequisite:* Bot 101.

FOR 206—SILVICS—2 cr. (2 and 0) S

Growth factors influencing the establishment and development of forest trees and stands. *Prerequisite:* Bot 101, Ch 102.

FOR 251S—SILVICS—2 cr. (Summer Camp) SS

Field studies of growth factors influencing the establishment and development of forest stands. *Prerequisite:* Agron 202, Bot 356, For 205, For 206.

FOR 252S—FOREST ENGINEERING—2 cr. (Summer Camp) SS

Field surveying, establishment of boundary lines, planning and construction of forest trails and roads. *Prerequisite:* CE 200, EG 105.

FOR 253S—DENDROMETRY—4 cr. (Summer Camp) SS

Elements of mensuration dealing with volume determination of standing and harvested trees as well as forest stands. *Prerequisite:* CE 200, EG 105, For 205.

FOR 254S—FOREST PRODUCTS—1 cr. (Summer Camp) SS

Field studies of logging methods and equipment; trips to selected wood-using industries. *Prerequisite:* For 205 or permission of instructor.

FOR 302—DENDROMETRY—3 cr. (2 and 3) S

Volume determination of trees, logs, and stands; statistical procedures applied to forest measurements. *Prerequisite:* Ex St 401 and Forestry Summer Camp.

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FOR 304—FOREST ECONOMICS—3 cr. (3 and 0) S

Economic problems and principles involved in the utilization of forest land and timber and in the distribution of forest products; cost analysis of integrated forest operations. *Prerequisite:* Econ 201.

FOR 306—IDENTIFICATION OF WOOD AND WOOD FIBERS—1 cr. (0 and 3) S

Macroscopic and microscopic identification, properties, and uses of selected economically significant timbers. *Prerequisite:* Bot 101, Ch 102 or permission of instructor.

FOR 307—ELEMENTS OF FORESTRY—3 cr. (2 and 3) F, S

A compendium of forestry subjects forming a foundation for the management and utilization of farm forests and especially those of South Carolina. *Prerequisite:* Bot 101 or permission of instructor.

FOR 308—AERIAL PHOTOGRAPHS IN FORESTRY—3 cr. (2 and 3) S

Use of aerial photographs in forestry; elementary photographic measurements; aerial photo interpretations; mapping and timber estimating procedures. *Prerequisite:* CE 203 and Forestry Summer Camp or permission of instructor.

FOR 310—SILVICULTURE—4 cr. (3 and 3) S

Maintenance, harvesting, natural and artificial regeneration of forest stands based on the interrelation of biotic characteristics of stands and their environment. *Prerequisite:* For 206 and Forestry Summer Camp.

FOR 401—LOGGING AND MILLING—4 cr. (2 and 6) F

Logging and milling methods and costs, their administration; analysis of logging and milling operations; seasoning, grading, and marketing of lumber. *Prerequisite:* Senior standing.

FOR 404—MANAGEMENT PLANS—1 cr. (0 and 3) S

Analysis and assembling of factors entering into a forest working plan; drawing of maps corollary to forest regulation; preparation of management plans. *Prerequisite:* For 407.

FOR 406—FOREST POLICY AND ADMINISTRATION—2 cr. (2 and 0) S

Development of public and private forest policy in the United States; administrative and executive tasks in forestry; principles of organization, personnel management, and budget. *Prerequisite:* Senior standing.

FOR 407—FOREST REGULATION—4 cr. (3 and 3) F

Correlation of production factors and yields of forests; normal and empirical forests; rotations and cutting cycles; regulation of cuts and growing stock in sustained yield management. *Prerequisite:* For 302, 310.

FOR 408—FOREST VALUATION—3 cr. (3 and 0) S

Capital investments in forestry and the returns derivable from them; valuation of land, timber, and other resources associated with forestry; appraisal of damage and stumpage values. *Prerequisite:* For 304, 407.

FOR 410—FOREST PRODUCTS—3 cr. (2 and 3) S

Primary forest products other than sawlogs, e.g., poles, pulpwood, veneer stock, excelsior; secondary forest products, e.g., naval stores, maple syrup, Christmas trees; utilization and marketing of forest products. *Prerequisite:* Phys 202 and Senior standing.

FOR 412—FOREST PROTECTION—2 cr. (2 and 0) S

Causative and control factors of forest fires; fire prevention and suppression. Protection of forest resources against damages caused by man and animals.
Prerequisite: Senior standing.

FOR 602—DENDROMETRY—3 cr. (2 and 3)

FOR 604—FOREST ECONOMICS—3 cr. (3 and 0)

FOR 606—IDENTIFICATION OF WOOD AND WOOD FIBERS—1 cr. (0 and 3)

FOR 607—ELEMENTS OF FORESTRY—3 cr. (2 and 3)

FOR 608—AERIAL PHOTOGRAPHS IN FORESTRY—3 cr. (2 and 3)

FOR 610—SILVICULTURE—4 cr. (3 and 3)

FOR 701—LOGGING AND MILLING—4 cr. (2 and 6)

FOR 704—MANAGEMENT PLANS—1 cr. (0 and 3)

FOR 706—FOREST POLICY AND ADMINISTRATION—2 cr. (2 and 0)

FOR 707—FOREST REGULATION—4 cr. (3 and 3)

FOR 708—FOREST VALUATION—3 cr. (3 and 0)

FOR 710—FOREST PRODUCTS—3 cr. (2 and 3)

FOR 712—FOREST PROTECTION—2 cr. (2 and 0)

FOR 801—DATA PROCESSING IN FORESTRY PROBLEMS—3 cr. (2 and 3)

FOR 802—DENDROMETRY—3 cr. (2 and 3)

FOR 803—PHOTO-INTERPRETATION—3 cr. (2 and 3)

FOR 804—FOREST ECONOMICS—3 cr. (2 and 3)

FOR 805—COST STUDIES IN HARVESTING AND PROCESSING—3 cr. (2 and 3)

FOR 806—MULTIPLE USE MANAGEMENT—3 cr. (3 and 0)

FOR 807—SPECIAL PROBLEMS IN FORESTRY—Credit to be arranged.

FOR 891—RESEARCH—Credit to be arranged.

FRENCH

Associate Professor: J. A. DEAN

Assistant Professor: D. Y. BRANNOCK, JR.

Instructors: R. L. COLEMAN, MARY J. FAZIO, JO ANN McNATT, J. B. MACY,
C. H. REED, JR.

Visiting Instructor: JOSETTE A. EUDE

FR 101—ELEMENTARY FRENCH—3 cr. (3 and 1)

A course for beginners in which, through conversation, composition, and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 102—ELEMENTARY FRENCH—3 cr. (3 and 1)

A continuation of FR 101, in which a reader is also used. Three hours a week of classroom instruction and one hour a week in the language laboratory.

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FR 151—FRENCH FOR GRADUATE STUDENTS—0 cr. (0 and 0)

An intensive program for graduate students preparing to take the reading examination in French. Some previous study of the language is helpful but not essential.

FR 201—INTERMEDIATE FRENCH—3 cr. (3 and 1)

Attention to grammar, with conversation, composition and dictation continued from Fr 102, and the beginning of more serious reading of French prose in short stories or novels. Three hours a week of classroom instruction and one hour a week in the language laboratory.

FR 202—INTERMEDIATE FRENCH—3 cr. (3 and 0)

While attention is paid to writing and speaking French, more stress is laid on the rapid reading of more difficult French prose than in the earlier courses. *Prerequisite:* Fr 201.

FR 303—SURVEY OF FRENCH LITERATURE I—3 cr. (3 and 0)

Literary movements and authors from the beginnings to the eighteenth century. Required of French majors. *Prerequisite:* Fr 201 and 202.

FR 304—SURVEY OF FRENCH LITERATURE II—3 cr. (3 and 0)

Literary movements and authors of the nineteenth and twentieth centuries. Required of French majors. *Prerequisite:* Fr 201 and 202.

FR 305—CONVERSATIONAL FRENCH—3 cr. (3 and 0)

Practice in the spoken language, with stress on vocabulary building, pronunciation, intonation, and comprehension; written work to increase accuracy. Assignments in the language laboratory. Required of French majors. *Prerequisite:* Fr 201 and 202.

FR 306—ADVANCED CONVERSATION AND COMPOSITION—3 cr. (3 and 0)

A continuation of Fr 305, with additional emphasis on written composition. Required of French majors. *Prerequisite:* Fr 305.

FR 403—TWENTIETH CENTURY PROSE—3 cr. (3 and 0)

The outstanding authors of the first half of the twentieth century: Proust, Gide, Mauriac, Saint-Exupéry, Sartre, Camus, and others. Reading of selected works, discussions, and reports. *Prerequisite:* Fr 303 and 304.

FR 404—TWENTIETH CENTURY DRAMA—3 cr. (3 and 0)

The French theater since 1900, with emphasis on the period after 1930. Readings, discussions, and reports. *Prerequisite:* Fr 303 and 304.

FR 405—NINETEENTH CENTURY FRENCH ROMANTICISM—3 cr. (3 and 0)

The romantic movement as expressed in the works of Chateaubriand, Hugo, Merimée, Vigny, Stendahl, Sand, and others. Readings, discussions, and reports. *Prerequisite:* Fr 303 and 304.

FR 406—NINETEENTH CENTURY FRENCH REALISM—3 cr. (3 and 0)

Realism as expressed in the works of Balzac, Flaubert, Daudet, Maupassant, Zola, and others. Selected works, discussions, and reports. *Prerequisite:* Fr 303 and 304.

FR 407—EIGHTEENTH CENTURY FRENCH LITERATURE—3 cr. (3 and 0)

The principal literary figures of the eighteenth century, with particular emphasis on Voltaire and Rousseau. Selected works, discussions, and reports. *Prerequisite:* Fr 303 and 304.

FR 408—SEVENTEENTH CENTURY FRENCH DRAMA—3 cr. (3 and 0)

The French classical drama, with emphasis on Corneille, Racine, and Molière. Selected works, discussions, and reports. *Prerequisite:* Fr 303 and 304.

GENETICS

Professor: C. M. JONES

Assistant Professor: W. D. GRAHAM, JR.

GEN 302—GENETICS—3 cr. (2 and 3) F, S, SS

A general coverage of the basic principles of genetics. Examples illustrating the fundamentals of heredity and variation are given for plants and animals, including man. *Prerequisite:* Bot 101 and Zool 101, 103 or consent of instructor.

GEN 451—GENETICS—3 cr. (3 and 0) F

Methods and concepts in classical and modern genetics. Topics will include advanced studies of linkage; variations in chromosome number and structure; natural and induced mutations; extranuclear inheritance; experimental evolution; population, biochemical and medical genetics. Principles will be illustrated by examples from plants, animals (including man), and microorganisms. *Prerequisite:* Gen 302.

GEN 602—GENETICS—3 cr. (2 and 3)

GEN 751—GENETICS—3 cr. (3 and 0)

GEN 801—CYTOGENETICS—3 cr. (2 and 3)

GEOGRAPHY

Associate Professor: VIRGINIA O. BARDSLEY

GEOG 301—ECONOMIC GEOGRAPHY—3 cr. (3 and 0)

The geographic conditions fundamental to the world's resources—agricultural, mineral, commercial and industrial, and the conditions which affect their production, exchange, consumption and strategic significance. *Prerequisite:* Junior standing.

GEOG 302—POLITICAL GEOGRAPHY—3 cr. (3 and 0)

The geographical pattern of the major nations, empires, dominions, commonwealths and other dependencies, their boundaries, resources and strategic connections. The current principles of geopolitics, with their application to the United States, Europe and Asia will be examined. *Prerequisite:* Junior standing.

GEOLOGY AND MINERALOGY

Assistant Professors: P. K. BIRKHEAD, V. S. GRIFFIN, JR., G. M. HASELTON, JR., R. D. HATCHER, JR.

GEOL 201—PHYSICAL GEOLOGY—3 cr. (3 and 0)

A study of the minerals and rock which compose the earth's crust, their origins and transformations. Emphasis is placed upon geological processes, both internal and external, by which changes are produced on or in the earth. *Prerequisite:* Registration in Geol 203.

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GEOL 203—PHYSICAL GEOLOGY LABORATORY—1 cr. (0 and 3)

Common minerals and rocks are studied. Instruction is also provided in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results. *Prerequisite:* Geol 201 or registration in Geol 201.

GEOL 204—HISTORICAL GEOLOGY—3 cr. (3 and 0)

Evolution, both organic and inorganic, is traced from the beginning of the record up through the ages to the present. *Prerequisite:* Geol 201 and registration in Geol 205 unless taken for elective credit.

GEOL 205—HISTORICAL GEOLOGY LABORATORY—1 cr. (0 and 3)

The student learns to recognize plants and animals which have left their record as fossils in the rocks of the earth's crust. Emphasis is placed upon geologic structures and the interpretation of geologic maps. Field trips are planned to demonstrate classroom concepts. *Prerequisite:* Geol 203 and simultaneous registration in Geol 204.

GEOL 306—MINERALOGY—3 cr. (2 and 3)

The student gains a working knowledge of crystallography and a comprehensive knowledge of determinative mineralogy. Identification of the minerals is based on their physical and chemical properties. *Prerequisite:* Geol 201 or 406.

GEOL 307—OPTICAL MINERALOGY—3 cr. (2 and 2)

The purpose of this course is to enable the student to identify minerals under the microscope on the basis of their optical properties. *Prerequisite:* Geol 306.

GEOL 309—PETROLOGY—3 cr. (2 and 3)

The genesis, evolution, and classification of rocks through lectures, laboratory exercises, and field trips. The occurrences, chemical relationships, and distribution of rock types are emphasized. *Prerequisite:* Geol 306.

GEOL 311—STRATIGRAPHY AND SEDIMENTATION—3 cr. (3 and 0)

The processes by which sediments are eroded, transported, and deposited (sedimentation), with major emphasis on relationships of the areal and time distribution of stratified rocks and their historical significances (stratigraphy). *Prerequisite:* Geol 201 and 204 or 406.

GEOL 402—STRUCTURAL GEOLOGY—3 cr. (2 and 2)

The diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. *Prerequisite:* Geol 201 and 204 or 406.

GEOL 403—INVERTEBRATE PALEONTOLOGY—3 cr. (2 and 3)

A study of life of past geologic ages, as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. *Prerequisites:* Geol 201 and 204 or permission of the instructor.

GEOL 404—ECONOMIC GEOLOGY—3 cr. (3 and 0)

This course concerns the description and classification of ore deposits and commercial non-metallic mineral deposits. The origin of mineral deposits and their occurrence is emphasized. Problem studies and field trips to nearby mines and quarries. *Prerequisite:* Geol 306.

GEOL 405—GEOMORPHOLOGY—4 cr. (3 and 3)

A study of the surface features of the earth—their form, nature, origin, development, and the change they are undergoing. *Prerequisite:* Geol 201 and 203 or Geol 406 or permission of the instructor.

GEOL 406—ENGINEERING GEOLOGY—3 cr. (2 and 3)

This course is similar to Geol 201 except that progress is faster and emphasis is on the relationship of geology to engineering.

GEOL 411—RESEARCH PROBLEMS—3 cr. (0 and 9)

A field, laboratory, or library study of an approved topic in geology. The topic would be one not normally covered in formal course offering, but may be an extension of a course. *Prerequisite:* Senior standing in geology or approval of the Department Head.

GEOL 412—RESEARCH PROBLEMS—3 cr. (0 and 9)

A continuation of Geol 411.

GEOL 606—MINERALOGY—3 cr. (2 and 3)**GEOL 607—OPTICAL MINERALOGY—3 cr. (2 and 3)****GEOL 609—PETROLOGY—3 cr. (2 and 3)****GEOL 611—STRATIGRAPHY AND SEDIMENTATION—3 cr. (3 and 0)****GEOL 702—STRUCTURAL GEOLOGY—3 cr. (2 and 2)****GEOL 703—INVERTEBRATE PALEONTOLOGY—3 cr. (2 and 3)****GEOL 704—ECONOMIC GEOLOGY—3 cr. (3 and 0)****GEOL 705—GEOMORPHOLOGY—4 cr. (3 and 3)****GEOL 800—EARTH SCIENCE I—3 cr. (2 and 3)****GEOL 850—EARTH SCIENCE II—3 cr. (2 and 3)**

GERMAN

Associate Professor: W. B. HERLINGER

Assistant Professor: PATRICIA W. WANNAMAKER

Instructors: MARGARET S. GRAHAM, H. L. LAWS

GER 101—ELEMENTARY GERMAN—3 cr. (3 and 1)

A course for beginners in which, through conversation, composition and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 102—ELEMENTARY GERMAN—3 cr. (3 and 1)

A continuation of Ger 101, in which a reader is also used.

GER 151—GERMAN FOR GRADUATE STUDENTS—0 cr. (0 and 0)

An intensive program for graduate students preparing to take the reading examination in German.

GER 201—INTERMEDIATE GERMAN—3 cr. (3 and 1)

A short review of grammar, with conversation, composition and dictation continued from Ger 102, and the beginning of more serious reading of German

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prose in short stories or novels. Three hours a week of classroom instruction and one hour a week in the language laboratory.

GER 202—INTERMEDIATE GERMAN—3 cr. (3 and 0)

While attention is paid to writing and speaking German, more stress is laid on the rapid reading of more difficult German prose than in the earlier courses. *Prerequisite:* Ger 201.

GER 251—SCIENTIFIC GERMAN—3 cr. (3 and 0)

An alternate course to Ger 202; readings in general science and some review of grammar and syntax. *Prerequisite:* Ger 201.

GER 303—SURVEY OF GERMAN LITERATURE I—3 cr. (3 and 0)

Literary movements and authors from the beginnings through romanticism, with emphasis upon Goethe and his contemporaries. Required of German majors. *Prerequisite:* Ger 201 and 202.

GER 304—SURVEY OF GERMAN LITERATURE II—3 cr. (3 and 0)

Literary movements and authors from the end of romanticism to the present. Required of German majors. *Prerequisite:* Ger 201 and 202.

GER 305—CONVERSATIONAL GERMAN—3 cr. (3 and 0)

Practice in the spoken language, with emphasis on vocabulary, pronunciation, and comprehension; written exercises for accuracy; assignments in the language laboratory. Required of German majors. *Prerequisite:* Ger 202 or 251.

GER 306—ADVANCED CONVERSATION AND COMPOSITION—3 cr. (3 and 0)

Continuation of Ger 305 with additional emphasis on written composition. Required of German majors. *Prerequisite:* Ger 305.

GER 403—NINETEENTH CENTURY GERMAN LITERATURE—3 cr. (3 and 0)

Selected works of Heine, Hebbel, Grillparzer, Keller, Meyer, Hauptmann, Schnitzler, and Hofmannsthal. Readings, discussions, and reports. *Prerequisite:* Ger 303 and 304.

GER 404—20TH CENTURY GERMAN LITERATURE—3 cr. (3 and 0)

Selected works from authors of the twentieth century. *Prerequisite:* Ger 303 and 304.

GER 406—FAUST—3 cr. (3 and 0)

An intensive reading of Goethe's masterpiece accompanied by extensive critical research. *Prerequisite:* Ger 303 and 304.

HISTORY

Professors: C. W. BOLEN, R. S. LAMBERT, E. M. LANDER, JR.

Associate Professors: VIRGINIA O. BARDSLEY, J. E. TUTTLE

Assistant Professors: J. W. BARNHILL, RUBY S. DAVIS, PATRICIA K. HILL, R. P. LEEMHUIS, RAMETH R. OWENS, J. V. REEL, JR., W. F. STEIRER, JR.

Instructors: H. D. ADAMS, J. L. ARBENA, G. R. DiBENEDETTO, C. A. GRUBB, R. P. MORGAN, NANCY A. RATLIFF

HIST 101—AMERICAN HISTORY—3 cr. (3 and 0)

The political, economic and social development of the American people from the period of discovery to the end of the Civil War.

HIST H101—AMERICAN HISTORY—3 cr. (3 and 0)

Same as Hist 101 except that this honors section is open to students only by invitation.

HIST 102—AMERICAN HISTORY—3 cr. (3 and 0)

The political, economic and social development of the American people from the end of the Civil War to the present.

HIST H102—AMERICAN HISTORY—3 cr. (3 and 0)

Continuation of Hist H101.

HIST 104—WESTERN CIVILIZATION—3 cr. (3 and 0)

A survey of the history of the modern world and the forces which have shaped its political, economic, and social institutions. (Not open to those who have passed Hist 204.)

HIST H104—WESTERN CIVILIZATION—3 cr. (3 and 0)

Same as Hist 104 except that this honors section is open to students only by invitation.

HIST 203—HISTORY OF CIVILIZATION—3 cr. (3 and 0)

The political, economic and social movements of Western Civilization from ancient times to 1660.

HIST 204—HISTORY OF CIVILIZATION—3 cr. (3 and 0)

The political, economic and social movements of Western Civilization from 1660 to the present. (Not open to those who have passed Hist 104.)

HIST 301—HISTORY OF THE UNITED STATES SINCE 1865—3 cr. (3 and 0)

An advanced study of the political, social, and economic development of the United States since the end of the Civil War. *Prerequisite:* Junior standing. Not open to students who have completed Hist 102.

HIST 306—AMERICAN ECONOMIC DEVELOPMENT—3 cr. (3 and 0)

The history of the economic development of the United States from 1492 to the present with emphasis on agriculture, transportation, banking, commerce, economic policies of the national government, and particularly the industrial revolutions. *Prerequisite:* Hist 101 and 102.

HIST 308—HISTORY OF ENGLAND TO 1603—3 cr. (3 and 0)

The history of England to 1603. *Prerequisite:* Junior standing.

HIST 309—HISTORY OF ENGLAND SINCE 1603—3 cr. (3 and 0)

England and her people. *Prerequisite:* Junior standing.

HIST 310—ANCIENT CIVILIZATION—3 cr. (3 and 0)

From beginning of civilization to A.D. 476.

HIST 312—HISTORY OF RUSSIA—3 cr. (3 and 0)

A survey of the history of Russia from the earliest times to the present.

HIST 313—HISTORY OF SOUTH CAROLINA—3 cr. (3 and 0)

The political, economic and social development of South Carolina from 1670 up to the present. *Prerequisite:* Junior standing.

HIST 314—HISTORY OF THE SOUTH—3 cr. (3 and 0)

Origins and development of political, economic, and cultural institutions of the South from the Colonial period to the present; and the role of the South in the nation's development. (Formerly Hist 403.)

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HIST 331—PRE-MODERN HISTORY OF EAST ASIA—3 cr. (3 and 0)

A survey of the history of China and Japan from earliest times to the arrival of Europeans in the sixteenth century. *Prerequisite:* Hist 102 or 204.

HIST 332—MODERNIZATION OF EAST ASIA—3 cr. (3 and 0)

A survey of the history of China and Japan from the Sixteenth Century to the present, with emphasis on the impact of Western culture. *Prerequisite:* Hist 102 or 104.

HIST 340—INDIGENOUS AND COLONIAL LATIN AMERICA—3 cr. (3 and 0)

An introduction to the geography of the region; structure and accomplishments of pre-Columbian societies; Iberian background to overseas expansion; conquest and settlement of the New World; political, economic, and social patterns in the colonial era leading to the Wars of Independence. *Prerequisite:* Junior standing or permission of the instructor.

HIST 341—MEXICO, CENTRAL AMERICA, AND THE CARIBBEAN SINCE 1800—3 cr. (3 and 0)

An introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after 1825; current domestic and international problems. *Prerequisite:* 6 hours of history or permission of instructor.

HIST 342—SOUTH AMERICA SINCE 1800—3 cr. (3 and 0)

An introduction to the geography of the region; origins and progress of the Independence movements; political, economic and social developments after 1825; current domestic and international problems. *Prerequisite:* 6 hours of history or permission of instructor.

HIST 357—EUROPE, 1850-1914—3 cr. (3 and 0)

A history of Europe from the mid-nineteenth century up to the outbreak of the First World War, with emphasis placed on the social, economic and political development of the European states and the forces of nationalism, imperialism, and liberalism. *Prerequisite:* Hist 203, 204.

HIST 402—MEDIEVAL HISTORY—3 cr. (3 and 0)

A survey of the period from the eclipse of Rome to the advent of the Renaissance; emphasizing human migrations, feudalism, rise of towns, and the cultural life. *Prerequisite:* Hist 203 and 204.

HIST 404—HISTORY OF THE RENAISSANCE AND REFORMATION—3 cr. (3 and 0)

An examination of the transitional period of European civilization (circa 1302 to 1648) with emphasis being placed on institutional, cultural and religious developments. *Prerequisite:* Hist 203, 204.

HIST 408—INTERNATIONAL RELATIONS SINCE 1914—3 cr. (3 and 0)

The great powers and world politics since 1914. *Prerequisite:* Hist 203, 204.

HIST 410—HISTORY OF COLONIAL AMERICA—3 cr. (3 and 0)

The development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards, and the philosophy of, the American revolution. *Prerequisite:* Hist 101, 102.

HIST 411—UNITED STATES, 1783-1850—3 cr. (3 and 0)

The formation and growing pains of the new nation through the Federal and Middle periods of its history, with emphasis on economic and political

development, the westward movement, and the conflicting forces of nationalism and sectionalism. *Prerequisite:* Hist 101, 102.

HIST 412—UNITED STATES, 1850-1900—3 cr. (3 and 0)

A course dealing with the background causes of, developments during, and broad problems after, the Civil War in American history. *Prerequisite:* Hist 101, 102.

HIST 413—UNITED STATES HISTORY SINCE 1900—3 cr. (3 and 0)

The history of the United States from 1900 to the present. *Prerequisite:* Hist 101, 102.

HIST 499—STUDIES IN HISTORY—3 cr. (3 and 0)

An attempt to integrate the students' knowledge and understanding of the field of history by lectures, discussions, and readings on the broad themes of history and their relevance to particular periods and geographical areas. Required of all history majors. *Prerequisite:* Hist 101, 102, 203, 204, and permission of the history adviser.

HIST 702—MEDIEVAL HISTORY—3 cr. (3 and 0)

HIST 704—HISTORY OF THE RENAISSANCE AND REFORMATION—3 cr. (3 and 0)

HIST 708—INTERNATIONAL RELATIONS SINCE 1914—3 cr. (3 and 0)

HIST 710—HISTORY OF COLONIAL AMERICA—3 cr. (3 and 0)

HIST 711—UNITED STATES, 1783-1850—3 cr. (3 and 0)

HIST 712—UNITED STATES, 1850-1900—3 cr. (3 and 0)

HIST 713—UNITED STATES SINCE 1900—3 cr. (3 and 0)

HIST 807—UNITED STATES DIPLOMATIC HISTORY SINCE 1877—3 cr. (3 and 0)

HIST 808—INTERNATIONAL RELATIONS SINCE 1914—3 cr. (3 and 0)

HIST 811—INTRODUCTION TO HISTORICAL RESEARCH—3 cr. (3 and 0)

HIST 812—UNITED STATES HISTORIOGRAPHY—3 cr. (3 and 0)

HIST 824—SEMINAR IN THE AMERICAN SOUTH—3 cr. (3 and 0)

HIST 825—SEMINAR IN THE CIVIL WAR AND RECONSTRUCTION—3 cr. (3 and 0)

HIST 891—RESEARCH—Credit to be arranged.

HORTICULTURE

Professors: L. O. VAN BLARICOM, W. L. OGLE, T. L. SENN, *Head*

Associate Professors: J. R. HAUN, H. J. SEFICK, E. T. SIMS, JR., G. E. STEM-BRIDGE, F. W. THODE

Assistant Professors: P. M. ALEXANDER, J. P. FULMER, W. S. JORDAN, R. R. ROTHENBERGER, B. J. SKELTON

HORT 201—GENERAL HORTICULTURE—3 cr. (2 and 3) F, S

A working knowledge of the fundamental plant processes is developed, showing the influence of light, temperature, water and nutrients upon vegetative growth and reproduction of horticultural plants. Production practices, harvesting, storage and marketing of the principal fruit, vegetable and orna-

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mental crops are discussed with demonstrations and practice in greenhouse and orchard. *Prerequisite:* Bot 101 and Ch 101.

HORT 302—PRINCIPLES OF VEGETABLE PRODUCTION—3 cr. (2 and 3) F

The general principles of vegetable growing and handling. Phases receiving special emphasis are economic importance, producing areas, management practices, plant forcing, cultural practices, irrigation, quality factors, harvesting, grading, packing, storage, market inspection, transportation, refrigeration, exhibition and seed production. *Prerequisite:* Hort 201.

HORT 303—PLANT MATERIALS I—3 cr. (2 and 3) F

Woody, ornamental plants and their aesthetic and functional uses in landscape developments. The study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements.

HORT 304—PLANT MATERIALS II—3 cr. (2 and 3) S

Herbaceous, ornamental plants which are commonly used as garden flowers. This study covers habit of growth, size, period of bloom, color and cultural requirements.

HORT 305—PLANT PROPAGATION—3 cr. (2 and 3) F

Methods of propagation; time, manner and material for making cuttings; temperature and media for rooting cuttings or ornamental trees, shrubs and flowering plants; propagating structures, soils and fertilizers. Practical instruction given in field and greenhouse. *Prerequisite:* Hort 201.

HORT 308—LANDSCAPE DESIGN—3 cr. (2 and 3) S

Landscape planning of residential and public properties in order to achieve best use and most enjoyment from a given piece of ground. *Prerequisite:* Hort 303.

HORT 310—FLORICULTURE—3 cr. (2 and 3) S

Greenhouse production of commercial flower crops; soils; fertilizers; greenhouse diseases and insects; flower crops to be grown on benches and as pot plants; marketing and costs of production. *Prerequisite:* Hort 201.

HORT 352—COMMERCIAL POMOLOGY—3 cr. (2 and 3) F

Fruit bud formation, rest period and water relations of fruit plants, soils, fruit setting; orchard soil management and responses of various fruits to fertilizers; principles of pruning, effect of climatic differences, freezing of tissues and means of avoiding injury; harvesting, transportation and storage. *Prerequisite:* Hort 201.

HORT 405—NUT TREE CULTURE—2 cr. (2 and 0) F, '68 and alternate years.

The production, harvesting and marketing of the principal nut crops with emphasis on the pecan. *Prerequisite:* Hort 201.

HORT 406—NURSERY TECHNOLOGY—3 cr. (2 and 3) S

Principles and techniques in handling nursery crops. *Prerequisite:* Hort 303 and Hort 305.

HORT 407—LANDSCAPE DESIGN—3 cr. (2 and 3) F

The first half of this course is a study of trees, shrubs, vines and ground covers used in landscape planting. Attention is given to cultural requirements, growth habits, period of bloom, texture and fall color. The second half of the course is devoted to landscape planning for small residential properties.

HORT 408—FLORAL DESIGN AND RETAIL MARKETING—3 cr. (2 and 3) F

Studies of the retail flower business with relation to financing, floor plan, equipment, personnel, supplies, salesmanship, advertising, and other important areas. Floral designing for the retail trade will include corsage construction, wreath construction, funeral and wedding designs as well as home arrangements.

HORT 409—SEMINAR—1 cr. (1 and 0) F

Recent research work on various phases of horticulture, methods of conducting investigations, and preparation of report of investigations.

HORT 410—SEMINAR—1 cr. (1 and 0) S

A continuation of Hort 409.

HORT 412—TURF MANAGEMENT—3 cr. (2 and 3) F

The identification, use, culture, and maintenance of turf grasses. *Prerequisite:* Junior standing.

HORT 451—SMALL FRUIT CULTURE—3 cr. (2 and 3) S

Varieties, soils, sites, culture, fertilizers, harvesting and preparation for marketing of grapes, strawberries, dewberries, blackberries, raspberries and other small fruits. *Prerequisite:* Hort 201.

HORT 456—TRUCK CROPS—3 cr. (3 and 0) S, '70 and alternate years.

The principles and practices employed in the commercial growing and marketing of vegetable crops. Emphasis is placed on temperature requirements, plant characteristics, varieties, soils, fertilizers, weed control, harvesting and preparation for market.

HORT 460—ADVANCED LANDSCAPE DESIGN—5 cr. (3 and 6) F

Landscape planning for larger residential properties, schools, industrial plants, real estate developments; detailed finished plans, costs; further study of materials used; original problems; field study. *Prerequisite:* Hort 308 or 407.

HORT 464—FOOD PRESERVATION—3 cr. (2 and 3) F

Theoretical background and fundamental processes of food preservation. Techniques used for community canning, commercial canning, frozen food preservation, juice manufacturing, jam and jelly making.

HORT 468—INTRODUCTION TO RESEARCH—2 cr. (1 and 3) S

Principles, developments and changes in research methods related to certain fields of agricultural research. The students obtain practice in experimental techniques, scientific writing and the use and maintenance of various research instruments and equipment. *Prerequisite:* Senior standing.

HORT 608—LANDSCAPE DESIGN 3 cr. (2 and 3)

HORT 610—FLORICULTURE—3 cr. (2 and 3)

HORT 652—COMMERCIAL POMOLOGY—3 cr. (2 and 3)

HORT 705—NUT TREE CULTURE—2 cr. (2 and 0)

HORT 706—NURSERY TECHNOLOGY—3 cr. (2 and 3)

HORT 707—LANDSCAPE DESIGN—3 cr. (2 and 3)

HORT 712—TURF MANAGEMENT—3 cr. (2 and 3)

HORT 751—SMALL FRUIT CULTURE—3 cr. (2 and 3)

HORT 756—TRUCK CROPS—3 cr. (3 and 0)

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HORT 760—LANDSCAPE DESIGN—5 cr. (3 and 6)

HORT 764—FOOD PRESERVATION—3 cr. (2 and 3)

HORT 768—INTRODUCTION TO RESEARCH—2 cr. (1 and 3)

HORT 801—PROBLEMS IN SMALL FRUIT PRODUCTION—3 cr. (3 and 0)

HORT 802—RESEARCH SYSTEMS IN HORTICULTURE—3 cr. (2 and 3)

HORT 803—EXPERIMENTAL OLERICULTURE—3 cr. (3 and 0)

HORT 804—SCIENTIFIC ADVANCES IN ORNAMENTAL HORTICULTURE—3 cr. (3 and 0)

HORT 805—PHYSICOCHEMICAL PROCEDURES FOR DETERMINING QUALITY IN HORTICULTURAL CROPS—3 cr. (2 and 3)

HORT 806—POST-HARVEST HANDLING OF HORTICULTURAL CROPS—3 cr. (3 and 0)

HORT 807—POMOLOGY—3 cr. (3 and 0)

HORT 808—SPECIAL INVESTIGATIONS IN HORTICULTURE—2 cr. (2 and 0)

HORT 809—SEMINAR I—1 cr. (1 and 0)

HORT 810—SEMINAR II—1 cr. (1 and 0)

HORT 891—RESEARCH—Credit to be arranged.

HORT 991—DOCTORAL RESEARCH—Credit to be arranged.

HOSPITAL AND HEALTH SERVICES ADMINISTRATION

Associate Professor: C. H. WHITEHURST, JR.

Assistant Professor: C. O. SHULER

H ADM 308—HOSPITAL AND HEALTH SERVICES ADMINISTRATION—3 cr. (3 and 0)

An introduction to the organization and operation of modern American hospitals, separate clinics and public health services. Included will be legal status, organizational peculiarities, and specific legislation effecting such agencies. *Prerequisite:* Junior standing.

H ADM 410—HOSPITAL INTERNSHIP—3 cr. (0 and 9)

The student will spend 9 hours per week on a specified program of observing, practicing and experiencing the duties of hospital administrators in selected local hospitals. The course will be specifically outlined along with the amount of time the student will spend in each phase or department of the hospital. Student progress will be constantly monitored by University faculty and hospital staff. *Prerequisite:* H Adm 308.

HUMANITIES

HUM 201—INTRODUCTION TO THE HUMANITIES—3 cr. (3 and 0)

A general introduction to humanistic studies, stressing the interrelatedness of various humanistic disciplines. Such fields as art, architecture, music, literature, philosophy, and drama will be considered as they interact with, support, and develop each other in various cultural settings.

HUM 202—INTRODUCTION TO THE HUMANITIES—3 cr. (3 and 0)

A continuation of Hum 201. *Prerequisite:* Hum 201.

INDUSTRIAL EDUCATION

Professor: J. L. BROCK

Associate Professor: A. F. NEWTON, *Head*

Assistant Professors: M. S. HAHN, H. E. MORGAN, JR., J. E. SQUIRES

IN ED 101—INDUSTRIAL EDUCATION LABORATORY—2 cr. (1 and 2)

This course is the first of a series designed to provide the student with the opportunity to gain competency needed for the successful teaching of Industrial subjects. Emphasis is on basic understanding of terminology, materials, tools, machines, and processes used in industry.

IN ED 102—INDUSTRIAL EDUCATION LABORATORY—3 cr. (1 and 6)

The properties of wood and woodworking practices. *Prerequisite:* In Ed 101.

IN ED 203—INDUSTRIAL EDUCATION LABORATORY—3 cr. (1 and 6)

Metal layout and forming, molding, casting practices, and welding. *Prerequisite:* In Ed 102.

IN ED 204—GRAPHIC ARTS—3 cr. (2 and 2)

Major emphasis is placed on projects involving composing, proofing, letter press work, bed press work, block printing, silk screen printing, offset printing and other processes in vogue at the present time.

IN ED 205—POWER TECHNOLOGY—3 cr. (2 and 2)

A study of power in terms of sources of energy, generation, and transmission.

IN ED 220—RECREATIONAL AND AVOCATIONAL CRAFTS—3 cr. (2 and 3)

The basic tools, materials, and processes used in recreational and avocational craft activities are emphasized. Students develop proficiency in the use of common hand tools and machines.

IN ED 302—DWELLING MATERIALS AND CONSTRUCTION METHODS—2 cr.

(1 and 2)

The commonly used building materials and the methods of combining them in present day construction. *Prerequisite:* In Ed 102.

IN ED 303—INDUSTRIAL EDUCATION LABORATORY—3 cr. (1 and 6)

Exploratory activities of a laboratory nature are concerned with typical circuits, rotating equipment, and electronics. *Prerequisite:* EE 303.

IN ED 305—INDUSTRIAL EDUCATION LABORATORY—3 cr. (1 and 6)

Machining practices. *Prerequisite:* In Ed 203 and Math 106.

IN ED 310—METHODS OF TRADE TEACHING—3 cr. (3 and 0)

This course is designed to give basic instruction to beginning teachers in trade work. Psychological factors of learning; individual differences; methods of teaching subjects; the special methods used in teaching skills; grading of students and keeping of proper records and reports. (Offered in Summer Sessions only.)

IN ED 312—METAL PROCESSES IN THE GENERAL SHOP—3 cr. (3 and 0)

Major emphasis is placed on planning and development of projects in wrought iron, sheet metal, art metal, metal spinning, welding, heat treating and other aspects of metal work that fit into a general shop program. (Offered in Summer Sessions only.)

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IN ED 313—**CERAMICS AND ALLIED PROCESSES IN THE GENERAL SHOP**—3 cr. (3 and 0)

Planning and development of projects involving extrusion, forming, molding and oven treatment of clays in making brick, tile, stoneware and pottery. Allied materials and processes, such as glass making, blowing, coloring, and leading and molding are given some attention. (Offered in Summer Sessions only.)

IN ED 314—**BASIC ELECTRICITY IN THE GENERAL SHOP**—3 cr. (3 and 0)

Major emphasis is placed on planning and developing projects involving an understanding of electrical principles as applied in electric circuits, electric motors, radio, television, telephony, and automatic controls involving vacuum tubes and other electronic devices and materials. (Offered in Summer Sessions only.)

IN ED 315—**CONSTRUCTION PRACTICES**—3 cr. (3 and 0)

This course covers brick, tile, concrete, plastering, and other construction materials and methods. (Offered in Summer Sessions only.)

IN ED 316—**PLASTICS AND PLASTIC PROCESSES IN THE GENERAL SHOP**—3 cr. (3 and 0)

The industrial, commercial and personal uses of plastics are discussed and demonstrated. In addition, the kinds of plastics, their properties, and special uses are studied. (Offered in Summer Sessions only.)

IN ED 318—**INDUSTRIAL TECHNOLOGY TECHNIQUES**—3 cr. (3 and 0)

Major emphasis is placed on casting, stamping and forming processes, forging and extrusion processes, machining processes, metal spraying or metallurgy, blast cutting, heating and case hardening, assembly processes, bending, finishing processes, inspection gaging. (Offered in Summer Sessions only.)

IN ED 320—**MACHINE WOODWORKING**—2 cr. (1 and 3)

Basic characteristics of woodcutting, shaping, and finishing operations by use of machinery and auxiliary tools. Includes project work. *Prerequisite:* Junior standing. (Not for Industrial Education Students.)

IN ED 325—**INDUSTRIAL SAFETY**—3 cr. (3 and 0)

Accident prevention and control, with emphasis on industrial safety programs and development of safety attitudes while working with industrial machines, tools, materials, and processes.

IN ED 333—**DESIGN**—3 cr. (2 and 3)

The study of the principles of form and design elements in two or three dimensions as related to products in the several industrial arts areas. Lectures and laboratory projects stress creativity in the use of materials in reaching design solutions and in developing a personal design philosophy. Limited market and engineering research is conducted along with the study of significant figures in the field. *Prerequisite:* Basic courses in laboratory methods.

IN ED 372—**ARTS AND CRAFTS FOR THE ELEMENTARY CHILD**—3 cr. (2 and 3)

Provides the elementary teacher with an opportunity to develop skills and knowledge in the use of a variety of media suitable for integrating the study of industry, technology, and the industrial society with the usual classroom procedures.

IN ED 402—DIRECTED TEACHING—6 cr. (0 and 18)

Supervised observation and teaching in cooperation with selected public schools in which opportunities are provided for securing experience in teaching industrial subjects. *Prerequisite:* In Ed 405, 416, 425, and grade-point ratio required for graduation.

IN ED 405—TESTS AND MEASUREMENTS IN INDUSTRIAL EDUCATION—3 cr. (3 and 0)

Methods used in measuring and evaluating pupil achievement in Industrial Education subjects. Emphasis is on developing tests, project evaluation, standardized testing, and statistical treatment of test scores. *Prerequisite:* Ed 302.

IN ED 408—TRAINING PROGRAMS IN INDUSTRY—3 cr. (3 and 0)

Basic concepts of supervision, administration, and management of training programs. Emphasis on determining training requirements, planning, directing, and evaluating training programs.

IN ED 416—DESIGN AND OPERATION OF INDUSTRIAL EDUCATION LABORATORIES—3 cr. (2 and 2)

Laboratory layout, selection and procurement of tools and equipment, budgeting, coordinating multiple activities in the general shop, and organizing course materials. *Prerequisite:* In Ed 303.

IN ED 422—VOCATIONAL EDUCATION PROGRAMS—3 cr. (3 and 0)

The types of vocational programs, financing, and administration and supervision. *Prerequisite:* In Ed 303.

IN ED 425—TEACHING INDUSTRIAL SUBJECTS—3 cr. (3 and 0)

Effective methods and techniques of teaching industrial subjects. Emphasis is given to class organization, preparation of lesson outlines, and audio-visual aids. *Prerequisite:* Ed 335 and In Ed 303.

IN ED 432—ADVANCED WOODWORKING—2 cr. (1 and 3)

An advanced consideration of machine methods and developments, materials, quality factors, and evaluation of instructional materials and problems. Inspection trips and reports. *Prerequisite:* In Ed 102.

IN ED 435—ADVANCED WELDING—2 cr. (1 and 3)

An advanced consideration of studies originated in In Ed 203, new developments, and evaluation of instructional materials and problems. Inspection trips and reports. *Prerequisite:* In Ed 203.

IN ED 436—ADVANCED MATERIAL FORMING—2 cr. (1 and 3)

Advanced consideration of studies initiated in In Ed 203, development, and evaluation of instructional materials and problems. Inspection trips and reports. *Prerequisite:* In Ed 203.

IN ED 438—ADVANCED MACHINING—2 cr. (1 and 3)

Advanced consideration of studies initiated in In Ed 305, new developments, industrial measurements, and evaluation of instructional materials and problems. Inspection trips and reports. *Prerequisite:* In Ed 305.

IN ED 441—COMPREHENSIVE GENERAL SHOP PRACTICES—2 cr. (2 and 0)

The problems and administration of the comprehensive general shop program. Objective is to consider planning multiple activity programs for the secondary school level. *Prerequisite:* In Ed 303.

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IN ED 442—COMPETENCY TESTING IN VOCATIONAL SUBJECTS—3 cr.
(3 and 0)

This course is especially designed for trade teachers who have assisted in making trade tests for S. C. Certification program. Teachers who expect to assist in making trade tests are also urged to enroll in this course. The course is devoted to revising present trade tests and developing tests in new fields. (Offered in Summer Sessions only.)

IN ED 451—PROBLEMS IN VOCATIONAL EDUCATION—3 cr. (3 and 0)

The expanding program of vocational education under the George-Barden Act and problems on national, state and local levels are discussed. Major specific problems involved in unit trade programs, out-of-school youth, selection and training of teachers, veterans' training and others are covered. (Offered in Summer Sessions only.)

IN ED 496—PUBLIC AND PROFESSIONAL RELATIONS—3 cr. (3 and 0)

This course emphasizes the techniques and methods of effective public and industrial relations which contribute to understanding and cooperation of labor, business, professional, educational, and industrial groups.

IN ED 605—INDUSTRIAL EDUCATION LABORATORY—3 cr. (1 and 6)

IN ED 705—TESTS AND MEASUREMENTS IN INDUSTRIAL EDUCATION—3 cr.
(3 and 0)

IN ED 716—DESIGN AND OPERATION OF INDUSTRIAL EDUCATION LABORATORIES—3 cr. (2 and 2)

IN ED 722—VOCATIONAL EDUCATIONAL PROGRAMS—3 cr. (3 and 0)

IN ED 725—TEACHING INDUSTRIAL SUBJECTS—3 cr. (3 and 0)

IN ED 732—ADVANCED WOODWORKING—2 cr. (1 and 3)

IN ED 735—ADVANCED WELDING—2 cr. (1 and 3)

IN ED 736—ADVANCED MATERIAL FORMING—2 cr. (1 and 3)

IN ED 738—ADVANCED MACHINING—2 cr. (1 and 3)

IN ED 741—COMPREHENSIVE GENERAL SHOP PRACTICES—2 cr. (2 and 0)

IN ED 796—PUBLIC AND INDUSTRIAL RELATIONS FOR VOCATIONAL TEACHERS AND SUPERVISORS—3 cr. (3 and 0)

IN ED 815—SEMINAR IN INDUSTRIAL EDUCATION—1 cr. (1 and 0)

IN ED 820—RECENT PROCESS DEVELOPMENTS—3 cr. (3 and 0)

IN ED 840—SCHOOL SHOP DESIGN—3 cr. (3 and 0)

IN ED 845—CURRICULUM DEVELOPMENT IN INDUSTRIAL EDUCATION—3 cr.
(3 and 0)

IN ED 860—CURRICULUM PLANNING AND DEVELOPMENT IN INDUSTRIAL ARTS—3 cr. (3 and 0)

IN ED 861—ADMINISTRATION AND SUPERVISION OF VOCATIONAL EDUCATION—3 cr. (3 and 0)

IN ED 865—AMERICAN INDUSTRIES—3 cr. (3 and 0)

IN ED 891—RESEARCH IN INDUSTRIAL EDUCATION—Credit to be arranged.

IN ED 895—SPECIAL PROBLEMS I—3 cr. (3 and 0)

IN ED 896—SPECIAL PROBLEMS II—3 cr. (3 and 0)

INDUSTRIAL ENGINEERING

Professor: E. LAITALA, *Head*

Associate Professor: J. H. COUCH

Instructor: J. R. FRAKER

IE 200—GEOMETRY CHANGING PROCESSES I—2 cr. (1 and 3)

Fundamentals of process planning. Includes study of diverse machining processes, metrology. *Prerequisite:* EG 103 or 109.

IE 201—GEOMETRY CHANGING PROCESSES II—2 cr. (1 and 3)

Fundamentals of process planning. Includes study of casting, joining, and forming of materials. *Prerequisite:* EG 103 or 109.

IE 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

An introduction to digital computer programming. Emphasis will be placed on computer language and its application to the solution of problems in industrial engineering. *Prerequisite:* Math 205.

IE 301—PROCESS PLANNING I—3 cr. (2 and 3)

Study of methods of conversion of raw materials into furnished products. Emphasis is from the viewpoint of management and control of manufacturing operations. Includes basic terminology, interpretation and use of engineering plans, impact of production volume. This course will examine various manufacturing processes including material removal, casting, joining and forming of materials, and associated measurement techniques. *Prerequisite:* EG 103 or 109 and Phys 122.

IE 303—JOB EVALUATION AND WAGE INCENTIVES—3 cr. (3 and 0)

Job description, specification, and classification. Systems employed for establishing relative ranks of jobs. Basic wage and salary determination. Wage incentive methods. *Prerequisite:* IE 307, 410 or consent of instructor.

IE 304—METHODS AND STANDARDS—3 cr. (2 and 3)

Fundamentals relating to work methods design and analysis. Includes study of techniques necessary for determining efficient work methods. Work measurement as a basis for control of costs and scheduling. *Prerequisite:* Junior standing.

IE 306—PROCESS PLANNING II—3 cr. (2 and 3)

Study of recent process developments and impact on planning and control of manufacturing operations. Numerical control of machines, computer-aided design, zero defects program, and others. Special laboratory investigations, and value engineering project. *Prerequisite:* IE 301.

IE 307—SURVEY OF ENGINEERING—3 cr. (3 and 0)

An examination of engineering in terms of types of fundamentals employed, governing parameters, basic plans, basic engineering functions, organization of divided engineering efforts, and measures of performance. Offered to students not majoring in engineering. *Prerequisite:* Phys 202 and Junior standing.

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IE 403—PROCESS PLANNING III—3 cr. (3 and 0)

Continuation of IE 306; study of latest process developments. *Prerequisite:* IE 306.

IE 404—ENGINEERING ECONOMIC ANALYSIS—3 cr. (3 and 0)

Basic principles and techniques of economic analysis of engineering projects. Consideration of time value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation and measures of cost effectiveness. *Prerequisite:* Senior standing in Engineering or consent of instructor.

IE 405—PLANT LAYOUT AND MATERIAL HANDLING—3 cr. (2 and 3)

Fundamentals underlying the planning of factory layout for new products and increases in production volume. Layout by product and process. Scale model, template, and other planning techniques. Materials handling analysis and equipment decisions. *Prerequisite:* IE 301 and IM 408 or consent of instructor.

IE 407—INDUSTRIAL APPLICATIONS OF STATISTICS—3 cr. (2 and 3)

Application of statistical principles of analysis and control to production processes, studies of process capabilities, quality control, work sampling, reliability analysis, and machine interference. *Prerequisite:* Math 208 and Math 313.

IE 408—PLANT DESIGN—2 cr. (1 and 3)

Integration of unit operations into a total production system. Study of analytical procedures for determining layout of production and other facilities, line balance, manner in which operations shall be linked or material moved between them. Creation and analysis of alternative designs. *Prerequisite:* IE 304 and Senior standing.

IE 410—ENGINEERING AND ORGANIZATION—3 cr. (3 and 0)

The nature of industrial enterprise in terms of purpose, organization structure, governing criteria, responsibilities and relationships of various functional groups. Project engineering and organization. Analysis and coordination of engineering functions as foundation for engineering management.

IE 411—WORK FLOW SYSTEMS AND CONTROL—3 cr. (3 and 0)

Fundamentals underlying the determination of production capacity requirements, economic lot sizes, and the regulating of flow and storage of materials to, within, and from the production system. Elements of forecasting, determination of materials requirements, scheduling, inventory control, etc. Consideration of data processing methods. *Prerequisite:* Math 313 and IE 410 or consent of instructor.

IE 412—SEMINAR—1 cr. (1 and 0)

Library search and oral reports covering recent technological developments in the field of industrial engineering. Consideration of professional responsibilities and post graduation plans. A major term paper is required. *Prerequisite:* Senior standing in Industrial Engineering.

IE 413—SEMINAR—1 cr. (1 and 0)

Continuation of IE 412. *Prerequisite:* IE 412.

IE 416—PROJECT SCHEDULING—3 cr. (3 and 0)

Basic planning and plans underlying the design and control of work flow systems for diverse engineering projects. Systems design of schedule plans

including design function, operations, materials procurement, facilities, equipment, etc. Fundamentals underlying critical path (PERT, C.P.M.) and data processing methods. *Prerequisite:* Senior standing in Engineering.

IE 704—ENGINEERING ECONOMIC ANALYSIS—3 cr. (3 and 0)

IE 707—INDUSTRIAL APPLICATIONS OF STATICS—3 cr. (3 and 0)

IE 710—ENGINEERING AND ORGANIZATION—3 cr. (3 and 0)

IE 711—WORK FLOW SYSTEMS AND CONTROL—3 cr. (3 and 0)

IE 716—PROJECT SCHEDULING—3 cr. (3 and 0)

INDUSTRIAL MANAGEMENT

Professor: C. C. DAVIS

Associate Professors: E. A. LAROCHE,* S. O. PARK, J. L. RICHARDSON, B. J. TODD, C. H. WHITEHURST, *Head*; C. V. WRAY

Assistant Professors: SUSAN H. BROWN, C. A. BURDEN, T. H. GUNTER, JR., N. K. KWAK, G. D. RIGGS, C. O. SHULER, J. M. WANNAMAKER

Visiting Lecturers: R. L. BROWN,† F. R. GRAY.

IM 100—INTRODUCTION TO INDUSTRIAL MANAGEMENT—0 cr. (1 and 0)

A series of lectures by University and industry speakers in which the role of the industrial manager in society is examined and explained. Particular emphasis is placed on orienting the student to understanding the manager's function in a market system economy.

IM 201—INTRODUCTION TO INDUSTRIAL MANAGEMENT—3 cr. (3 and 0)

An introductory survey of management's role as a fourth factor of economic production.

IM 299—COMPUTER PROGRAMMING I—1 cr. (0 and 3)

An elementary operating course primarily designed to familiarize the student with the various capabilities of electronic computers. A demonstrated ability to write basic programs applicable to management areas is required. *Prerequisites* Permission of instructor.

IM 304—QUALITY CONTROL—3 cr. (3 and 0)

Basic control techniques in the field of industrial production, inspection and experimentation. Various sampling, control and inspection problems are studied with special reference to practical applications. Underlying theory, assumptions and limitations are presented. *Prerequisite:* Math 313.

IM 305—INCOME TAXATION—3 cr. (3 and 0)

Interpretation of Federal Income Tax laws, regulations, and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. *Prerequisite:* Junior standing.

IM 306—CORPORATION FINANCE—3 cr. (3 and 0)

The organization and operation of corporations with emphasis on the nature and influences of the various sources of funds. *Prerequisite:* Junior standing.

* On leave.

† Part-time.

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IM 307—PERSONNEL MANAGEMENT—3 cr. (3 and 0)

An introductory course dealing with the principles and policies governing present day employee-employer relationships. Attention directed to methods of electing, training, placing, and promoting of employees to develop sound personnel techniques. *Prerequisite:* Junior standing.

IM 312—COMMERCIAL LAW—3 cr. (3 and 0)

An introduction to business law with primary attention given to contracts, agency, negotiable instruments and sales. *Prerequisite:* Junior standing.

IM 313—COMMERCIAL LAW—3 cr. (3 and 0)

Continuation of IM 312 with emphasis on business organization, personal and real property, estates and bankruptcy and security services.

IM 322—LEGAL ENVIRONMENT OF BUSINESS—3 cr. (3 and 0)

A comprehensive study of the development of governmental regulation of business including both state and national regulations. Attention is given to the constitutional source and limitation of power in both governments; specific areas in which the governments have acted (production, labor, combinations, prices, etc.) and the regulations that have been imposed in these areas; and the scope of the administrative process.

IM 401—MARKETING ANALYSIS—3 cr. (3 and 0)

An examination of the activities involved in the flow of goods and services from producer to consumer. Stressed will be the application of quantitative techniques for predicting sales and evaluating alternative promotional strategies. *Prerequisite:* Senior standing in IM or permission of instructor.

IM 402—PRODUCTION PLANNING AND CONTROL—3 cr. (3 and 0)

Methods of controlling the flow of personnel, machines and materials by means of scheduling, dispatching and routing. Includes a study of layout of equipment and facilities within the factory, and methods of materials handling. *Prerequisite:* IM 304 and Senior standing.

IM 403—SPECIAL PROBLEMS—2 cr. (2 and 0)

Each student will plan and develop a research project related to the field of management. *Prerequisite:* Senior standing in Industrial Management.

IM 404—MANAGERIAL ECONOMICS—3 cr. (3 and 0)

Includes an introduction to statistical decision theory, econometrics, and quantitative applications of economic tools as related to the industrial manager in his role as decision maker and forward planner. *Prerequisite:* Econ 314 and Senior standing.

IM 405—ECONOMICS OF TRANSPORTATION—3 cr. (3 and 0)

History and structure of transportation systems of the United States; the nature of transportation costs and rates. Transportation systems as factors in industrial location. Government policy towards transportation. *Prerequisite:* Senior standing and permission of the instructor.

IM 406—THEORY OF INDUSTRIAL LOCATION—3 cr. (3 and 0)

A theoretical study of the general factors which determine plant location in a capitalist society. Particular attention is paid to the selection of location sites by small nonbranch manufacturing plants. A comparison of location theory and actual location patterns is stressed. *Prerequisite:* Senior standing and permission of instructor.

IM 407—SPECIAL PROBLEMS—1 cr. (1 and 0)

Each student will plan and develop a research project related to the field of management. *Prerequisite:* Senior standing in Industrial Management.

IM 408—WORK SIMPLIFICATION AND STANDARDIZATION—3 cr. (2 and 3)

Principles and practices of motion and time as it is applied to industry. Emphasis is given to its application and its influence on methods, material handling, plant layout, and time study procedures.

IM 409—MANAGEMENT SIMULATION—0 cr. (1 and 0)

Practice in managerial decision-making under simulated competitive industry conditions. Guidance is furnished by the staff member administering the requirement. The model is designed to derive maximum benefit from previous courses in economics, econometrics and statistics. *Prerequisite:* Senior standing and permission of instructor.

IM 411—MARKETING RESEARCH—2 cr. (2 and 0)

A directed research course oriented toward those students interested in a career in marketing.

IM 412—MARKETING ANALYSIS II—3 cr. (3 and 0)

A continuation of Marketing Analysis IM 401. *Prerequisite:* IM 401 or permission of instructor.

IM 415—MANAGERIAL DECISION MAKING—3 cr. (3 and 0)

Management problems and methods involved in the operation of manufacturing institutions, including location, equipment investment, organization structure, and budgets. Attention is given primarily to the above areas by the use of the case method. Emphasis on oral and written communication. *Prerequisite:* Permission of instructor.

IM 416—MANAGEMENT OF HUMAN RESOURCES—3 cr. (3 and 0)

A course designed to orient the student toward recent developments in enlightened uses of human resources with emphasis on procurement, training, development, rewarding and retention of such resources. *Prerequisite:* Permission of instructor.

IM 417—MANUFACTURING LOGISTICS—3 cr. (3 and 0)

A study of more advanced manufacturing and production techniques including predetermined motion time data systems, micromotion study analysis, work sampling or ratio delay studies, zero defects, materials handling techniques, machine interference, time study formula construction, machinery and equipment replacement calculations, economic lot size determination, development and use of standard data, cost reduction programs, operator training methods, charting of time study data, problems of machinery and equipment layout, and developing of complex time standards. *Prerequisite:* IM 408 or permission of instructor.

IM 499—COMPUTER PROGRAMMING II—1 cr. (0 and 3)

Each student will complete a research project relating to the accomplishment of some management function in which a computer program is now—or is expected to be—of cardinal importance. *Prerequisite:* IM 299 or equivalent.

IM 701—MARKETING ANALYSIS I—3 cr. (3 and 0)

IM 702—PRODUCTION AND PLANNING CONTROL—3 cr. (3 and 0)

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- IM 704—MANAGERIAL ECONOMICS—3 cr. (3 and 0)
IM 705—ECONOMICS OF TRANSPORTATION—3 cr. (3 and 0)
IM 706—THEORY OF INDUSTRIAL LOCATION—3 cr. (3 and 0)
IM 708—WORK SIMPLIFICATION AND STANDARDIZATION—3 cr. (2 and 3)
IM 712—MARKETING ANALYSIS II—3 cr. (3 and 0)
IM 715—MANAGERIAL DECISION MAKING—3 cr. (3 and 0)
IM 716—MANAGEMENT OF HUMAN RESOURCES—3 cr. (3 and 0)
IM 717—MANUFACTURING LOGISTICS—3 cr. (3 and 0)
IM 800—MANAGEMENT SIMULATION—1 cr. (0 and 3)
IM 801—QUANTITATIVE ECONOMIC ANALYSIS—3 cr. (3 and 0)
IM 802—FINANCE—3 cr. (3 and 0)
IM 803—PRODUCTION MANAGEMENT—3 cr. (3 and 0)
IM 804—MANAGERIAL POLICY—3 cr. (3 and 0)
IM 805—QUALITY CONTROL—3 cr. (3 and 0)
IM 811—ADVANCED MARKETING ANALYSIS—3 cr. (3 and 0)
IM 816—MANAGEMENT OF HUMAN RESOURCES II—3 cr. (3 and 0)
IM 891—THESIS—3 cr.

MANAGEMENT SCIENCE

Associate Professors: E. A. LAROCHE,* S. O. PARK, B. J. TODD, C. H. WHITEHURST

Assistant Professor: N. K. KWAK

MGT SC 311—INTRODUCTION TO ECONOMETRICS—3 cr. (3 and 0)

An application of modern statistical methods to economic theory formulated in mathematical terms. Emphasis is placed upon elementary mathematics, formulation of economic theory, application of calculus to economic theory, and statistical inference and its application to econometric models. *Prerequisite:* Math 313 and Econ 314.

MGT SC 413—MANAGEMENT SCIENCE I—3 cr. (3 and 0)

An application of management science techniques—both operations research and econometric analysis—to decision making in business. *Prerequisite:* Permission of instructor.

MGT SC 414—STATISTICAL ANALYSIS—3 cr. (3 and 0)

The application of statistical analysis to management decision making. Topics include time series analysis, regression and correlation as tools of control and forecasting; analysis of variance and regression in planning, control and research. *Prerequisite:* Math 313.

MGT SC 611—INTRODUCTION TO ECONOMETRICS—3 cr. (3 and 0)

MGT SC 713—MANAGEMENT SCIENCE I—3 cr. (3 and 0)

MGT SC 714—STATISTICAL ANALYSIS—3 cr. (3 and 0)

* On leave.

MGT SC 806—REGIONAL SCIENCE METHODS—3 cr. (3 and 0)

MGT SC 807—ECONOMETRIC METHODS I—3 cr. (3 and 0)

MGT SC 808—ECONOMETRIC METHODS II—3 cr. (3 and 0)

MGT SC 812—MANAGEMENT SCIENCE II—3 cr. (3 and 0)

MATHEMATICS

Professors: C. V. AUCOIN, *Head*; A. T. HIND, JR., A. F. SOBCZYK

Associate Professors: M. C. BELL, J. W. BROWN, F. M. CHOLEWINSKI, E. C. COKER, JR., J. L. FLATT, J. C. HARDEN, JR., W. R. HARE, JR., J. W. KENNELLY, JR., C. E. KIRKWOOD, JR., J. W. LAGRONE, S. M. LUKAWECKI, M. C. PALMER, E. PARK, L. A. RIFE, K. SEO, E. L. STANLEY, J. R. SULLIVAN

Assistant Professors: CLAIRE R. AUCOIN, A. K. BOSE, J. V. BRAWLEY, JR., A. S. COVER, SUE K. DUNKLE, J. D. FULTON, D. R. LATORRE, J. H. NICHOLSON, M. F. O'REILLY, W. B. OWEN, T. G. PROCTOR, J. A. RENEKE, C. B. RUSSELL

Instructors: EUGENIE V. BARTMESS, LOUISE G. FULMER, JEUEL G. LATORRE, B. J. PROCHASKA

MATH 100—COLLEGE ALGEBRA—2 cr. (5 and 0).

Required of all freshmen who fail to make a satisfactory grade on the Mathematics Test, Level I (Standard). An intensified review of high school algebra and the topics listed under Math 103. Students enrolled in Math 100 must receive a passing grade in this course before they are eligible to enroll in any other mathematics course. Math 100 may be substituted for Math 103.

MATH 101—MATHEMATICAL ANALYSIS—3 cr. (3 and 0)

An introductory course in college mathematics open only to students in the Bachelor of Arts curriculum and Pre-Medicine students. The subject matter includes graphing, differentiation, integration, solution of equations, trigonometry, exponential functions, series, and probability. *Prerequisite:* A satisfactory score on the Mathematics Test, Level I (Standard).

MATH 102—MATHEMATICAL ANALYSIS—3 cr. (3 and 0)

A continuation of Math 101.

MATH 103—COLLEGE ALGEBRA—2 cr. (3 and 0)

Algebraic processes, functions, equations, inequalities, mathematical induction, theory of equations, determinants, and logarithms. *Prerequisite:* A satisfactory score on the Mathematics Test, Level I (Standard).

MATH 104—TRIGONOMETRY—2 cr. (3 and 0)

Trigonometric functions, equations, identities, and solution of triangles. Logarithms and complex numbers. *Prerequisite:* A satisfactory score on the Mathematics Test, Level I (Standard).

MATH 106—ANALYTIC GEOMETRY AND CALCULUS I—4 cr. (4 and 0)

A unified course in analytic geometry and calculus presented in three semesters. *Prerequisite:* Math 103, 104 or a satisfactory score on the Mathematics Test, Level I (Standard).

MATH H106—ANALYTIC GEOMETRY AND CALCULUS I—4 cr. (4 and 0)

Same as Math 106 except that this honors section is open to students only by invitation.

MATH 115—CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS I—3 cr. (3 and 0)

Logic, sets, and the properties of the counting numbers, numeration systems.

MATH 116—CONTEMPORARY MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS II—3 cr. (3 and 0)

A continuation of Math 115. Subtraction, properties of the integers, elementary number theory, rational number system, real number system.

MATH 200—LINEAR ALGEBRA—3 cr. (3 and 0)

Principal topics include: vector and matrix operations, linear systems of equations, linear mapping, determinants, quadratic forms, eigenvalues, and geometric applications. *Prerequisite:* Math 106.

MATH 203—ELEMENTARY STATISTICAL INFERENCE—3 cr. (3 and 0)

A survey course in fundamental statistical principles with applications to social sciences and other fields. The development of the course will assume knowledge of finite probability. Major topics include: empirical frequency distributions, computation of descriptive constants, statistical inference, regression correlation, analysis of variance, and applications of Markov processes. *Prerequisite:* Math 102 or a 3-credit course in finite probability.

MATH 205—ANALYTIC GEOMETRY AND CALCULUS II—4 cr. (4 and 0)

A continuation of Math 106.

MATH H205—ANALYTIC GEOMETRY AND CALCULUS II—4 cr. (4 and 0)

A continuation of Math H106.

MATH 206—ANALYTIC GEOMETRY AND CALCULUS III—4 cr. (4 and 0)

A continuation of Math 205.

MATH H206—ANALYTIC GEOMETRY AND CALCULUS III—4 cr. (4 and 0)

A continuation of Math H205.

MATH 207—MULTIPLE DIMENSION CALCULUS—4 cr. (4 and 0)

Principal topics include: differential and integral calculus for functions of several variables, extreme values of functions, Lagrangian multipliers, infinite sequences and series. Taylor's series, differential equations and difference equations. Examples from the managerial and social sciences. *Prerequisite:* Math 200.

MATH 208—ENGINEERING MATHEMATICS I—4 cr. (4 and 0)

This course presents an introduction to the study of differential equations, linear algebra, complex variables, and the Laplace transforms. *Prerequisite:* Math 206.

MATH 215—ALGEBRA FOR ELEMENTARY SCHOOL TEACHERS—3 cr. (3 and 0)

Linear equations and linear inequalities in one variable, functions and graphs, systems of linear equations and linear inequalities, quadratic equations, complex number system. Finite number systems, algebraic structures.

MATH 216—GEOMETRY FOR ELEMENTARY SCHOOL TEACHERS—3 cr. (3 and 0)

An informal treatment of the basic concepts of geometry.

MATH 305—FOUNDATIONS OF ANALYSIS—3 cr. (3 and 0)

An introduction to the language and use of symbolic logic and the properties of the real number system with applications to the calculus. *Prerequisite:* Math 206.

MATH 306—ORDINARY DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)

Linear equations with constant coefficients, simultaneous equations, linear equations of second order, series solutions, applications to physics and engineering. *Prerequisite:* Math 206.

MATH H306—ORDINARY DIFFERENTIAL EQUATIONS—4 cr. (4 and 0)

Honors section in Math 306.

MATH 308—COLLEGE GEOMETRY—3 cr. (3 and 0)

Theorems and concepts more advanced than those of high school geometry. A treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. *Prerequisite:* Math 106.

MATH 309—ENGINEERING MATHEMATICS II—3 cr. (3 and 0)

A continuation of Math 208. An introduction to Fourier Series, numerical methods, vector algebra, vector calculus, partial differential equations and certain special functions is given. *Prerequisite:* Math 208.

MATH 313—STATISTICAL THEORY AND METHODS I—3 cr. (3 and 0)

Principal topics include: empirical distributions, random variables, probability space, normal distribution, chi-square distribution, t—distribution, F—distribution, test of hypothesis, estimation curve fitting. *Prerequisite:* Math 205.

MATH 322—SYMBOLIC LOGIC—3 cr. (3 and 0)

A consideration of the necessary logical structure of a very exact language in terms of modern relational logic. Quantification, Truth Functions, Propositional Functions, Properties of Relations, Arguments involving Relations, and some nonformal logical systems will be considered. *Prerequisite:* Math 205, Phil 302 or a computer programming course.

MATH 402—THEORY OF PROBABILITY—3 cr. (3 and 0)

Principal topics include: combinatorial theory, random variables, expected values, jointly distributed random variables, correlation, conditional expectation, predictions, binomial distribution, poisson distribution, normal distribution, law of large numbers, central limit theorem, elementary markov chains.

MATH 403—STATISTICAL INFERENCE—3 cr. (3 and 0)

Principal topics include: point estimation, linear hypothesis, correlation, regression, distribution free methods, sequential analysis. *Prerequisite:* Math 402.

MATH 404—INTRODUCTION TO STOCHASTIC PROCESSES—3 cr. (3 and 0)

Principal topics include—random variables, counting processes, stationary processes, ergodic processes, spectral distribution function, examples from scientific fields to indicate the use of stochastic processes in construction of models of physical and behavioral phenomena. *Prerequisite:* Math 402.

MATH 405—STATISTICAL THEORY AND METHODS II—3 cr. (3 and 0)

Principal topics include contingency tables, goodness of fit, rank-sum tests, Kolmogorov-Smirnov tests, analysis of variance, factorial experimentation, applications to reliability and life testing, applications to quality assurance. *Prerequisite:* Math 313.

MATH 406—HISTORY OF MATHEMATICS—3 cr. (3 and 0)

A survey of the development of mathematics. Use of reference material to supplement the text and class discussion is expected. *Prerequisite:* Math 206.

MATH 407—PARTIAL DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)

Partial differentiation and space geometry, origins of partial differential equations, linear and non-linear equations of the first order, Fourier series, linear equations of the second and higher orders. *Prerequisite:* Math 306.

MATH 408—TOPICS IN GEOMETRY—3 cr. (3 and 0)

An introduction to topics in special geometries which include non-Euclidean space concepts, such as projective geometry, finite geometries, and intuitive elementary topology. A brief introduction to vector geometry. *Prerequisite:* Math 206.

MATH 411—LINEAR ALGEBRA—3 cr. (3 and 0)

An introduction to the algebra of matrices, vector spaces, polynomials and linear transformations. *Prerequisite:* Math 206.

MATH 412—INTRODUCTION TO MODERN ALGEBRA—3 cr. (3 and 0)

An introduction to the concepts of algebra. Topics included are the number system; elementary theory of groups; rings, integral domains, and fields; matrices over a field; determinants and matrices; groups, rings, and ideals. *Prerequisite:* Math 206.

MATH 413—MODERN ALGEBRA—3 cr. (3 and 0)

A continuation of Math 412.

MATH 415—INTRODUCTION TO TOPOLOGY—3 cr. (3 and 0)

An introduction to point set topology; Hausdorff, regular and normal spaces; metric connected and compact spaces; continuous mappings and homeomorphisms. *Prerequisite:* Math 305.

MATH 417—MATHEMATICS PROGRAMS—3 cr. (3 and 0)

Aspects of the new high school programs in mathematics. Open only to in-service teachers or students in the Mathematics Teacher Training Program. *Prerequisite:* Math 311; *corequisite:* Math 408.

MATH 422—MATHEMATICAL LOGIC—3 cr. (3 and 0)

A detailed and rigorous study of a logical system as a foundation for mathematics. An analysis of basic concepts occurring in the foundations of mathematics. *Prerequisite:* Math 322 or sufficient mathematical background.

MATH 425—INTERMEDIATE DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)

Second order linear differential equations, regular singular points, Bessel, Legendre and hypergeometric functions, general linear equations, existence and uniqueness theorems, plane autonomous systems and phase plane concepts, Sturm-Liouville systems. *Corequisite:* Advanced Calculus.

MATH 429—INTRODUCTION TO NUMERICAL ANALYSIS—3 cr. (3 and 0)

Difference and summation calculus, round off noise, finite Fourier series, polynomial approximation, numerical solution of differential equations. *Prerequisite:* Math 306 or 208.

MATH 451—VECTOR ANALYSIS—3 cr. (3 and 0)

The algebra and calculus of vectors in two and three dimensions with applications to physics, geometry and engineering problems. *Prerequisite:* Math 306 and Junior standing.

MATH 452—LINEAR PROGRAMMING—3 cr. (3 and 0)

An introduction to linear programming, using elementary matrix algebra and the theory of convex polygons. Applications to managerial problems, operations research, economic behavior, the theory of games and military strategy are considered. *Prerequisite:* Math 206 or permission of the instructor.

MATH 453—ADVANCED CALCULUS I—3 cr. (3 and 0)

Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. *Prerequisite:* Math 306 and Junior standing.

MATH 454—ADVANCED CALCULUS II—3 cr. (3 and 0)

A continuation of Math 453. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals.

MATH 455—LAPLACE TRANSFORMS—3 cr. (3 and 0)

Elementary properties of transforms of real functions; development and use of tables of transforms and inverses; applications to ordinary differential equations and linear partial differential equations. *Prerequisite:* Math 306 or Math 208.

MATH 457—APPLIED MATHEMATICS I—3 cr. (3 and 0)

Determinants and matrices, review of differential equations, finite differences, Fourier series and integrals, Laplace transformations, a large selection of applications. *Prerequisite:* Math 306 or Math 208.

MATH 458—APPLIED MATHEMATICS II—3 cr. (3 and 0)

A continuation of Math 457. Partial differential equations, Bessel functions and Legendre polynomials, analytic functions of complex variables, infinite series in a complex plane, the theory of residues, conformal mapping. *Prerequisite:* Math 457.

MATH 463—MATHEMATICAL ANALYSIS I—3 cr. (3 and 0)

Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. *Prerequisite:* Math 305.

MATH 464—MATHEMATICAL ANALYSIS II—3 cr. (3 and 0)

A continuation of Math 463.

MATH 605—FOUNDATIONS OF ANALYSIS—3 cr. (3 and 0)**MATH 606—ORDINARY DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)****MATH 608—COLLEGE GEOMETRY—3 cr. (3 and 0)****MATH 613—STATISTICAL THEORY AND METHODS I—3 cr. (3 and 0)****MATH 702—THEORY OF PROBABILITY—3 cr. (3 and 0)****MATH 703—STATISTICAL INFERENCE—3 cr. (3 and 0)**

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- MATH 704—INTRODUCTION TO STOCHASTIC PROCESSES—3 cr. (3 and 0)
MATH 705—STATISTICAL THEORY AND METHODS II—3 cr. (3 and 0)
MATH 707—PARTIAL DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)
MATH 708—TOPICS IN GEOMETRY—3 cr. (3 and 0)
MATH 711—LINEAR ALGEBRA—3 cr. (3 and 0)
MATH 712—INTRODUCTION TO MODERN ALGEBRA I—3 cr. (3 and 0)
MATH 713—INTRODUCTION TO MODERN ALGEBRA II—3 cr. (3 and 0)
MATH 715—INTRODUCTION TO TOPOLOGY—3 cr. (3 and 0)
MATH 717—MATHEMATICS PROGRAMS—3 cr. (3 and 0)
MATH 729—INTRODUCTION TO NUMERICAL ANALYSIS—3 cr. (3 and 0)
MATH 751—VECTOR ANALYSIS—3 cr. (3 and 0)
MATH 752—LINEAR PROGRAMMING—3 cr. (3 and 0)
MATH 753—ADVANCED CALCULUS I—3 cr. (3 and 0)
MATH 754—ADVANCED CALCULUS II—3 cr. (3 and 0)
MATH 755—LAPLACE TRANSFORMS—3 cr. (3 and 0)
MATH 757—APPLIED MATHEMATICS I—3 cr. (3 and 0)
MATH 758—APPLIED MATHEMATICS II—3 cr. (3 and 0)
MATH 763—MATHEMATICAL ANALYSIS I—3 cr. (3 and 0)
MATH 764—MATHEMATICAL ANALYSIS II—3 cr. (3 and 0)
MATH 801—GENERAL LINEAR HYPOTHESIS I—3 cr. (3 and 0)
MATH 802—GENERAL LINEAR HYPOTHESIS II—3 cr. (3 and 0)
MATH 803—STOCHASTIC PROCESSES I—3 cr. (3 and 0)
MATH 804—STOCHASTIC PROCESSES II—3 cr. (3 and 0)
MATH 805—ADVANCED METHODS IN PROBABILITY AND STATISTICS—3 cr.
(3 and 0)
MATH 821—REAL ANALYSIS I—3 cr. (3 and 0)
MATH 822—REAL ANALYSIS II—3 cr. (3 and 0)
MATH 823—COMPLEX ANALYSIS I—3 cr. (3 and 0)
MATH 824—COMPLEX ANALYSIS II—3 cr. (3 and 0)
MATH 825—ORDINARY DIFFERENTIAL EQUATIONS I—3 cr. (3 and 0)
MATH 826—ORDINARY DIFFERENTIAL EQUATIONS II—3 cr. (3 and 0)
MATH 831—FOURIER SERIES—3 cr. (3 and 0)
MATH 833—OPERATIONAL MATHEMATICS—3 cr. (3 and 0)
MATH 835—COMPLEX VARIABLES—3 cr. (3 and 0)
MATH 837—CALCULUS OF VARIATIONS—3 cr. (3 and 0)
MATH 839—INTEGRAL EQUATIONS—3 cr. (3 and 0)
MATH 851—ABSTRACT ALGEBRA I—3 cr. (3 and 0)

- MATH 852—ABSTRACT ALGEBRA I.—3 cr. (3 and 0)
- MATH 853—ADVANCED LINEAR ALGEBRA—3 cr. (3 and 0)
- MATH 855—COMBINATORIAL ANALYSIS—3 cr. (3 and 0)
- MATH 857—GROUP THEORY—3 cr. (3 and 0)
- MATH 861—NUMERICAL ANALYSIS—3 cr. (3 and 0)
- MATH 863—CALCULUS OF FINITE DIFFERENCES—3 cr. (3 and 0)
- MATH 871—GENERAL TOPOLOGY I—3 cr. (3 and 0)
- MATH 872—GENERAL TOPOLOGY II—3 cr. (3 and 0)
- MATH 881—HISTORY OF MATHEMATICS—3 cr. (3 and 0)
- MATH 883—THEORY OF NUMBERS—3 cr. (3 and 0)
- MATH 885—PROJECTIVE GEOMETRY—3 cr. (3 and 0)
- MATH 891—RESEARCH—Credit to be arranged.
- MATH 901—PROBABILITY THEORY I—3 cr. (3 and 0)
- MATH 902—PROBABILITY THEORY II—3 cr. (3 and 0)
- MATH 903—ADVANCED STOCHASTIC PROCESSES—3 cr. (3 and 0)
- MATH 905—DECISION THEORY I—3 cr. (3 and 0)
- MATH 906—DECISION THEORY II—3 cr. (3 and 0)
- MATH 907—MULTIVARIATE ANALYSIS—3 cr. (3 and 0)
- MATH 920—INTRODUCTION TO HARMONIC ANALYSIS—3 cr. (3 and 0)
- MATH 921—ABSTRACT HARMONIC ANALYSIS I—3 cr. (3 and 0)
- MATH 922—ABSTRACT HARMONIC ANALYSIS II—3 cr. (3 and 0)
- MATH 923—INTRODUCTION TO THE THEORY OF DISTRIBUTION I—3 cr. (3 and 0)
- MATH 924—INTRODUCTION TO THE THEORY OF DISTRIBUTION II—3 cr. (3 and 0)
- MATH 925—TOPICS IN NON-LINEAR DIFFERENTIAL EQUATIONS—3 cr. (3 and 0)
- MATH 927—FUNCTIONAL ANALYSIS I—3 cr. (3 and 0)
- MATH 928—FUNCTIONAL ANALYSIS II—3 cr. (3 and 0)
- MATH 929—FUNCTIONAL ANALYSIS III—3 cr. (3 and 0)
- MATH 930—FUNCTIONAL ANALYSIS IV—3 cr. (3 and 0)
- MATH 941—APPLIED MATHEMATICS I—3 cr. (3 and 0)
- MATH 942—APPLIED MATHEMATICS II—3 cr. (3 and 0)
- MATH 975—CONVEXITY I—3 cr. (3 and 0)
- MATH 976—CONVEXITY II—3 cr. (3 and 0)
- MATH 980—SPECIAL TOPICS IN PROBABILITY—3 cr. (3 and 0)
- MATH 981—SPECIAL TOPICS IN MATHEMATICAL STATISTICS—3 cr. (3 and 0)

MATH 982—SPECIAL TOPICS IN ANALYSIS—3 cr. (3 and 0)

MATH 983—SPECIAL TOPICS IN FUNCTIONAL ANALYSIS—3 cr. (3 and 0)

MATH 984—SPECIAL TOPICS IN APPLIED MATHEMATICS—3 cr. (3 and 0)

MATH 985—SPECIAL TOPICS IN ALGEBRA—3 cr. (3 and 0)

MATH 986—SPECIAL TOPICS IN CONVEXITY—3 cr. (3 and 0)

MATH 991—RESEARCH—credit variable.

MECHANICAL ENGINEERING

Professors: D. W. BRADBURY, J. L. EDWARDS, T. C. HARDIN, *Head*; E. HARRISON, A. D. LEWIS, S. M. WATSON

Associate Professors: A. C. ELROD,* W. G. HUDSON, T. YANG

Assistant Professors: J. A. CHISMAN, T. L. DRAKE, J. K. JOHNSON, JR., D. W. LYONS, C. S. RUDISILL

ME 201—ENGINEERING DESIGN AND PRODUCTION—3 cr. (2 and 3)

An introduction to engineering design with emphasis on creativity, synthesis, participation in a realistic experience in design to satisfy human needs, experimentation and analysis commensurate with the student's background in mathematics and science. Problems are authentic. The building of a prototype, at least of critical parts, is the consummation of the design. Non-technical aspects of engineering such as cost, market, contracts, and ethics are stressed. Engineering materials and methods of production are introduced to assist the student in making decisions concerning material selection and methods of production. *Corequisite:* EG 109, Phys 122, and Sophomore standing.

ME 299—DIGITAL COMPUTATION—1 cr. (0 and 3)

An introduction to digital computer programming for students majoring in mechanical engineering. Emphasis is placed on the computer languages in use at Clemson University, and their application to the solution of simple problems in mechanical engineering. *Prerequisite:* Sophomore standing.

ME 304—HEAT TRANSFER I—3 cr. (3 and 0)

A comprehensive study of the principles of heat transmission with applications to engineering problems. Special emphasis is given to the following topics: heat conduction in the steady and unsteady states; dimensional analysis of convection; free and forced convection; the combined effects of conduction, convection and radiation. *Prerequisite:* Junior standing, ME 311, or ChE 331, and Math 208.

ME 307—MECHANICAL ENGINEERING LABORATORY—1 cr. (0 and 2)

For those curriculums requiring one course in Mechanical Engineering Laboratory. The course is intended to illustrate mechanical engineering theory and to develop experimental technique. Experiments in the first and second laws of thermodynamics are covered. *Prerequisite:* ME 311.

ME 311—ENGINEERING THERMODYNAMICS I—3 cr. (3 and 0)

A study of thermodynamics as an engineering science. Topics stressed are the first and second laws of thermodynamics, properties of the pure substance, ideal gases, and gaseous mixtures. *Prerequisite:* Math 208, Phys 222, and Junior standing.

* On leave.

ME 312—ENGINEERING THERMODYNAMICS II—3 cr. (3 and 0)

A continuation of ME 311. *Prerequisite:* ME 311.

ME 313—INSTRUMENTATION AND MEASUREMENTS—1 cr. (0 and 2)

Principles of measurements, accuracy of instruments, and data analysis. Modern instruments for measuring and recording static and dynamic pressures, temperatures, fluid flow, speed, power, and torque. *Prerequisite:* Enrollment in ME 311, and EE 308, EE 310, or EE 206, EE 208.

ME 314—ENGINEERING EXPERIMENTATION—1 cr. (0 and 2)

Theoretical, analytic and statistical aspects of basic engineering experimentation. Error analysis, dimensional analysis, experimental plans, and data analyses. *Prerequisite:* Math 313.

ME 315—KINEMATICS OF MECHANISMS—3 cr. (2 and 3)

Kinematic analysis of mechanisms to include analysis of displacement, velocity, and accelerations. Gears, cams, and trains of mechanisms. Linkages, including synthesis of linkages. Application of computer methods to linkage design. Analysis of space mechanisms. *Prerequisite:* EM 202.

ME 318—DYNAMIC ANALYSIS OF MACHINES—3 cr. (2 and 3)

Dynamic and static force analysis of plane mechanisms. Dynamic force analysis of space mechanisms. Vibration analysis. Balancing. Dynamics of cams. Analog simulation of dynamic systems. Laboratory includes analytical, graphical, and computer solutions of problems in dynamic analysis. *Prerequisite:* ME 315.

ME 401—PRINCIPLES OF MECHANICAL ENGINEERING DESIGN—3 cr. (3 and 0)

Philosophy of engineering design; decision theory in design. Introduction to Optimum Design Techniques, feasibility studies, stress and strength considerations in design, deflection analysis. Design factors, cost, material selection, reliability. Creative problems are assigned to implement application of principles of design. *Prerequisite:* ME 315, ME 318, EM 304, Senior standing, concurrent registration in CrE 310.

ME 402—MECHANICAL ENGINEERING ANALYSIS AND DESIGN—3 cr. (1 and 6)

The student is given the opportunity to apply creatively his general knowledge and his knowledge of engineering in the analysis and design of one or more engineering systems, machines, or devices. Problems may be selected from two sources: A meritorious problem of the student's own choice or a problem assigned by appropriate authority. *Corequisite:* ME 401, Senior standing.

ME 403—FLUID DYNAMICS—3 cr. (3 and 0)

A continuation of EM 320. Topics include: concepts from thermodynamics; analogy between heat transfer and momentum transfer; reversible adiabatic flow with variable area; normal and oblique shocks and expansion fans; one dimensional flow in constant area ducts with friction and heat transfer; similarity laws in subsonic, transonic, and supersonic regions. *Prerequisite:* EM 320.

ME 404—PHYSICAL SYSTEMS ANALYSIS I—3 cr. (3 and 0)

Modern techniques relating to systems analysis and control are presented. Procedures necessary in obtaining meaningful data through proper instrumentation especially as associated with component terminal representation is stressed.

304 *Description of Courses*

ME 406—PHYSICAL SYSTEMS ANALYSIS II—3 cr. (3 and 0)

Operational methods in mixed systems of equations. Further concepts of modeling and optimization. State model system stability definitions and an introduction to discrete systems.

ME 407—HEAT TRANSFER II—3 cr. (3 and 0)

An engineering science course dealing with the transfer of energy. This course is designed to supplement and extend the material covered in ME 304. A rigorous study of conduction, convection, and radiation including transient and periodic heat transfer and an introduction to mass and momentum transport phenomena. *Prerequisite:* ME 304, Math 208, and Senior standing.

ME 408—DESIGN OF MACHINE ELEMENTS—3 cr. (2 and 3)

Design of machines and machine components, including analysis synthesis, layout, and reports. A synthesis course with emphasis on making decisions. *Prerequisite:* ME 401.

ME 411—GAS POWER—3 cr. (3 and 0)

A study of the effects of variation in specific heat, some fundamentals of compressible flow, the combustion process, and chemical dissociation. The theoretical and actual processes associated with the gas turbine, the thermal jet, the thermal rocket, and the spark ignition and compression ignition reciprocating engines are analyzed. *Prerequisite:* ME 312 and Senior Engineering standing.

ME 412—THERMAL POWER SYSTEMS—3 cr. (3 and 0)

Topics stressed are the design, arrangement and economic justification of steam power plant equipment. *Prerequisite:* ME 304, 312, and Senior standing.

ME 413—MECHANICAL ENGINEERING LABORATORY—1 cr. (0 and 2)

Experimental investigations in a wide variety of mechanical engineering areas, such as fluid dynamics, automatic control, heat and mass transfer, combustion, thermodynamics, and solid mechanics. *Prerequisite:* ME 313 and 314.

ME 414—MECHANICAL ENGINEERING LABORATORY—1 cr. (0 and 2)

Continuation of ME 413.

ME 415—UNDERGRADUATE RESEARCH—1 to 3 cr.

Individual research projects to be conducted under the direct supervision and guidance of a faculty member. *Prerequisite:* Consent of instructor.

ME 416—UNDERGRADUATE RESEARCH—1 to 3 cr.

Individual research projects to be conducted under the direct supervision and guidance of a faculty member. *Prerequisite:* Consent of instructor.

ME 421—PROPULSION SYSTEMS I—3 cr. (3 and 0)

Detailed analysis of the thermochemical processes and the associated effects of chemical dissociation. A study of the energy and entropy relation based upon the datum of absolute zero degree Rankine. *Prerequisite:* ME 411 or the equivalent.

ME 422—PRINCIPLES OF TURBOMACHINERY—3 cr. (3 and 0)

The guiding principles underlying all forms of turbomachinery. A unified treatment of turbomachinery to include pumps, fans, compressors and steam, gas and hydraulic turbines. Dimensional analysis as applied to turbomachinery, Euler's Equation, concepts of specific speed and thermodynamics of turbomachinery processes and allied topics are covered. *Prerequisite:* ME 312, EM 320, and Senior standing.

ME 424—ENGINEERING ANALYSIS—3 cr. (2 and 3)

A senior-level course requiring the student to utilize his knowledge of mathematics, fluid and solid mechanics, thermodynamics, heat transfer, and other background work in solving engineering problems. Both analog and digital computers are utilized as tools contributing to these solutions. *Prerequisite:* ME 299, ME 312, ME 304, EM 320.

ME 429—AIR CONDITIONING—3 cr. (3 and 0)

A study of the principles of heating and air conditioning, including calculation of heat loss and heat gains for buildings, heating and cooling systems, psychrometric principles, air distribution, refrigeration and automatic control apparatus. *Prerequisite:* ME 304, 312, and Senior standing.

ME 430—AIR CONDITIONING DESIGN—1 cr. (0 and 3)

An application of the theory covered in ME 429 to the design of air-conditioning systems. *Prerequisite:* Enrollment in ME 429.

ME 433—AERODYNAMICS—3 cr. (3 and 0)

The flow of incompressible inviscid fluids in two dimensions. The vector flow field, Gauss's Theorem, Stoke's Theorem, the velocity potential and stream function. Euler's Equation applied to incompressible fluids, superposition of flows. Method of conformal mapping and non-steady incompressible flow problems. *Prerequisite:* ME 312, EM 320.

ME 480—METHODS OF OPERATIONS RESEARCH I—3 cr. (3 and 0)

Applications and elementary theory of selected topics from Operations Research. Topics included are linear algebra, linear programming, transportation and assignment problems, network analysis, and game theory. *Prerequisite:* ME 299 and Math 313 or equivalent.

ME 481—METHODS OF OPERATIONS RESEARCH II—3 cr. (3 and 0)

A continuation of ME 484. Topics included are nonlinear programming, dynamic programming, queuing theory, and markov processes. *Prerequisite:* ME 480 or consent of instructor.

ME 701—PRINCIPLES OF MECHANICAL ENGINEERING DESIGN—3 cr. (3 and 0)

ME 702—MECHANICAL ENGINEERING ANALYSIS AND DESIGN—3 cr. (1 and 6)

ME 703—FLUID DYNAMICS—3 cr. (3 and 0)

ME 704—PHYSICAL SYSTEMS ANALYSIS—3 cr. (3 and 0)

ME 706—PHYSICAL SYSTEMS ANALYSIS II—3 cr. (3 and 0)

ME 707—HEAT TRANSFER II—3 cr. (3 and 0)

ME 711—GAS POWER—3 cr. (3 and 0)

ME 721—PROPULSION SYSTEMS I—3 cr. (3 and 0)

ME 722—PRINCIPLE OF TURBOMACHINERY—3 cr. (3 and 0)

ME 801—THERMAL ENVIRONMENTAL ENGINEERING—3 cr. (3 and 0)

ME 808—FLUID MECHANICS—3 cr. (3 and 0)

ME 809—AERODYNAMICS—3 cr. (3 and 0)

ME 810—ADVANCED THERMODYNAMICS—3 cr. (3 and 0)

ME 811—GAS DYNAMICS II—3 cr. (3 and 0)

- ME 812—BOUNDARY LAYER THEORY I—3 cr. (3 and 0)
ME 813—GAS DYNAMICS III—3 cr. (3 and 0)
ME 814—HYPERSONICS—3 cr. (3 and 0)
ME 815—KINETIC THEORY OF GASES—3 cr. (3 and 0)
ME 824—PROPULSION SYSTEMS—3 cr. (3 and 0)
ME 830—HEAT TRANSFER III—3 cr. (3 and 0)
ME 831—HEAT AND MASS TRANSFER IV—3 cr. (3 and 0)
ME 840—KINEMATICS II—3 cr. (3 and 0)
ME 842—ADVANCED MECHANICAL ENGINEERING DESIGN I—3 cr. (3 and 0)
ME 843—ADVANCED MECHANICAL ENGINEERING DESIGN II—3 cr. (3 and 0)
ME 844—DYNAMICS OF ELASTIC MECHANICAL SYSTEMS—3 cr. (3 and 0)
ME 860—DYNAMIC PROGRAMMING—3 cr. (3 and 0)
ME 861—NONLINEAR PROGRAMMING—3 cr. (3 and 0)
ME 862—ANALYTICAL METHODS OF SYSTEMS ANALYSIS—3 cr. (3 and 0)
ME 863—ADVANCED PHYSICAL SYSTEMS I—3 cr. (3 and 0)
ME 864—ADVANCED PHYSICAL SYSTEMS II—3 cr. (3 and 0)
ME 865—MODERN CONTROL THEORY—3 cr. (3 and 0)
ME 866—NONLINEAR CONTROL THEORY—3 cr. (3 and 0)
ME 867—SYSTEMS COMPONENTS—3 cr. (3 and 0)
ME 868—CONTROL OF AEROSPACE SYSTEMS—3 cr. (3 and 0)
ME 870—BIOSYSTEMS ANALYSIS—3 cr. (3 and 0)
ME 880—ADVANCED METHODS OF OPERATIONS RESEARCH I—3 cr. (3 and 0)
ME 881—ADVANCED METHODS OF OPERATIONS RESEARCH II—3 cr. (3 and 0)
ME 882—RELIABILITY ENGINEERING—3 cr. (3 and 0)
ME 883—OPERATIONS SYSTEM SIMULATION I—3 cr. (3 and 0)
ME 884—OPERATIONS SYSTEM SIMULATION II—3 cr. (3 and 0)
ME 885—OPERATIONS RESEARCH IN PRODUCTION CONTROL—3 cr. (3 and 0)
ME 891—RESEARCH—Credit to be arranged.
ME 893—SELECTED TOPICS IN MECHANICAL ENGINEERING—1-6 cr. (1-6 and 0)
ME 912—BOUNDARY LAYER THEORY II—3 cr. (3 and 0)
ME 914—MAGNETOHYDRODYNAMICS—3 cr. (3 and 0)
ME 915—ENERGY CONVERSION—3 cr. (3 and 0)
ME 930—CONDUCTION HEAT TRANSFER—3 cr. (3 and 0)
ME 931—CONVECTION HEAT TRANSFER—3 cr. (3 and 0)
ME 932—RADIATION HEAT TRANSFER—3 cr. (3 and 0)
ME 940—APPLIED PLASTICITY—3 cr. (3 and 0)
ME 941—THEORY OF LUBRICATION AND WEAR—3 cr. (3 and 0)
ME 991—DOCTORAL RESEARCH—Credit to be arranged.

MEDICAL TECHNOLOGY

Anderson—*Lecturer*: T. C. NATION

Greenville—*Lecturers*: E. A. DRESKIN, D. G. KILGORE, JR.

Spartanburg—*Lecturer*: M. F. PATTON

MED TECH 401—SEROLOGY AND IMMUNOLOGY—4 cr. (21,10,49)*

Presents the basic principles of serology and immunology and the tests utilizing these principles to detect abnormalities helpful in the diagnosis of disease.

MED TECH 402—MICROBIOLOGY—7 cr. (59,6,470)

The principles of microbiology-bacteriology, mycology, and parasitology. Emphasis is placed on human pathogenic organisms, using both fresh and prepared organisms.

MED TECH 403—HEMATOLOGY—5 cr. (12,32,276)

Information on blood as a tissue, the theory of hematological tests, factors that affect test reliability. Knowledge of test results and knowledge of blood dyscrasias. Skill in the performance of hematological tests is emphasized and the use of automation techniques is covered.

MED TECH 404—BLOOD BANK—3 cr. (8,20,132)

History and principles of blood group systems and methods of cross matching. Testing for, and quantitative determination of, Rh antibodies with all available techniques. Selection, pre-testing and bleeding of donors and processing of blood for transfusions.

MED TECH 405—CYTOLOGY—1 cr. (2,12,26)

An introduction to cytology and cytologic techniques in the diagnosis of cancer. Definition and brief history, sources of material, collection and preservation of specimens, together with practice in interpretation.

MED TECH 406—HISTOLOGY—3 cr. (20,30,190)

Histologic preparation, including actual preparation of tissue specimens derived from surgical procedures and autopsies. Routine and special staining, together with experience using the Cryostat.

MED TECH 407—URINALYSIS—2 cr. (10,8,102)

The study of renal function together with principles of urine analysis, pregnancy tests and anatomy of the urinary system. Emphasis is placed on laboratory procedures and their utilization to detect abnormalities helpful in the diagnosis of disease.

MED TECH 408—CHEMISTRY—10 cr. (40,50,470)

Introduction to the chemistry of carbohydrates, nitrogen, calcium, and phosphorus compounds, acid-base balance, etc., with emphasis on the chemistry of blood and urine using both qualitative and quantitative procedures in the laboratory.

MED TECH 409—RADIOISOTOPES—1 cr. (2,0,7)

Introduction to principles of diagnostic radioisotope procedures and the use of the scintillation detector, the well counter, and the scaler.

* First figure represents lecture hours, second figure represents seminar hours, and the third figure represents clinical practice hours.

METALLURGICAL ENGINEERING

Associate Professor: L. E. POTEAT

Assistant Professors: B. P. BARDES,* D. A. VENKATU

MetE 202—INTRODUCTION TO METALLURGY—3 cr. (3 and 0)

A survey of the field of metallurgical operations, extractive, mechanical and physical. Designed to acquaint the student with the various fields of operation and provide basic information for more advanced courses.

MetE 220—EXTRACTIVE METALLURGY—3 cr. (3 and 0)

The processes used to reduce ore to metal. This course is a survey of both the ferrous and non-ferrous extractive processes. Pyrometallurgical, electro-metallurgical and hydrometallurgical processes will be studied.

MetE 301—PHYSICAL METALLURGY—3 cr. (2 and 3)

The first of two sequential courses to acquaint the student with the nature and properties of metals. The properties of metals are defined and studied in terms of solid state physics which explains how and why metals have the useful properties that they do possess. Basic metal forming processes involving these principles are studied. *Prerequisite:* MetE 202 or 302.

MetE 302—GENERAL METALLURGY—3 cr. (2 and 3)

Basic general metallurgy for students in Engineering and related curriculums. This course is designed to acquaint students with the properties of metals so that they may select intelligently for engineering applications. The nature of metals and of metal working processes are considered. *Prerequisite:* Junior standing in Engineering.

MetE 304—PHYSICAL METALLURGY—3 cr. (2 and 3)

A continuation of MetE 301. In this portion of the course alloys are considered particularly. The use of an alloy diagram to represent properties and phases is studied. The student learns to interpret and construct these diagrams. Solid state phase changes are studied, such as occur in the heat treating of steel and the age hardening of aluminum alloys. *Prerequisite:* MetE 301.

MetE 320—MECHANICAL METALLURGY—2 cr. (2 and 0)

The processes whereby useful shapes are formed in metal, and the response of the metal to the deformative forces. Rolling, forging, extrusion, drawing and "high energy" deformations are studied. The effects of these forces on the character and properties of the metal are evaluated. *Prerequisite:* MetE 304 or consent of instructor.

MetE 323—METALLOGRAPHY—2 cr. (1 and 3)

The development of techniques necessary for metallographic investigations. The selection, cutting, mounting and polishing of specimens; the use of the microscope; the techniques of etching, and of photography. Training in the use of laboratory equipment in evaluating metallic material. *Prerequisite:* MetE 304, or MetE 302 and consent of instructor.

MetE 350—METALLURGY OF CAST METALS—3 cr. (2 and 3)

The fundamentals of melting, fluxing, pouring, and the control of the solidification of metals in molds. The metallurgical aspects of the production of all kinds of castings—sand mold, permanent mold, shell mold, die casting, and

* On leave.

centrifugal casting. Studies are made of the physical properties of castings. *Prerequisite:* MetE 302 or MetE 304.

METE 402—METALLURGICAL LITERATURE—1 cr. (0 and 3)

To acquaint students with sources of information on metallurgy and to develop a background for the senior thesis. *Prerequisite:* Senior standing in Metallurgical standing.

METE 408—HEAT TREATING—3 cr. (2 and 3)

The phase changes in both ferrous and non-ferrous metals caused by changes in environment at significant times in the processing. Studies relating the time-temperature changes in metals with their physical properties. *Prerequisite:* MetE 302 or MetE 304.

METE 425—SENIOR THESIS—2 cr. (0 and 6)

The independent investigation of a project in Metallurgical Engineering. A competent bachelor thesis is required. *Prerequisite:* Senior standing in Metallurgical Engineering.

METE 430—POWDER METALLURGY—3 cr. (2 and 3)

The production of metal powders and of articles from these powders. By powder metal techniques it is possible to produce controlled porosity, unconventional alloys and to produce complex parts of limited size rapidly, accurately, and economically. Combinations of metals and non-metals may be produced. *Prerequisite:* MetE 302 or MetE 304.

METE 440—METALLURGY OF REACTOR MATERIALS—3 cr. (2 and 3)

The metallurgy of materials used in reactor construction. The physical metallurgy of metallic fuels, controls, reflectors, and shielding. The effects of radiation on structural metals will be considered. *Prerequisite:* Senior standing and the consent of the instructor.

METE 450—METALLIC CORROSION—3 cr. (2 and 3)

The corrosion of metallic materials and means of preventing such corrosion. Environmental factors in corrosion are considered. *Prerequisite:* MetE 302 or MetE 304.

METE 455—ELECTROMETALLURGY—3 cr. (2 and 3)

The electrowinning and electrorefining of metals. Electrothermic cells will be studied. The principles and operation of electric furnaces will be considered. Electroplating, electroetching and electromachining will be studied. *Prerequisite:* MetE 302 or MetE 304 and EE 308.

METE 802—RESEARCH TECHNIQUES IN PHYSICAL METALLURGY—3 cr. (2 and 3)

METE 805—PHYSICAL METALLURGY I—3 cr. (3 and 0)

METE 806—PHYSICAL METALLURGY II—3 cr. (3 and 0)

METE 820—DEFORMATION MECHANISMS IN SOLIDS—3 cr. (3 and 0)

METE 821—STRENGTHENING MECHANISMS IN SOLIDS—3 cr. (3 and 0)

MILITARY SCIENCE

Professor: COLONEL M. C. BROWN

Assistant Professors: LT. COL. V. D. R. GUIDE, LT. COL. C. F. TISDALE, LT. COL. B. C. WRIGHT, MAJ. R. A. ANDERSON, MAJ. M. E. HALTIWANGER, MAJ. J. D. RABON, CAPT. T. G. BERRY, CAPT. J. D. BRITTON, CAPT. R. J. BRITZ, CAPT. M. W. DOWDLE, JR., CAPT. R. D. JAMES, CAPT. K. S. LYON, CAPT. M. E. MANN, CAPT. O. M. MARTIN, CAPT. R. D. NEWMAN, CAPT. W. M. SHEPHERD

MS 101—FUNDAMENTALS (BASIC)—1 cr. (2 and 1)

Introduction to organization, equipment, and mission of Reserve Officers Training Corps and the U. S. Army, with detailed study of smaller units and basic aims and discussion seminar on current events. Laboratory periods provide training in basic drill, discipline, and leadership.

MS 102—ARMY AND NATIONAL SECURITY (BASIC)—1 cr. (2 and 1)

Organization of Department of Defense, roles and missions of the Armed Forces with particular emphasis on U. S. Army. Effects of modern weapons, including chemical, biological, and radiological, with sub-course on mass casualty treatment, first aid, and effective communications. Current events seminar. Drill.

MS 201—AMERICAN MILITARY HISTORY (BASIC)—1 cr. (2 and 1)

A survey of American military history from the origins of the American Army to the present, with emphasis on the factors which led to the organizational, tactical, logistical, operational, strategic, social, and similar patterns found in our present-day Army.

MS 202—INTRODUCTION TO OPERATIONS AND BASIC TACTICS AND MAP AND AERIAL PHOTOGRAPH READING (BASIC)—1 cr. (2 and 1)

An introduction to the organization, composition, and mission of infantry rifle squad and small infantry-tank teams. Interpretation and use of maps and aerial photographs in study and evaluation of terrain.

MS 300—MILITARY SCIENCE (ADVANCED)—6 cr. (ROTC 3, ELECTIVE 3)

Study and practical application of Leadership; Military Teaching Principles; Branches of the Army; Small Unit Tactics and Communications. Further training for duty as officers by application of principles of leadership in actual command during drills, parades, reviews, inspections and ceremonies. One three-hour elective, presented by appropriate department, in the fields of Effective Communications, Science Comprehension, General Psychology, Political Development, or Political Institutions. Students have the option of taking the elective course or Advanced ROTC during either semester but must participate in Leadership Laboratory Training throughout the School Year.

Three class hours and two laboratory hours (presented by Military Science Department) each week in one semester and three class hours (elective presented by appropriate department) and two laboratory hours (presented by Military Science Department) each week in the other semester.

MS 400—MILITARY SCIENCE (ADVANCED)—6 cr. (ROTC 3, ELECTIVE 3)

A study of Military Operations; Logistics; Military Law; Role of the United States in World Affairs; Service Orientation; and Leadership Laboratory. One three-hour elective course, presented by appropriate department, in the fields

of Effective Communications, Science Comprehension, General Psychology, Political Development or Political Institutions. Students have the option of taking the elective or Advanced ROTC during either semester but must participate in Leadership Laboratory Training throughout the School Year.

Three class hours and two laboratory hours (presented by Military Science Department) each week in one semester and three class hours (elective presented by appropriate department) and two laboratory hours (presented by Military Science Department) each week in the other semester.

MUSIC

Assistant Professor: J. H. BUTLER *

Instructors: EDITH B. CARD, J. E. JACKSON

Visiting Assistant Professor: B. F. COOK

Mus 310—MUSIC APPRECIATION: MUSIC IN THE WESTERN WORLD—3 cr. (3 and 0)

Designed to widen and deepen the student's appreciation of his musical heritage through a study of the development of music in Western culture from the time of the early Christians to the present. Not open to students who have taken Mus 402.

Mus 315—MUSIC HISTORY—3 cr. (3 and 0)

The development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods.

Mus 316—MUSIC HISTORY—3 cr. (3 and 0)

Continuation of Mus 315. Music from 1750 to present. *Prerequisite:* Mus 315.

Mus 361—MARCHING BAND—1 cr. (0 and 3)

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Fall semester only. *Prerequisite:* Consent of director.

Mus 362—CONCERT BAND—1 cr. (0 and 3)

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. Spring semester only. *Prerequisite:* Consent of director.

Mus 363—MEN'S GLEE CLUB—1 cr. (0 and 3)

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. *Prerequisite:* Consent of director.

Mus 364—WOMEN'S GLEE CLUB—1 cr. (0 and 3)

Ensembles: Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music; public performances given

* On leave.

periodically in addition to the minimum rehearsal time; may be repeated for credit, with a maximum of four hours of ensemble credit allowable toward a degree. *Prerequisite:* Consent of director.

MUS 400—MUSIC IN THE ELEMENTARY SCHOOL CLASSROOMS—3 cr. (3 and 0)

Designed to give the teacher in the elementary school a familiarity with music suitable for use with children at the elementary level. Recordings of appropriate music, pre-band instruments, unison and part singing will be included. No previous training in music is required.

MUS 401—METHODS AND MATERIALS IN ELEMENTARY SCHOOL MUSIC—3 cr. (3 and 0)

Materials, methods, and techniques in elementary school music. *Prerequisite:* Mus 400.

MUS 405—MUSIC THEORY—3 cr. (3 and 0)

The principles of notation, its symbols and abbreviations, major and minor scales, intervals and chords, measure, rhythm and tempo, and the terminology of music are the principal topics covered in this course.

MUS 406—MUSIC THEORY—3 cr. (3 and 0)

Continuation of Mus 405 with emphasis on sight singing, melodic dictation, and secondary chord structure. *Prerequisite:* Mus 405.

MUS 411—AMERICAN MUSIC: MUSIC APPRECIATION—3 cr. (3 and 0)

Music in America from 1620 to the present. Indigenous and borrowed influences will be examined.

NURSING

Acting Director: LIDA M. WILLIAMS

Assistant Professors: DOROTHY C. DAVENPORT, AILEEN S. PREVOST

Instructors: JUDITH A. BOUKNIGHT, EDITH G. GUNTER, BEVERLY D. ROBERTS

Lecturer: J. L. HENSON

NURS 101—INTRODUCTION TO NURSING—6 cr. (3 and 9)

An introduction to nursing through historical concepts, interpersonal relations, health, hygiene, hospital community, basic nursing skills, asepsis, medications, assisting with diagnostic and therapeutic measures. Concurrent laboratory experiences are carefully selected.

NURS 102—ACUTE ILLNESSES—ADULT—6 cr. (2 and 12)

Built on the concepts of Nurs 101 with increasing depth to include—beginning understandings of body responses to illness. Carefully selected clinical experiences continue.

NURS 103—PRINCIPLES OF NUTRITION—4 cr. (3 and 3)

Nutrition is discussed in relation to the requirement and role of nutrients in mammalian metabolism—nutrition and disease are emphasized. Laboratory exercises demonstrate nutrient assay methods and the importance of selected nutrients in mammalian diets.

NURS 104—MEDICAL-SURGICAL NURSING I—5 cr. (3 and 6)

A continuation of Nurs 102. It is concerned with nursing care of adult patients with long term illnesses and focusses on disruption of family living.

NURS 105—INTEGRATED SCIENCE I—4 cr. (3 and 3)

A general course surveying chemistry, human anatomy, physiology, and microbiology, and emphasizing the physical and chemical bases for physiology.

NURS 106—INTEGRATED SCIENCE II—4 cr. (3 and 3)

Continuation of Nurs 105.

NURS 201—PSYCHODYNAMIC NURSING—5 cr. (3 and 6)

Designed to develop basic understandings and skills in the nursing care of patients with behavioral and anxiety problems. Lectures, discussions, field trips and clinical experiences are used concurrently.

NURS 202—PEDIATRIC NURSING—5 cr. (3 and 6)

This course presents the nursing care of children from infancy to adolescence. It considers disease processes that cause deviation from normal through all stages of growth and development.

NURS 204—MATERNAL AND NEWBORN CARE—5 cr. (3 and 6)

This course is divided into two parts, the first of which is concerned with the care of mothers and newborn infants, emphasis being placed on the care of mothers during pregnancy, delivery and postpartum. The other part studies the care of children from infancy through adolescence.

NURS 206—MEDICAL-SURGICAL NURSING II—6 cr. (3 and 9)

This is a continuation of Nurs 104. Emphasis is placed on the planning and executing care plans for groups of patients in conjunction with various co-workers present in hospital settings today. The student is introduced to her responsibilities as a graduate nurse.

NUTRITION

Professors: B. D. BARNETT, W. A. KING, R. F. WHEELER

Associate Professors: R. F. BORGMAN, W. V. CHALUPA, R. L. EDWARDS, W. C. MICKELBERRY, W. P. WILLIAMS

Assistant Professors: L. CROOK, D. E. TURK

(See courses listed under Animal Science, Biochemistry, Dairy Science, Food Science, and Poultry Science)

NUTR 851—NUTRITION SEMINAR I—1 cr. (1 and 0)

NUTR 852—NUTRITION SEMINAR II—1 cr. (1 and 0)

NUTR 891—RESEARCH—Credit to be arranged.

NUTR 991—DOCTORAL RESEARCH—Credit to be arranged.

PHILOSOPHY

Assistant Professors: R. B. HARRIS, D. F. WHITE, JR.

PHIL 201—INTRODUCTION TO PHILOSOPHY—3 cr. (3 and 0)

An introduction to the basic issues involved in philosophical thinking, with special emphasis upon these issues as they occur in Greek philosophy. The systems of Plato and Aristotle will be considered in some detail.

PHIL 202—LOGIC—3 cr. (3 and 0)

An introduction to the methods and techniques of logic and continuing to elementary symbolic logic.

PHIL 303—PHILOSOPHY OF RELIGION—3 cr. (3 and 0)

An analytical and critical consideration of the philosophical foundations of religion. Such topics as the existence of God, the problem of evil, theism and atheism, prayer, and immortality will be considered.

PHIL 304—INTRODUCTION TO ETHICAL THEORY—3 cr. (3 and 0)

An examination of moral judgment: its concepts, criteria and relations to factual judgment. Classical theories and current issues are searched for an ideal of the good man and the life we prize. Construction of a model theory of obligation, value, justice, and punishment is attempted.

PHIL 305—AESTHETICS—3 cr. (3 and 0)

A study of the function of art in human life along with a consideration of the various philosophical elements involved in art and art criticism. Various historical types of aesthetic theory will be considered. *Prerequisite:* Junior standing or permission of the instructor.

PHIL 309—RELIGIONS OF THE FAR EAST—3 cr. (3 and 0)

A study of the origin, evolution, and contemporary status of Hinduism, Buddhism, Confucianism, and Taoism. *Prerequisite:* Junior standing.

PHIL 312—MODERN PHILOSOPHY—3 cr. (3 and 0)

The development of the modern mind as seen in the Renaissance and Eighteenth Century philosophers. The writings of Hobbes, Locke, Spinoza, Leibniz, Hume, and Kant will be considered along with the development of Rationalism and Empiricism.

PHIL 318—CONTEMPORARY PHILOSOPHY—3 cr. (3 and 0)

A study of some of the recent schools and movements in philosophy. Pragmatism, Existentialism, Vitalism, Recent Realism, and some of the linguistic schools will be considered.

PHIL 322—SYMBOLIC LOGIC—3 cr. (3 and 0)

A consideration of the necessary logical structure of a very exact language in terms of modern relational logic. Quantification, Truth Functions, Propositional Functions, Properties of Relations, Arguments Involving Relations, and some non-formal logical systems will be considered. *Prerequisite:* Phil 302 or Math 205 or a computer programming course.

PHIL 422—MATHEMATICAL LOGIC—3 cr. (3 and 0)

A detailed and rigorous study of a logical system as a foundation for mathematics. An analysis of basic concepts occurring in the foundations of mathematics. *Prerequisite:* Phil 322 or sufficient mathematical background.

PHIL 425—PHILOSOPHY OF SCIENCE—3 cr. (3 and 0)

A study of the presuppositions, categories, and implications of the physical and social sciences with special reference to the concepts of Space and Time, Matter, Causation, and Relativity. The logic of "scientific method" and the unity of the sciences are considered. *Prerequisite:* Junior standing and permission of the instructor.

PHYSICS

Professors: L. D. HUFF, H. E. VOGEL, *Head*

Associate Professors: R. L. CHAPLIN, JR., W. E. GETTYS, H. W. GRABEN, D. P. MILLER, M. G. MILLER, M. D. SHERRILL, M. J. SKOVE, E. P. STILLWELL, JR., K. L. WOOD

Assistant Professors: P. B. BURT, T. F. COLLINS,* J. L. GING, F. J. KELLER, J. R. RAY, P. A. STEINER, C. W. ULBRICH

Instructor: J. A. GILREATH

PHYS 101—CURRENT TOPICS IN MODERN PHYSICS—0 cr. (0 and 2)

Demonstrations and lectures supplemented by slides and motion pictures on current topics in physics such as superfluids, lasers, superconductors, elementary particles, etc., chosen from the fields of atomic, nuclear, solid state physics, and astrophysics. Several members of the staff will participate.

PHYS 122—MECHANICS AND WAVE PHENOMENA—3 cr. (3 and 0)

Vectors; laws of motion; rotation; vibratory and wave motion; mechanical properties of materials. *Prerequisite:* Registration in Math 205.

PHYS H122—MECHANICS AND WAVE PHENOMENA—3 cr. (3 and 0)

Honors section of Phys 122. Open by invitation only.

PHYS 132—GENERAL PHYSICS FOR PHYSICS MAJORS—3 cr. (3 and 0)

Introduction to physical quantities, linear and rotational motion, conservation laws, gravitational and electric fields, and kinetic theory. *Prerequisite:* Registration in Math 205.

PHYS 201—GENERAL PHYSICS—3 cr. (3 and 0)

Motion; equilibrium; the conservation of momentum, mass and energy; vibrations; waves; temperature and heat. *Prerequisite:* Registration in Phys 203.

PHYS 202—GENERAL PHYSICS—3 cr. (3 and 0)

A continuation of Phys 201: Optics of lenses and mirrors; light waves; electric charges and currents, magnetism, electric and magnetic fields; properties of atomic particles; structure of atoms. *Prerequisite:* Phys 201 and registration in Phys 204.

PHYS 203—GENERAL PHYSICS LABORATORY—1 cr. (0 and 3)

Experiments designed to test or exemplify the laws studied in Phys 201 and to introduce precision measuring instruments. *Prerequisite:* Registration in Phys 201.

PHYS 204—GENERAL PHYSICS LABORATORY—1 cr. (0 and 3)

A continuation of Phys 203 using optical and electrical instruments. *Prerequisite:* Registration in Phys 202.

PHYS 221—THERMAL AND ELECTRICAL PHENOMENA—3 cr. (3 and 0)

Thermal properties of matter; electric and magnetic fields; electric currents and circuits; motions of charged particles in fields. *Prerequisite:* Phys 122, registration in Phys 223.

PHYS H221—THERMAL AND ELECTRICAL PHENOMENA—3 cr. (3 and 0)

Honors section in Phys 221. Open by invitation only.

* On leave.

PHYS 222—OPTICS AND MODERN PHYSICS—3 cr. (3 and 0)

Theory of light waves and photons; optical instruments; relativity; atomic particles; nuclear physics. *Prerequisite:* Phys 221, registration in Phys 224.

PHYS H222—OPTICS AND MODERN PHYSICS—3 cr. (3 and 0)

Honors section in Phys 222. Open by invitation only.

PHYS 223—ENGINEERING PHYSICS LABORATORY—1 cr. (0 and 3)

An introduction to physical experimentation employing the Berkeley A laboratory course. Experiments are performed in acceleration and deflection of electrons, measurement of electron charge to mass ratio by helical motion and time of flight, oscillating systems involving capacitance, resistance and inductance, resonance, modulation, negative resistance and relaxation oscillations. *Prerequisite:* Registration in Phys 221 or 231.

PHYS 224—ENGINEERING PHYSICS LABORATORY—1 cr. (0 and 3)

Continuation of Phys 223. Experiments in the areas of solid state, optical and modern physics. Experiments are performed on electrical carrier mobility in solids, minority carrier lifetime, transistor action, microwave optics, interference and diffraction, light polarization, gas laser optics, optical spectra, electron and X-ray diffraction, radioactive particle counting, Compton scattering of X-rays, radioactive decay and Mossbauer effect. *Prerequisite:* Registration in Phys 222 or 232.

PHYS 231—GENERAL PHYSICS FOR PHYSICS MAJORS II—3 cr. (3 and 0)

A continuation of Phys 132. An introduction to the magnetic field, electric circuits, wave motion, reflection, refraction, diffraction of waves, electromagnetic waves. *Prerequisite:* Phys 132, registration in Phys 223.

PHYS 232—GENERAL PHYSICS FOR PHYSICS MAJORS III—3 cr. (3 and 0)

A continuation of Phys 231. An introduction to thermodynamics, relativity, particle and wave descriptions of matter and light. Includes a description of experiments which were crucial to recent developments in physics. *Prerequisite:* Phys 231, registration in Phys 224.

PHYS 304—DESCRIPTIVE ASTRONOMY—3 cr. (3 and 0)

The properties of the planets and their satellites, their actual and apparent motions; the properties of stars and galaxies; current theories and speculations. *Prerequisite:* Phys 202, 222 or 232.

PHYS 321—MECHANICS I—3 cr. (3 and 0)

Statics; motions of particles and rigid bodies; vibratory motion; gravitation; properties of matter, flow of fluids. *Prerequisite:* Phys 221 or 231, registration in Math 306.

PHYS 322—MECHANICS II—3 cr. (3 and 0)

Dynamics of particles and of rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. *Prerequisite:* Phys 321 or permission of instructor.

PHYS 325—EXPERIMENTAL PHYSICS I—4 cr. (2 and 6)

Introduction to laboratory techniques, measurement of fundamental constants, and performance of some of the experiments (Stern-Gerlach, Zeeman, Photoelectric, specific charge of electrons and protons, etc.) which are crucial to the development of our present concepts of physics. *Prerequisite:* Phys 321 or equivalent or enrollment in Phys 321 or by permission of the instructor.

PHYS 326—EXPERIMENTAL PHYSICS II—4 cr. (2 and 6)

Continuation of Phys 325.

PHYS 341—ELECTRICITY AND MAGNETISM—3 cr. (3 and 0)

Electric potential and electrostatic fields; solutions of Laplace's and Poisson's equations; properties of dielectrics and of capacitors; electrostatic energy; current and treatment of circuit problems. Vector analysis is used throughout after introduction. *Prerequisite:* Phys 221 or 231 and registration in Math 306.

PHYS 401—SENIOR THESIS—3 cr. (1 and 6)

The senior thesis is a semi-original piece of work performed under the direction of a member of the physics staff. Theoretical fields available include relativity, statistical mechanics, nuclear physics and astrophysics. Experimental work may be done in the fields of X-ray diffraction, elasticity, low-temperature thermal conductivity, super-conductivity, radiation damage in metals, and electron paramagnetic resonance. *Prerequisite:* At least three physics courses beyond General Physics.

PHYS 404—ASTRODYNAMICS—3 cr. (3 and 0)

Astronomical coordinate systems, orbit determinations, multiple body problems, perturbations, non-gravitational and relativistic effects and observational theory. Special attention to problems of artificial satellites. *Prerequisite:* Phys 321.

PHYS 432—PHYSICAL OPTICS AND INTRODUCTION TO SPECTROSCOPY—3 cr. (3 and 0)

Theory and application of interference and diffraction phenomena, polarized light, magneto-optics and electro-optics. Introductory theory of spectroscopy.

PHYS 441—ELECTRICITY AND MAGNETISM—3 cr. (3 and 0)

A continuation of Phys 341. Magnetic fields and energy; magnetic properties of materials; electromagnetic induction; A. C. circuit problems with vector methods and complex numbers; Maxwell's field equations with applications. *Prerequisite:* Phys 341 or equivalent.

PHYS 446—SOLID STATE PHYSICS—3 cr. (3 and 0)

An introductory treatment of the crystal structure of solids and the properties of solids which depend on crystal structure; free electron model of metals; band theory of solids; Brillouin zones, crystalline defects and diffusion. *Prerequisite:* Phys 455 or permission of instructor.

PHYS 452—INTRODUCTORY NUCLEAR PHYSICS—3 cr. (3 and 0)

Various phases of nuclear physics including natural and induced radioactivity; properties of alpha, beta and gamma-rays; cosmic rays; nuclear energy levels and decay schemes; particle accelerators, fission, fusion and nuclear reactors. *Prerequisite:* Phys 455 or permission of instructor.

PHYS 454—NUCLEAR PHYSICS LABORATORY—1 cr. (0 and 3)

Techniques and instruments used in detection and measurement of nuclear radiation. Experiments include half-life determination, absorption measurements, neutron activation, coincidence measurements, decay schemes, and gamma-ray spectroscopy. *Prerequisite:* Registration in Phys 452.

PHYS 455—QUANTUM PHYSICS I—3 cr. (3 and 0)

Discussion of solutions of the Schroedinger equation for free particles, the hydrogen atom and the harmonic oscillator.

PHYS 456—QUANTUM PHYSICS II—3 cr. (3 and 0)

Continuation of Physics 455. Application of principles of quantum mechanics as developed in Physics 455 to atomic, molecular, solid state and nuclear systems. *Prerequisite:* Phys 455.

PHYS 460—MODERN PHYSICS FOR HIGH SCHOOL TEACHERS—3 cr. (3 and 0)

A study of later developments including the measurements of atomic particles. The formulation of new laws and the modifications of old ideas needed to describe the interactions of these particles.

PHYS 465—THERMODYNAMICS AND STATISTICAL MECHANICS—3 cr. (3 and 0)

A study of temperature, development of the laws of thermodynamics and their application to thermodynamic systems. An introduction to low temperature physics is given. *Prerequisite:* Six hours of physics beyond Phys 222, Math 306 or permission.

PHYS 471—ELECTRON MICROSCOPY—3 cr. (2 and 3)

The theory and operation of the electron microscope. Magnetic lens theory. The technique of specimen mounting and the interpretation of electron micrographs and diffraction patterns. Each student may choose specimens from his major field. *Prerequisite:* General Physics, Math 206 and permission of instructor.

PHYS 473—X-RAY CRYSTALLOGRAPHY—3 cr. (2 and 3)

A study of crystal symmetry, elementary space group theory, diffraction of X-rays by electronic charge distribution. Experimental methods of optical goniometry, powder diffraction and single crystal techniques are used to obtain diffraction intensities from a simple crystalline solid and electron charge distribution is determined. Applications of X-ray diffraction to chemical, physical and metallurgical investigations are discussed.

PHYS 621—MECHANICS I—3 cr. (3 and 0)

PHYS 622—MECHANICS II—3 cr. (3 and 0)

PHYS 625—EXPERIMENTAL PHYSICS—4 cr. (2 and 6)

PHYS 626—EXPERIMENTAL PHYSICS—4 cr. (2 and 6)

PHYS 641—ELECTRICITY AND MAGNETISM—3 cr. (3 and 0)

PHYS 704—ASTRODYNAMICS—3 cr. (3 and 0)

PHYS 732—PHYSICAL OPTICS AND INTRODUCTION TO SPECTROSCOPY—3 cr. (3 and 0)

PHYS 741—ELECTRICITY AND MAGNETISM—3 cr. (3 and 0)

PHYS 746—SOLID STATE PHYSICS—3 cr. (3 and 0)

PHYS 752—INTRODUCTORY NUCLEAR PHYSICS—3 cr. (3 and 0)

PHYS 755—QUANTUM PHYSICS I—3 cr. (3 and 0)

PHYS 756—QUANTUM PHYSICS II—3 cr. (3 and 0)

PHYS 760—MODERN PHYSICS FOR HIGH SCHOOL TEACHERS—3 cr. (3 and 0)

PHYS 765—THERMODYNAMICS AND STATISTICAL MECHANICS—3 cr. (3 and 0)

PHYS 771—ELECTRON MICROSCOPY—3 cr. (2 and 3)

PHYS 773—X-RAY CRYSTALLOGRAPHY—3 cr. (2 and 3)

PHYS 801—PHYSICS FOR HIGH SCHOOL TEACHERS I—3 cr. (3 and 0)

- PHYS 802—PHYSICS FOR HIGH SCHOOL TEACHERS II—3 cr. (3 and 0)
PHYS 804—ASTRONOMY FOR HIGH SCHOOL TEACHERS—3 cr. (3 and 0)
PHYS 811—METHODS OF THEORETICAL PHYSICS I—3 cr. (3 and 0)
PHYS 812—METHODS OF THEORETICAL PHYSICS II—3 cr. (3 and 0)
PHYS 813—THERMODYNAMICS AND STATISTICAL MECHANICS—3 cr. (3 and 0)
PHYS 821—CLASSICAL MECHANICS I—3 cr. (3 and 0)
PHYS 822—CLASSICAL MECHANICS II—3 cr. (3 and 0)
PHYS 841—ELECTRODYNAMICS I—3 cr. (3 and 0)
PHYS 842—ELECTRODYNAMICS II—3 cr. (3 and 0)
PHYS 845—SOLID STATE I—3 cr. (3 and 0)
PHYS 846—SOLID STATE II—3 cr. (3 and 0)
PHYS 853—NUCLEAR PHYSICS I—3 cr. (3 and 0)
PHYS 854—NUCLEAR PHYSICS II—3 cr. (3 and 0)
PHYS 856—CRYSTALLOGRAPHY—3 cr. (3 and 0)
PHYS 875—SEMINAR IN CONTEMPORARY PHYSICS—1 or 2 or 3 cr. (1 or 2 or 3 and 0)
PHYS 885—COLLOQUIUM—1 cr. (1 and 0)
PHYS 891—RESEARCH—Credit to be arranged.
PHYS 922—HYDRODYNAMICS—3 cr. (3 and 0)
PHYS 951—QUANTUM MECHANICS I—3 cr. (3 and 0)
PHYS 952—QUANTUM MECHANICS II—3 cr. (3 and 0)
PHYS 955—ADVANCED MODERN PHYSICS I—3 cr. (3 and 0)
PHYS 956—ADVANCED MODERN PHYSICS II—3 cr. (3 and 0)
PHYS 966—REALITY—3 cr. (3 and 0)
PHYS 991—DOCTORAL RESEARCH AND DISSERTATION—Credit to be arranged.

POLITICAL SCIENCE

Associate Professor: J. E. TUTTLE

Assistant Professors: J. S. GORDON, W. H. OWENS, JR.

Instructor: R. A. FREDLAND

POL SC 201—INTRODUCTION TO POLITICAL SCIENCE I—3 cr. (3 and 0)

The basic introduction to the study, analysis, and scope of all areas of government.

POL SC 202—INTRODUCTION TO POLITICAL SCIENCE II—AMERICAN GOVERNMENT—3 cr. (3 and 0)

The institutions of the national government of the United States with special emphasis on Congress, the Presidency and the Courts. Not open to those who have completed Pol Sc 301.

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POL SC 301—AMERICAN GOVERNMENT AND POLITICAL PARTIES—3 cr. (3 and 0)

The Constitution: powers and functions of the governmental activities; political parties and elections. Not open to those who have completed Pol Sc 202.

POL SC 302—STATE AND LOCAL GOVERNMENT—3 cr. (3 and 0)

The structural features, functions, and legislative, executive and judicial processes of American state and local governments.

POL SC 321—GENERAL PUBLIC ADMINISTRATION—3 cr. (3 and 0)

An introduction to public administration including the elements of organization, personnel and financial management, and administrative law and administrative responsibility. *Prerequisite:* Pol Sc 201, 202.

POL SC 331—CONSTITUTIONAL DEVELOPMENT OF THE UNITED STATES—3 cr. (3 and 0)

The origin and growth of the Constitution of the United States. *Prerequisite:* Pol Sc 301 or 202.

POL SC 341—POLITICAL BEHAVIOR—3 cr. (2 and 3)

An introduction to behavioral methods. Identification of regularities in the type, degree, and direction of political participation. Laboratory training and field work in interviewing. *Prerequisite:* Junior standing and permission of instructor.

POL SC 351—CLASSICAL POLITICAL THOUGHT—3 cr. (3 and 0)

Political philosophy from the pre-Socratic period to Machiavelli. *Prerequisite:* Pol Sc 201, 202.

POL SC 352—MODERN POLITICAL THOUGHT—3 cr. (3 and 0)

The early theories of the nation state in the sixteenth century and the major political thinkers, problems and movements through the twentieth century. *Prerequisite:* Pol Sc 201, 202.

POL SC 361—INTERNATIONAL POLITICS—3 cr. (3 and 0)

An introduction to foreign policy, international law, and international organizations. *Prerequisite:* Pol Sc 201, 202.

POL SC 371—COMPARATIVE EUROPEAN GOVERNMENTS I; CONSTITUTIONAL SYSTEMS—3 cr. (3 and 0)

Major emphasis on the United Kingdom, France, Germany, and the U.S.S.R., with brief attention given to Italy and Switzerland. Current methods of comparison will be studied and applied to the formal and informal functioning of these governments. *Prerequisite:* Pol Sc 201, 202.

POL SC 372—COMPARATIVE EUROPEAN GOVERNMENT II; TOTALITARIAN SYSTEMS—3 cr. (3 and 0)

A continuation of Pol Sc 371. This course will deal specifically with the Soviet Union as an example of totalitarian political systems, with references made to Nazi Germany and the present Eastern European political systems.

POL SC 432—AMERICAN CONSTITUTIONAL LAW—3 cr. (3 and 0)

A brief introduction to the judicial process followed by a detailed examination of leading cases pertaining to the Judiciary, the Congress, the Presidency, and the federal system. *Prerequisite:* Pol Sc 201, 202.

POL SC 442—POLITICAL PARTIES AND POLITICS—3 cr. (3 and 0)

A study of the historical development of political parties, and the role they play in the organization and functioning of our national government, and the influence of politics in policy making. *Prerequisite:* Pol Sc 201, 202.

POL SC 443—PUBLIC OPINION AND PROPAGANDA—3 cr. (3 and 0)

This course examines the nature of public opinion, its social and political context, the social-psychological processes basic to it, the dynamics of its formation and change and its measurement. *Prerequisite:* Pol Sc 201, 202.

POL SC 462—INTERNATIONAL ORGANIZATIONS—3 cr. (3 and 0)

Emphasis on international organizations. Analysis of current problems and proposed solution. *Prerequisite:* Pol Sc 201, 202.

POL SC 463—UNITED STATES FOREIGN POLICY—3 cr. (3 and 0)

Focus on foreign policy in its historical perspective, examines the decision-making process in foreign policy; evaluates contemporary American capabilities, and analyzes specific issues. *Prerequisite:* Pol Sc 201, 202.

POL SC 732—AMERICAN CONSTITUTIONAL LAW—3 cr. (3 and 0)

POL SC 762—INTERNATIONAL ORGANIZATIONS—3 cr. (3 and 0)

POULTRY SCIENCE

Professors: B. D. BARNETT, *Head*; M. A. BOONE

Associate Professors: J. B. COOPER, J. F. STEPHENS

Assistant Professor: D. E. TURK

PS 201—INTRODUCTION TO POULTRY SCIENCE—3 cr. (2 and 3) F, S

The application of the physical and biological sciences to modern poultry production and utilization. A study of the anatomy and physiology of the fowl and the economic aspects of poultry enterprises.

PS 354—POULTRY BREEDING—3 cr. (2 and 3) S, '70 and alternate years.

The application of genetics to the improvement of poultry and the effectiveness of different selection methods and mating systems. *Prerequisite:* Gen 302.

PS 355—POULTRY PRODUCTS GRADING AND TECHNOLOGY—3 cr. (2 and 3) F, '69 and alternate years.

Factors important in the quality of poultry products will be considered.

The effects of production, handling, packaging and storage on consumer acceptability will be discussed. Quality evaluation will be considered from the standpoint of tenderness, flavor, microbiology, and USDA grades.

PS 356—INCUBATION AND BROODING—3 cr. (2 and 3) F, '68 and alternate years.

Principles and practice of incubation of chicken and turkey eggs with consideration of hatchery management and embryology of the chick.

PS 401—ANIMAL ENVIRONMENTAL TECHNOLOGY—3 cr. (2 and 3) F, '68 and alternate years.

Effects of various environmental factors on the economic performance of domesticated animals. The requirements and/or tolerance of domestic species for temperature, humidity, visible light, floor space, oxygen, ammonia, radiation, atmospheric pressure and muscular activity will be reviewed. The economics

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of providing the optimum environment and the structural and mechanical requirements for altering certain factors will be discussed.

PS 451—POULTRY NUTRITION—2 cr. (2 and 0) S, '70 and alternate years.

Nutrient requirements of the various classes of poultry and the use of feed-stuffs in meeting these needs. *Prerequisite:* An Sc 301.

PS 458—AVIAN MICROBIOLOGY AND PARASITOLOGY—4 cr. (3 and 3) F, '68 and alternate years.

Agents causing poultry diseases; the diagnosis, prevention, and treatment of specific diseases and their economic and public health significance.

PS 460—SEMINAR—2 cr. (2 and 0) S, '69 and alternate years.

Current research reported in journals covering the various areas of poultry science. Students will practice scientific writing and interpretation of technical material for lay readers. *Prerequisite:* Permission of instructor.

PS 654—POULTRY BREEDING—3 cr. (2 and 3)

PS 655—POULTRY PRODUCTS GRADING AND TECHNOLOGY—3 cr. (2 and 3)

PS 656—INCUBATION AND BROODING—3 cr. (2 and 3)

PS 701—ANIMAL ENVIRONMENT TECHNOLOGY—3 cr. (2 and 3)

PS 751—POULTRY NUTRITION—3 cr. (2 and 3)

PS 758—AVIAN MICROBIOLOGY AND PARASITOLOGY—4 cr. (3 and 3)

PS 760—SEMINAR—2 cr. (2 and 0)

PS 801—POULTRY NUTRITION AND METABOLISM—3 cr. (2 and 3)

PS 804—POULTRY PATHOLOGY—3 cr. (1 and 6)

PS 805—SEMINAR—1 cr. (1 and 0)

PS 891—RESEARCH—Credit to be arranged.

PSYCHOLOGY

Associate Professor: E. E. WAITE, JR.

Assistant Professors: C. B. CAFFREY, J. D. DAVENPORT

Instructor: R. D. TOWELL

PSYCH 101—THE PSYCHOLOGY OF NURSING—3 cr. (3 and 0)

Based upon the fundamental principles of psychology, this course includes a consideration of such problems as: psychology and the student nurse; the psychology of efficiency; emotion and health; personality; conflicts, frustration, and adjustment; the neuroses and psychoses; general patient nurse interaction; pediatric and geriatric nursing; and so on.

PSYCH 201—GENERAL PSYCHOLOGY—3 cr. (3 and 0)

A survey of the field of psychology: development and adjustment, motivation, emotions, intelligence, personality, the sensory experiences, perception, learning, thinking, imagination and mental hygiene.

PSYCH 202—EXPERIMENTAL PSYCHOLOGY I—3 cr. (2 and 2)

This course places emphasis on theoretical and practical problems of reporting research. Required of psychology majors (and minors after May, 1969). Not open to those who have had Psych 362. *Prerequisite:* Psych 201.

PSYCH 211—GROWTH AND DEVELOPMENT—3 cr. (3 and 0)

A study of the physical and emotional growth of the child.

PSYCH 302—SOCIAL PSYCHOLOGY—3 cr. (3 and 0)

The interaction between the individual and the forces of society; the classical theories, the psychobiological bases of human behavior, the sociocultural bases of behavior, types of human behavior, overt and covert experiences, symbolism, personality and social interaction. *Prerequisite:* Psych 201.

PSYCH 321—DEVELOPMENTAL PSYCHOLOGY—3 cr. (3 and 0)

A survey of current theory and research concerned with the psychological aspects of human growth and development. *Prerequisite:* Psych 201, 202.

PSYCH 331—THEORIES OF LEARNING—3 cr. (3 and 0)

An historical approach to the study of the major modern learning theories.

PSYCH 341—PHYSIOLOGICAL PSYCHOLOGY—3 cr. (3 and 0)

The study of human neuroanatomy, with an emphasis on the functions of the nervous system. Treats of the biological bases of behavior in both normal and abnormal dimensions.

PSYCH 351—HISTORY AND SYSTEMS OF PSYCHOLOGY—3 cr. (3 and 0)

A treatment of the science of psychology as understood in the light of the ideas of men who have been responsible for its development. *Prerequisite:* Psych 201, 202.

PSYCH 361—MOTIVATION—3 cr. (3 and 0)

The various aspects of motivation are considered through a study of contributions of biologists, sociologists, anthropologists, and psychologists. The orientation is empirical rather than theoretical, with emphasis on pertinent research and research methods, and on the measurement of motives. *Prerequisite:* Psych 201.

PSYCH 363—EXPERIMENTAL PSYCHOLOGY II—4 cr. (3 and 3)

A continuation of Experimental Psychology I, with a stress on the carrying out of original research in the scientific study of human and animal behavior. Laboratory periods stress the refinement of techniques and the execution of research in a guided setting. *Prerequisite:* Psych 201, 202.

PSYCH 401—APPLIED PSYCHOLOGY—3 cr. (3 and 0)

A study of the concepts of psychology as applied to individual, business, and professional behavior. *Prerequisite:* Psych 201.

PSYCH 402—ABNORMAL PSYCHOLOGY—3 cr. (3 and 0)

Mental and emotional disorders: theories of causation and problems of treatment; special phenomena of consciousness and unconsciousness, e.g., dreams, dissociation, hypnosis; analysis of pathological behavior: alcoholism, drug addiction, suicide, criminality, neurosis, and psychoneurosis. *Prerequisite:* Psych 201.

PSYCH 403—PERSONALITY—3 cr. (3 and 0)

An analysis of the theories of personality: Freud, Adler, Jung, Sullivan, Horney, Allport, et al. *Prerequisite:* Psych 201, 202 and permission of instructor.

RECREATION AND PARK ADMINISTRATION

Associate Professor: H. BRANTLEY, *Head*

Assistant Professors: R. M. FRYE, G. E. HOWARD, M. O. KEITH

Instructor: J. R. SELLERS

RPA 101—INTRODUCTION TO COMMUNITY RECREATION—3 cr. (3 and 0)

History and foundations of Community Recreation in public, private and commercial settings; job opportunities, specifications and demands.

RPA 102—HISTORY AND PRINCIPLES OF OUTDOOR RECREATION—3 cr. (3 and 0)

Includes the study of the history, present status and the principles of operation of parks and park systems in America; Outdoor Education Programs; implications for continued growth of this leisure phenomenon.

RPA 201—METHODS AND TECHNIQUES OF RECREATION LEADERSHIP—3 cr. (3 and 0)

Considers characteristics of the several levels of recreation leadership with special emphasis on supervision. Examination is made of the Group Processes. Also includes a study of community resources for leadership in specialized program areas.

RPA 202—MANAGEMENT OF AQUATIC FACILITIES—2 cr. (2 and 0)

Includes the organization of water safety programs and the maintenance of swimming pools and lake front facilities. Also trends and growth patterns of water-based recreation. *Prerequisite:* RPA 101 or permission of instructor.

RPA 203—PERSONAL AND COMMUNITY HEALTH—3 cr. (3 and 0)

The course deals with health problems, disease prevention and control, school health practices, public health administration, and other health information which may enable one to live intelligently in today's complex society.

RPA 301—SPORTS IN RECREATION—3 cr. (2 and 3)

Administrative and supervisory skills indigenous to public and/or private agency athletic programs are considered. Group instruction is given in individual and team sports and officiating techniques applicable to these sports are taught.

RPA 302—CAMP ORGANIZATION AND ADMINISTRATION—3 cr. (2 and 3)

Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables student to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking.

RPA 303—PROGRAM PLANNING FOR RECREATION—2 cr. (2 and 0)

Course includes fields of activity available to participants; principles and methods of program development; utilization of time-blocks and facilities. *Prerequisite:* Junior standing.

RPA 304—RECREATION IN MODERN SOCIETY—3 cr. (3 and 0)

An historical study of the growth of leisure with special attention given to the utilization of community resources for recreation.

RPA 305—PHYSICAL ASPECTS OF SPORTS IN RECREATION—3 cr. (2 and 3)

The course considers the physiology of exercise as it relates to safety in recreational sports programs, the practice of first aid, and the treatment of athletic injuries.

RPA 401—PARK MAINTENANCE AND OPERATION—3 cr. (3 and 0)

Maintenance techniques and materials, interpretive programs, job planning and scheduling, problems of overuse and preventive maintenance are included. *Prerequisite:* RPA 202 or permission of instructor.

RPA 402—RECREATION ADMINISTRATION—3 cr. (3 and 0)

An analysis of the internal organization of a recreation department dealing with finances and accounting; records and reports; publicity and public relations; state and federal legislation; staff organization; coordination of community resources. *Prerequisite:* Senior standing.

RPA 403—FACILITY AND SITE PLANNING—3 cr. (1 and 6)

Trends in recreation facility development, planning principles involved in design of recreation buildings, and orientation of facilities to given area are integrated into sound planning programs. *Prerequisite:* RPA 401 or permission of instructor.

RPA 404—METHODS OF RECREATION RESEARCH—3 cr. (3 and 0)

An analysis of the principal methods of recreation research; the development of experiments; use of questionnaires; research problem under the guidance of the instructor is developed. *Prerequisite:* Senior standing.

RPA 405—FIELD TRAINING IN RECREATION—6 cr.

The student, in a ten-week program, has the opportunity to observe recreation programs in operation. He will also have responsibilities of organizing and conducting activities under supervision. Maintenance and operation of facilities will be observed and practiced. Total of 250 hours required. *Prerequisite:* Senior standing.

RPA 406—RECREATION FOR THE ILL AND HANDICAPPED—3 cr. (3 and 0)

Surveys the recreational opportunities and benefits available to the ill and handicapped citizens. Designed to provide the student with an awareness of the role of the professional recreator in serving the needs of such special groups as the mentally retarded, cerebral palsied, emotionally disturbed—institutionalized, hospitalized, etc. Particular emphasis will be given to program development applicable to each specific situation.

RELIGION

Assistant Professors: R. B. HARRIS, D. F. WHITE, JR.

REL 301—THE OLD TESTAMENT—3 cr. (3 and 0)

A survey of books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.

REL 302—A SURVEY OF NEW TESTAMENT LITERATURE—3 cr. (3 and 0)

A study of the books of the New Testament from the standpoint of their occasion, content, literary form and basic theology.

REL 306—RELIGIONS OF THE WEST—3 cr. (3 and 0)

A study of the origin, evolution, and contemporary status of Judaism, Christianity, and Islam. *Prerequisite:* Junior standing.

REL 309—RELIGIONS OF THE FAR EAST—3 cr. (3 and 0)

A study of the origin, evolution, and contemporary status of Hinduism, Buddhism, Confucianism, and Taoism. *Prerequisite:* Junior standing.

RURAL SOCIOLOGY

Professor: W. J. LANHAM, *Head*

Associate Professor: V. A. BOYD

RS 301—RURAL SOCIOLOGY—3 cr. (3 and 0) F, S

A study of human social relationships as influenced by life in the open country and in small towns and villages including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development.

RS 359—THE COMMUNITY—3 cr. (3 and 0) F

An examination of the sociological aspects of contemporary communities and of their growth and development. The structural relations of social class, status and power and the relationships among social institutions within the community are examined. Emphasis is placed on the organization and development of communities in a constantly changing environment.

RS 461—RURAL LEADERSHIP—3 cr. (3 and 0) S

A consideration of the social and psychological factors involved in leadership including an examination and analysis of characteristics of the successful leader. Particular attention is paid to the role of the leader in the process of economic and social development of rural communities and small towns.

RS 659—THE COMMUNITY—3 cr. (3 and 0)

RS 761—RURAL LEADERSHIP—3 cr. (3 and 0)

RS 801—RURAL SOCIAL SYSTEMS—3 cr. (3 and 0)

RUSSIAN

Lecturer: LUDMILA A. SAVITSKY

RUSS 101—ELEMENTARY RUSSIAN—3 cr. (3 and 1)

Training in pronunciation, grammatical forms, and syntax with a view of giving the student the fundamentals necessary to read simple Russian texts. Three hours a week classroom instruction and one hour a week in the language laboratory.

RUSS 102—ELEMENTARY RUSSIAN—3 cr. (3 and 1)

A continuation of Russ 101. Three hours a week classroom instruction and one hour a week in the language laboratory.

RUSS 201—INTERMEDIATE RUSSIAN—3 cr. (3 and 1)

The reading of simple Russian prose; a review of grammar and syntax. Drill on vocabulary and idiom. Three hours a week classroom instruction and one hour a week in the language laboratory. *Prerequisite:* Russ 101 and 102.

RUSS 202—INTERMEDIATE RUSSIAN—3 cr. (3 and 0)

A continuation of Russ 201.

SOCIOLOGY

Professor: F. A. BURTNER

Assistant Professors: W. C. CAPEL, JR., R. J. KNAPP *

Instructors: K. D. BIRTMAN, J. P. HUTCHINSON

SOC 101—SOCIOLOGY FOR NURSES—3 cr. (3 and 0)

Basic sociological concepts: group life, socialization, environment, urban growth, population factors, social change. Institutions such as family, economic, religion and others are treated in an introductory manner.

SOC 201—INTRODUCTORY SOCIOLOGY—3 cr. (3 and 0)

The basic principles of sociology: culture, biological factors, the influence of geographical environment, human nature, group life, social stratification, communities, social institutions and social change. *Prerequisite:* Sophomore standing.

SOC 202—SOCIAL PROBLEMS—3 cr. (3 and 0)

A survey of the major social problems, including problems of industry, education, religion, disease and public health, poverty, dependency and factors affecting social adjustment. Required of all students presenting Sociology as the primary or secondary field of concentration. *Prerequisite:* Soc 201.

SOC 311—THE FAMILY—3 cr. (3 and 0)

The family as one of the basic institutions of society. The history of the family, and a study of its functions in early and modern social structures. A comparative study of family life in other cultures is made. *Prerequisite:* Soc 201, 202.

SOC 321—CULTURAL ANTHROPOLOGY—3 cr. (3 and 0)

Recent and contemporary man, as a social and culture-bearing animal, with emphasis on the constants and variants in human behavior involved in technology, social relations, language, religion, art, and other aspects of cultures. *Prerequisite:* Soc 201, 202.

SOC 331—URBAN SOCIOLOGY—3 cr. (3 and 0)

A survey of the history and development of modern urban organization; rise of the city; problems of modern urban life. *Prerequisite:* Soc 201, 202 (for Sociology majors and minors).

SOC 341—POPULATION ANALYSIS—3 cr. (3 and 0)

An analysis of population growth and distribution and their bearing on current economic, political, and social problems. *Prerequisite:* Soc 201, 202.

SOC 351—INDUSTRIAL SOCIOLOGY—3 cr. (3 and 0)

Industry as a social organization; the factory as a social system; personality in industrial relations; power groupings within industry; and industry and the community. *Prerequisite:* Soc 201 and permission of the instructor.

SOC 411—HISTORY OF SOCIAL THOUGHT—3 cr. (3 and 0)

A survey of social thought from ancient times to the nineteenth century. Required of all students presenting sociology as a primary or secondary field of concentration. *Prerequisite:* 9 hours of sociology.

* On leave.

SOC 421—SOCIOLOGICAL THEORY—3 cr. (3 and 0)

A survey of the growth of sociological theory considered from the viewpoint of the development of representative schools, their interrelationships, and convergencies in mid-twentieth century theory. Required of all students presenting sociology as a secondary field of concentration. *Prerequisite:* Soc 411.

SOC 431—COMPLEX ORGANIZATIONS—3 cr. (3 and 0)

An examination and comparison of theories of formal organization; and analysis of the structure and function of specific organizations illustrating various theoretical approaches. *Prerequisite:* 12 semester hours in Sociology.

SOC 441—SOCIAL STRATIFICATION—3 cr. (3 and 0)

Analysis of social structure in terms of class, status, prestige, rank and function. Attention is given to the social role of the elite, bureaucracies, the professional, and middle classes. *Prerequisite:* 12 semester hours in Sociology.

SOC 451—SOCIOLOGY OF MEDICINE—3 cr. (3 and 0)

Consideration of the major contributions of sociology to medicine; an exploration of patterned social relationships in the field of health and medicine. *Prerequisite:* 12 semester hours in Sociology.

SOC 711—HISTORY OF SOCIAL THOUGHT—3 cr. (3 and 0)

SOC 721—SOCIOLOGICAL THEORY—3 cr. (3 and 0)

SOC 731—COMPLEX ORGANIZATIONS—3 cr. (3 and 0)

SOC 741—SOCIAL STRATIFICATION—3 cr. (3 and 0)

SOC 751—SOCIOLOGY OF MEDICINE—3 cr. (3 and 0)

SPANISH

Assistant Professors: G. J. FERNANDEZ, R. F. MIXON

Instructors: P. F. PARRADO, L. T. PERRY, C. F. THOET, JR.

Lecturer: ELENA G. FERNANDEZ

SPAN 101—ELEMENTARY SPANISH—3 cr. (3 and 1)

A course for beginners in which the essentials of grammar are taught and a foundation is provided for a conversational and reading knowledge of the language. Three hours a week of classroom instruction and one hour a week in the language laboratory.

SPAN 102—ELEMENTARY SPANISH—3 cr. (3 and 1)

A continuation of Span 101, with a reader.

SPAN 201—INTERMEDIATE SPANISH—3 cr. (3 and 1)

Grammar, vocabulary, and idioms; conversation, composition, and translation. Three hours a week classroom instruction and one hour a week in the language laboratory. *Prerequisite:* Span 102.

SPAN 202—INTERMEDIATE SPANISH—3 cr. (3 and 0)

Introduction to Spanish literature: representative short stories, essays, novels, poetry, and plays. *Prerequisite:* Span 201.

SPAN 303—SURVEY OF SPANISH LITERATURE I—3 cr. (3 and 0)

Literary movements, influences, and authors from the beginnings to the end of the seventeenth century. Representative works, discussions. Required of Spanish majors. *Prerequisite:* Span 201 and 202.

SPAN 304—SURVEY OF SPANISH LITERATURE II—3 cr. (3 and 0)

Literary movements, influences, and authors from the eighteenth century to the present. Required of Spanish majors. *Prerequisite:* Span 303.

SPAN 305—CONVERSATIONAL SPANISH—3 cr. (3 and 0)

Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Some written work to increase accuracy. Required of Spanish majors. Assignments in the language laboratory. *Prerequisite:* Span 201 and 202.

SPAN 306—ADVANCED CONVERSATION AND COMPOSITION—3 cr. (3 and 0)

A continuation of Span 305 with more emphasis on written Spanish. Required of Spanish majors. *Prerequisite:* Span 305.

SPAN 401—CONTEMPORARY SPANISH LITERATURE—3 cr. (3 and 0)

Literary trends and representative authors since 1898. *Prerequisite:* Span 303 and 304.

SPAN 402—CONTEMPORARY SPANISH DRAMA—3 cr. (3 and 0)

The Spanish theater from Benavente to the present. *Prerequisite:* Span 303 and 304.

SPAN 405—NINETEENTH CENTURY SPANISH LITERATURE—3 cr. (3 and 0)

Representative authors and movements of the nineteenth century; romanticism, *costumbrismo*, and the regional novel. *Prerequisite:* Span 303 and 304.

SPAN 406—CERVANTES AND THE GOLDEN AGE—3 cr. (3 and 0)

A study of Cervantes and the theater of the Golden Age of Spanish literature. *Prerequisite:* Span 303 and 304.

TEXTILE CHEMISTRY

Associate Professors: R. H. BARKER, H. G. CLARK III, E. S. OLSON, J. J. PORTER

TC 303—TEXTILE CHEMISTRY—3 cr. (3 and 0)

Aliphatic organic compounds with major emphasis on products essential to the textile industry for Textile and Textile Chemistry majors. *Prerequisite:* Ch 102.

TC 304—TEXTILE CHEMISTRY—3 cr. (3 and 0)

Continuation of TC 303 covering the aromatic compounds with particular attention to the chemistry of dyes, finishes, and polymers.

TC 305—TEXTILE CHEMISTRY LABORATORY—1 cr. (0 and 3)

For textile majors not majoring in Textile Chemistry. To be taken concurrently with TC 303.

TC 306—TEXTILE CHEMISTRY LABORATORY—1 cr. (0 and 3)

Continuation of TC 305. To be taken concurrently with TC 304.

TC 315—THE CHEMISTRY OF FIBERS—3 cr. (3 and 0)

The physical and chemical properties of large molecular substances such as synthetic and natural fibers. The kinetics of addition and condensation polymerization, and the common physical methods of measurement that are used in polymer science. The design of polymer systems for an end use in the textile industry with emphasis on fabric and dyeing properties. *Prerequisite:* TC 304.

TC 316—CHEMICAL PREPARATION OF TEXTILES—3 cr. (2 and 3)

The chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties. *Prerequisite:* TC 315.

TC 317—SYNTHETIC FIBER LABORATORY—1 cr. (0 and 3)

The preparation of synthetic fibers from monomeric compounds. The spinning of regenerated and synthetic fibers in a dyed and undyed form. Some of the reactions of large molecules will be covered. This course is to be taken concurrently with TC 315.

TC 448—DYEING AND FINISHING II—3 cr. (3 and 0)

The chemical finishing of textile fabrics and the use of spectrophotometry as a control device for dyeing and finishing will be covered. The mechanism of reaction of various finishing agents with different substrates will be presented as well as the color measurement of textile fabrics.

TC 450—DYEING AND FINISHING LABORATORY—1 cr. (0 and 3)

To be scheduled concurrently with TC 448. The course will cover finishing in addition to dyeing operations and their instrumental control.

TC 457—DYEING AND FINISHING I—3 cr. (3 and 0)

The kinetics and equilibria of dyeing processes will be covered. The use of conductivity, diffusion, and other methods useful for measuring adsorption isotherms and dyeing rates and the general thermodynamic relationships applicable to dyeing operations. Fiber properties such as zeta potential, dye sites, relative amorphous area available will be included. *Prerequisite:* TC 315.

TC 459—DYEING AND FINISHING LABORATORY—1 cr. (0 and 3)

To be scheduled concurrently with TC 457. The course will introduce the student to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations.

TC 461—SEMINAR AND RESEARCH—3 cr. (1 and 6)

An investigation by each textile chemistry senior of an assigned problem related to textile processing. A formal written report is required. *Prerequisite:* Senior standing.

TC 466—TEXTILE UNIT OPERATIONS—3 cr. (3 and 0)

Designed to cover some of the principles behind textile equipment operation such as heat transfer in drying and dyeing processes and fluid flow in pressure and open dye operations and polymer production.

TC 475—CELLULOSE CHEMISTRY—2 cr. (2 and 0)

The constitution proof of structure and reaction of cotton and other cellulosic materials with oxidizing agents, alkali, etc. The implications of accessibility-crystallinity relationships in cellulosic materials. The effect of mercerization and degree of substitution on physical properties of cellulose. The preparation of different rayons and acetate fibers. *Prerequisite:* TC 315 or permission of instructor.

TC 615—THE CHEMISTRY OF FIBERS—3 cr. (3 and 0)

TC 616—CHEMISTRY OF SCOURING, BLEACHING AND SURFACE ACTIVE AGENTS—3 cr. (3 and 0)

- TC 617—SYNTHETIC FIBERS LABORATORY—1 cr. (0 and 3)
 TC 757—DYEING AND FINISHING I—1 cr. (0 and 3)
 TC 759—DYEING AND FINISHING LABORATORY—1 cr. (0 and 3)
 TC 766—TEXTILE UNIT OPERATIONS—3 cr. (3 and 0)
 TC 775—CELLULOSE CHEMISTRY—2 cr. (2 and 0)
 TC 811—THE THEORY OF FIBER-FORMING HIGH POLYMERS I—3 cr. (3 and 0)
 TC 812—THE THEORY OF FIBER-FORMING HIGH POLYMERS II—3 cr. (3 and 0)
 TC 821—ADVANCED CELLULOSE CHEMISTRY—3 cr. (3 and 0)
 TC 831—THE PHYSICAL CHEMISTRY OF DYEING—3 cr. (3 and 0)
 TC 891—RESEARCH—Credit to be arranged.

TEXTILES

Professors: T. A. CAMPBELL, JR., *Head*; J. V. WALTERS

Associate Professors: J. C. HUBBARD, JR., J. H. MARVIN, JR., D. P. THOMSON, JR., W. B. WILLIAMS

Assistant Professor: D. W. LYONS

Instructor: E. A. VAUGHAN *

Visiting Lecturers: B. C. GOSWAMI, H. J. KEEGAN

TEXT 122—INTRODUCTION TO TEXTILES—1 cr. (1 and 0)

An introduction to the various areas involved in the scientific processing of fibrous materials culminating in the production of applicable structures for yarns and fabrics.

TEXT 201—FIBER PROCESSING I—3 cr. (2 and 3)

Acquaints students with various fibers, terminology, fundamental properties and initial processing.

TEXT 202—FIBER PROCESSING II—3 cr. (2 and 3)

The mechanical operations and related equipment used in the processing of fibers to a usable structure, usually yarns.

TEXT 303—FIBER PROCESSING III—3 cr. (2 and 3)

The various fiber assemblies and yarn structures encountered in the manufacture of yarns.

TEXT 304—FIBER PROCESSING IV—3 cr. (2 and 3)

The interactions of the mechanical operations used in fiber processing and the geometry and properties of fibers and yarn structures. Primarily, cause and effect relations will be investigated showing the effects of fiber properties on process dynamics and properties of the fiber assemblies produced.

TEXT 305—YARN STRUCTURE I—3 cr. (2 and 3)

Basic study of materials used for manufacturing yarns. Machine mechanisms, theory and operations for the opening, picking, carding, and combing of fibers. Draft, production, and waste at these machines are dealt with mathematically. Other factors concerned with this portion of a textile plant covered generally,

* On leave.

including organization and layout. *Prerequisite:* Junior standing. Non-textile majors.

TEXT 306—YARN STRUCTURE II—3 cr. (2 and 3)

Machine mechanisms, theory, and operations for the drawing, roving, spinning, and twister frames. Emphasis on the mathematical study of the drafting, twisting, and winding components for these processes. Brief survey of the silk, and worsted system for yarn production. *Prerequisite:* Text 305. Non-textile majors.

TEXT 311—FABRIC DEVELOPMENT I—3 cr. (2 and 3)

The theory of mechanisms as applied to weaving machines together with the application of the theory of elementary textile designs used in the construction of woven fabrics.

TEXT 312—FABRIC DEVELOPMENT II—3 cr. (2 and 3)

A continuation of Text 311 with emphasis on special and compound materials fabrication.

TEXT 313—FABRIC STRUCTURE I—3 cr. (2 and 3)

Theory and practice involved in the application of design to textile uses. Principles involved in converting yarns to fabrics, including loom mechanics. *Prerequisite:* Junior standing. Non-textile majors.

TEXT 314—FABRIC STRUCTURE II—3 cr. (2 and 3)

Continuation of Text 313.

TEXT 321—FIBER SCIENCE—3 cr. (2 and 3)

Fiber properties and the proper scientific evaluation of these properties.

TEXT 322—PROPERTIES OF TEXTILE STRUCTURES—3 cr. (2 and 3)

The analysis and significance of yarn and fabric properties and a study of methods of determining these properties.

TEXT 324—TEXTILE STATISTICS—3 cr. (3 and 0)

An introduction to statistics with particular application to the Textile Industry. Measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation and regression. *Prerequisite:* Junior standing.

TEXT 411—FABRIC DEVELOPMENT III—4 cr. (3 and 3)

The principles concerning the specifications required for the production of fabrics to include layouts, designs, construction, warping, and slashing. *Prerequisite:* Text 312.

TEXT 412—FABRIC DEVELOPMENT IV—4 cr. (3 and 3)

Production and analysis of woven patterns as studied in fundamental courses in the weaving and designing areas. Fabric development, analysis and cloth order problems. *Prerequisite:* Text 411.

TEXT 413—FABRIC DEVELOPMENT V—3 cr. (2 and 3)

A continuation of Text 412 covering more complex weaves for double cloths, pile fabrics, and jacquard effects. *Prerequisite:* Concurrent with Text 412.

TEXT 414—NON-WOVEN AND KNITTED STRUCTURES—3 cr. (3 and 0)

A survey of non-woven and knitted fabrics dealing with the principles and mechanisms involved. Various systems will be covered with emphasis on yarn requirements and fabric properties.

TEXT 421—TEXTILE COSTING I—3 cr. (2 and 3)

Actual and standard cost principles as they apply to the manufacture of textiles. Allocating the cost of material, labor and overhead; determining the cost of individual yarns and fabrics; valuing the inventory; making of cost reports, payroll analysis and the use of data processing. *Prerequisite:* Acct 201 and Senior standing or permission of instructor.

TEXT 426—INSTRUMENTATION—3 cr. (3 and 0)

The approach to instrumentation will be directed at developing an understanding of the principles of controlling regulatory variables encountered in textile plants. The course will deal with types of control devices available in the configurations usually applied to textile processes with a minimum emphasis on design of systems as such. The control of temperature, humidity, pressure, flow, energies and time will be covered with contrasts drawn between mechanical, pneumatic, electrical and electronic methods.

TEXT 428*—TEXTILE RESEARCH—0 to 3 cr.

The student will conduct an individual research problem in the textile or textile chemistry area under the direct supervision and guidance of a faculty member.

TEXT 429*—TEXTILE RESEARCH—0 to 3 cr.

Same as Text 428.

TEXT 440—SPECTROPHOTOMETRY AND COLORIMETRY—3 cr. (3 and 0)

Theory of light waves, color and thermal-radiation of solids. Spectral properties of man-made objects. Specification of colored materials. Spectral reflectance of natural specimens from 0.2 to 25 microns in the temperature range of -150°C. to $+1000^{\circ}\text{C.}$

TEXT 460—TEXTILE PROCESSES—3 cr. (3 and 0)

Survey of machinery and processes of textile manufacturing from fiber formation through fabric finishing.

TEXT 603—FIBER PROCESSING III—3 cr. (2 and 3)

TEXT 604—FIBER PROCESSING IV—3 cr. (2 and 3)

TEXT 621—FIBER SCIENCE—3 cr. (2 and 3)

TEXT 622—PROPERTIES OF TEXTILE STRUCTURES—3 cr. (2 and 3)

TEXT 711—FABRIC DEVELOPMENT III—4 cr. (3 and 3)

TEXT 712—FABRIC DEVELOPMENT IV—4 cr. (3 and 3)

TEXT 726—INSTRUMENTATION—3 cr. (3 and 0)

TEXT 760—TEXTILE PROCESSES—3 cr. (3 and 0)

TEXT 821—FIBER PHYSICS I—3 cr. (3 and 0)

TEXT 822—FIBER PHYSICS II—3 cr. (3 and 0)

TEXT 830—TEXTILE PHYSICS—3 cr. (3 and 0)

TEXT 840—SPECTROPHOTOMETRY—3 cr. (3 and 0)

TEXT 870—ADVANCES IN TEXTILE MANUFACTURING—3 cr. (3 and 0)

TEXT 880—SELECTED TOPICS—3 cr. (3 and 0)

TEXT 891—RESEARCH—Credit to be arranged.

VISUAL STUDIES

Associate Professors: J. T. ACORN, R. H. HUNTER, *Head*; I. G. REGNIER

Assistant Professor: S. WANG

Vis 203—VISUAL ARTS STUDIO—2 cr. (0 and 6)

Studio work in drawing, painting, graphics, photography and related media. To be taken concurrently with Arch 403 or *Prerequisite:* Arch 403.

Vis 205—DRAWING—2 cr. (0 and 6)

Studio work in drawing and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 207—BEGINNING PAINTING—2 cr. (0 and 6)

Studio work in painting and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 209—BEGINNING SCULPTURE—2 cr. (0 and 6)

Studio work in sculpture and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 211—BEGINNING PRINTMAKING—2 cr. (0 and 6)

Studio work in lithography, silk screen, wood cuts, and graphics and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 213—BEGINNING PHOTOGRAPHY—2 cr. (0 and 6)

Studio work in photography and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 215—BEGINNING GRAPHICS—2 cr. (0 and 6)

Studio work in graphic composition, letterpress, photo lithography, silk screen process and related media. *Prerequisite:* Arch 102 or Vis 203.

Vis 305—LIFE DRAWING—2 cr. (0 and 6)

Studio work in life drawing and related subject matter. *Prerequisite:* Vis 205, or Vis 207, or Vis 209.

Vis 306—LIFE DRAWING—2 cr. (0 and 6)

Continuation of Vis 305. *Prerequisite:* Vis 305.

Vis 307—PAINTING—2 cr. (0 and 6)

Studio work in water color and related media. *Prerequisite:* Vis 207.

Vis 308—PAINTING—2 cr. (0 and 6)

Continuation of Vis 307. *Prerequisite:* Vis 307.

Vis 309—SCULPTURE—2 cr. (0 and 6)

Studio work in sculpture and related media. *Prerequisite:* Vis 209.

Vis 310—SCULPTURE—2 cr. (0 and 6)

Continuation of Vis 309. *Prerequisite:* Vis 309.

Vis 311—PRINTMAKING—2 cr. (0 and 6)

Studio work in lithography, silk screen, etching, wood cuts and related media. *Prerequisite:* Vis 211.

Vis 312—PRINTMAKING—2 cr. (0 and 6)

Continuation of Vis 311. *Prerequisite:* Vis 311.

Vis 313—PHOTOGRAPHY—2 cr. (0 and 6)

Studio work in still photography and related media. *Prerequisite:* Vis 213.

Vis 314—PHOTOGRAPHY—2 cr. (0 and 6)

Continuation of Vis 313. *Prerequisite:* Vis 313.

Vis 315—GRAPHICS—2 cr. (0 and 6)

Studio work in graphic composition, letterpress, photo lithography, silk screen process, and related media. *Prerequisite:* Vis 215.

Vis 316—GRAPHICS—2 cr. (0 and 6)

Continuation of Vis 316. *Prerequisite:* Vis 316.

Vis 405—DRAWING—3 cr. (0 and 9)

Studio work in advanced drawing and related media. *Prerequisite:* Vis 306 or Vis 308 or Vis 312 or Vis 316.

Vis 406—DRAWING—3 cr. (0 and 9)

Continuation of Vis 405. *Prerequisite:* Vis 405.

Vis 407—PAINTING—3 cr. (0 and 9)

Studio work in advanced painting and related media. *Prerequisite:* Vis 306 or Vis 312 or Vis 314, Vis 316.

Vis 408—PAINTING—3 cr. (0 and 9)

Continuation of Vis 407. *Prerequisite:* Vis 407.

Vis 409—SCULPTURE—3 cr. (0 and 9)

Advanced studio work in sculpture and related media. *Prerequisite:* Vis 310.

Vis 410—SCULPTURE—3 cr. (0 and 9)

Continuation of Vis 409. *Prerequisite:* Vis 409.

Vis 411—PRINTMAKING—3 cr. (0 and 9)

Advanced studio in Printmaking and related media. *Prerequisite:* Vis 312.

Vis 412—PRINTMAKING—3 cr. (0 and 9)

Continuation of Vis 411. *Prerequisite:* Vis 411.

Vis 413—PHOTOGRAPHY—3 cr. (0 and 9)

Advanced studio work in photography. *Prerequisite:* Vis 314.

Vis 414—PHOTOGRAPHY—3 cr. (0 and 9)

Continuation of Vis 413. *Prerequisite:* Vis 413.

Vis 415—GRAPHICS—3 cr. (0 and 9)

Advanced work in graphic arts. *Prerequisite:* Vis 316.

Vis 416—GRAPHICS—3 cr. (0 and 9)

Continuation of Vis 415. *Prerequisite:* Vis 415.

WATER RESOURCES ENGINEERING

Professor: L. G. RICH, Program Director

WRE 811—CLIMATOLOGY—3 cr. (3 and 0)

WRE 812—METEOROLOGY—3 cr. (3 and 0)

WRE 822—WATER MOVEMENT IN SOILS—3 cr. (3 and 0)

WRE 861—HYDROLOGY—3 cr. (3 and 0)

WRE 862—ADVANCED HYDROLOGY—3 cr. (3 and 0)

WRE 864—GROUND-WATER HYDROLOGY—3 cr. (3 and 0)

WRE 881—SPECIAL TOPICS IN WATER RESOURCES—3 cr. (3 and 0)

WRE 891—RESEARCH—Credit to be arranged.

WRE 981—SPECIAL TOPICS IN WATER RESOURCES—3 cr. (3 and 0)

WRE 982—SPECIAL TOPICS IN WATER RESOURCES—3 cr. (3 and 0)

WRE 991—DOCTORAL RESEARCH—Credit to be arranged.

ZOOLOGY

Professors: J. H. COCHRAN, *Head*; E. W. KING,† J. K. REED

Associate Professors: T. R. ADKINS, JR., G. W. ANDERSON, R. C. FOX, A. S. TOMBES, R. E. WARE, L. G. WEBB

Assistant Professors: RUTH L. HAYS, S. B. HAYS, G. C. PACKARD, L. E. PRIESTER, JR., R. PRINS, W. K. WILLARD

Instructor: J. M. BARRIER

ZOOL 101, 103—GENERAL ZOOLOGY—4 cr. (3 and 3) F, S, SS

Thorough training in fundamental animal types and zoological principles. The morphology, physiology, behavior, reproduction, ecology, embryology, zoogeography, evolution and palaeontology of each phylum are presented.

ZOOL 201—INVERTEBRATE ZOOLOGY—4 cr. (3 and 3) F, S

A survey of the phyla of invertebrate animals, including their taxonomy, morphology, development and evolution. *Prerequisite:* Zool 101, 103 or permission of instructor.

ZOOL 301—COMPARATIVE VERTEBRATE ANATOMY—3 cr. (2 and 3) F, S, SS

Advanced training in zoological principles, physiology and comparative vertebrate anatomy. *Prerequisite:* Zool 101, 103.

ZOOL 302—VERTEBRATE EMBRYOLOGY—3 cr. (2 and 3) F, S, SS

Fundamentals of developmental anatomy of the organ systems as illustrated by the chick and pig. Students prepare histological sections and mounts to acquire practice in laboratory procedures and knowledge of vertebrate microscopic anatomy. Identification of the various tissues is stressed. *Prerequisite:* Zool 101, 103 and 301 or permission of the instructor.

ZOOL 304—ANIMAL ECOLOGY—3 cr. (2 and 3) F

Marine, fresh water and land animal communities as they exist in South Carolina. Students will gain a knowledge of the common animal associations as they are related to land use through lectures, reading, films and field trips.

ZOOL 306—GAME MANAGEMENT—2 cr. (2 and 0) S

Breeding habits of game animals and birds and type of territory desirable. The ethics of sportsmanship and the control of predators are among other subjects covered.

ZOOL 307—ANIMAL ANATOMY AND PHYSIOLOGY—3 cr. (2 and 3) F

Anatomy, and physiological processes of ingestion, secretion, excretion, respiration, circulation, reproduction and metabolism of warm-blooded animals.

* The introduction of these courses will allow a student to take a maximum of 6 credit hours of research as part of his elective requirements. The introduction of variable credit courses allows flexibility in the magnitude of the research projects and the introduction of 2 courses allows the possibility of a 2-semester project.

† On leave.

This course is designed for students majoring in Pre-Medicine, Pre-Veterinary, Animal Science, Dairy Science, and Poultry Science. *Prerequisite:* Zool 101, 103.

ZOOL 312—WILDLIFE MANAGEMENT—3 cr. (2 and 3) F, S

Basic principles and general practices of Wildlife Management and Conservation will be covered. This course deals with the major problems concerning the management of Wildlife Resources, with emphasis on upland game species. The laboratory work includes practical work on the Clemson University Woodlands and field trips to several areas where wildlife management is being practiced.

ZOOL 403—PROTOZOOLOGY—3 cr. (2 and 3) S

Taxonomy of the sub-kingdom protozoa with special reference to the parasitic forms directly affecting man. Representative types of free-living forms are surveyed with emphasis on their morphology, physiology and distribution. *Prerequisite:* Zool 101, 103.

ZOOL 404—ANIMAL PATHOLOGY—3 cr. (2 and 3) S

Designed to inform students in the causes, treatments, and prevention of animal diseases. Those transmissible to man are considered in detail. Emphasis is placed on hygiene and care of the sick.

ZOOL 405—ANIMAL HISTOLOGY—3 cr. (2 and 3) F

Microscopic structures of tissues and organs of the animal body. This course is for students in Pre-Veterinary, Pre-Medicine and the Animal Science courses. *Prerequisite:* Zool 101, 103.

ZOOL 410—LIMNOLOGY—3 cr. (2 and 3) F

This course is designed to familiarize the student with interrelationships between fresh-water organisms and their abiotic environment. *Prerequisite:* Zool 101, 103, Ch 101, 102.

ZOOL 456—PARASITOLOGY—3 cr. (2 and 3) F

Parasites affecting man and domestic animals. Life cycles, vectors and practical controls are emphasized.

ZOOL 458—CELL PHYSIOLOGY—3 cr. (2 and 3) F

An introduction to the fundamental processes of physiology as exemplified by the cell. Dynamic cellular environment, irritability and response, metabolism, respiration and growth and differentiation will be studied. *Prerequisite:* Zool 101, 103, Organic Chemistry.

ZOOL 460—GENERAL PHYSIOLOGY—3 cr. (2 and 3) S

Systematic study of the physiology of nervous activity, hormonal control, neuro-hormonal interrelations, circulation, respiration, digestion, renal control, muscular activity and reproduction. Effort in the laboratory will be concentrated toward acquainting the student with methods of obtaining information about these systems. *Prerequisite:* Zool 101, 103 or permission of instructor.

ZOOL 461—ANATOMY—3 cr. (3 and 0) F

Those aspects of anatomy related to the skeletal, circulatory, muscular, nervous, endocrine, respiratory, digestive and excretory systems will be covered. Emphasis will be placed on gross anatomy with some work in micro-anatomy. *Prerequisite:* Zool 101, 103 or permission of instructor.

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ZOOL 462—HERPETOLOGY AND ICHTHYOLOGY—4 cr. (3 and 3) F, '68

Taxonomy, ecology and behavior of amphibians, reptiles and fish with emphasis on species occurring in the Southeast. *Prerequisite:* Zool 101, 103 or permission of instructor.

ZOOL 602—VERTEBRATE EMBRYOLOGY—3 cr. (2 and 3)

ZOOL 604—ANIMAL ECOLOGY—3 cr. (2 and 3)

ZOOL 612—WILDLIFE MANAGEMENT—3 cr. (2 and 3)

ZOOL 703—PROTOZOOLOGY—3 cr. (2 and 3)

ZOOL 704—ANIMAL PATHOLOGY—3 cr. (2 and 3)

ZOOL 705—ANIMAL HISTOLOGY—3 cr. (2 and 3)

ZOOL 710—LIMNOLOGY—3 cr. (2 and 3)

ZOOL 756—PARASITOLOGY—3 cr. (2 and 3)

ZOOL 758—CELL PHYSIOLOGY—3 cr. (2 and 3)

ZOOL 760—GENERAL PHYSIOLOGY—3 cr. (2 and 3)

ZOOL 761—ANATOMY—3 cr. (3 and 0)

ZOOL 762—HERPETOLOGY AND ICHTHYOLOGY—4 cr. (3 and 3)

ZOOL 801—ANIMAL HISTOLOGY—3 cr. (2 and 3)

ZOOL 802—HISTOLOGICAL TECHNIQUES—3 cr. (1 and 6)

ZOOL 803—ANIMAL ECOLOGY—4 cr. (2 and 6)

ZOOL 804—ORNITHOLOGY—3 cr. (2 and 3)

ZOOL 805—ANIMAL PATHOLOGY—3 cr. (3 and 0)

ZOOL 806—COMPARATIVE ANIMAL PHYSIOLOGY—3 cr. (3 and 0)

ZOOL 807—USE OF RADIOISOTOPES IN BIOLOGICAL RESEARCH—3 cr. (2 and 3)

ZOOL 808—RADIOBIOLOGY—3 cr. (2 and 3)

ZOOL 809—TOXICOLOGY—3 cr. (2 and 3)

ZOOL 810—MAMMALOLOGY—3 cr. (2 and 3)

ZOOL 811—RECENT ADVANCES IN ZOOLOGY AND ENTOMOLOGY I—1 cr.
(1 and 0)

ZOOL 812—RECENT ADVANCES IN ZOOLOGY AND ENTOMOLOGY II—1 cr.
(1 and 0)

ZOOL 813—EVOLUTION—3 cr. (3 and 0)

ZOOL 815—PRINCIPLES OF WILDLIFE BIOLOGY—3 cr. (2 and 3)

ZOOL 816—APPLIED WILDLIFE BIOLOGY—3 cr. (2 and 3)

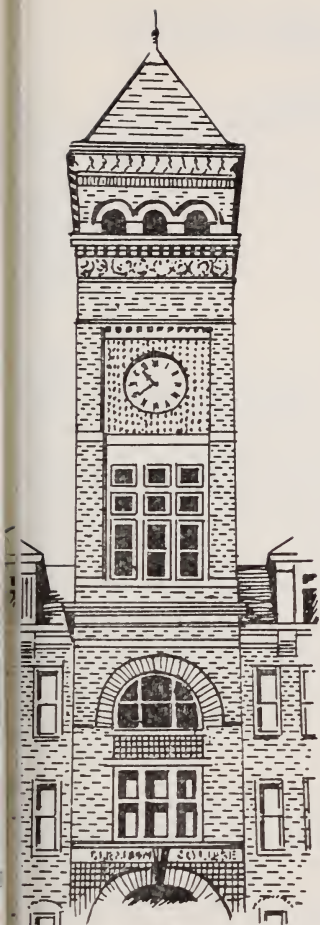
ZOOL 852—PRINCIPLES AND METHODS OF SYSTEMATIC ZOOLOGY—2 cr.
(2 and 0)

ZOOL 856—ECONOMIC ZOOLOGY—3 cr. (2 and 3)

ZOOL 863—SPECIAL PROBLEMS—1 to 4 cr.

ZOOL 891—RESEARCH—Credit to be arranged.

ZOOL 991—RESEARCH—Credit to be arranged.



PUBLIC SERVICE ACTIVITIES

PART VI

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES STAFF

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Sarah S. Knox, B.S.....	Associate District Agent, Pee Dee District, Clemson

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D. F. Cohoon, Ph.D.....	P. O. Box C, Edisto Station, Blackville
J. B. Pitner, Ph.D.....	P. O. Box 271, Pee Dee Station, Florence
W. H. Rhodes, B.S.....	Sandhill Station, P. O. Box 1771, Columbia

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J. T. Gillingham, Ph.D.†.....	Assistant Chemist
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W. R. McCaskill, M.S.†.....	Assistant Entomologist
Mary Lee McCrackan, A.B.†.....	Assistant Chemist

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† Research staff.

‡ Extension staff.

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C. P. Butler, M.S.†	Agricultural Economist (USDA)
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H. C. Gilliam, M.S.†	Agricultural Economist (USDA)
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J. E. Nix, M.S.†	Agricultural Economist (USDA)
T. D. Nolen, M.S.†§	Extension Farm Management Specialist
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M. C. Rochester, Ph.D.†	Leader, Extension Agricultural Economics Work
M. D. Rogers, B.S.†	Agricultural Statistician, Columbia (USDA)
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Agricultural Education

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F. E. Kirkley, M.S.*	Associate Professor

Agricultural Engineering

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J. C. Alphin, Ph.D.†	Assistant Professor, Pee Dee Station
W. A. Balk, B.S.†	Associate Agricultural Engineer, Edisto Station
J. B. Cocke, B.S.†	Agricultural Engineer (USDA)
J. T. Craig, M.S.*	Assistant Professor

* Teaching staff.
† Research staff.
‡ Extension staff.
§ On leave.

D. G. Dickson, M.S.†	Research Assistant
T. L. DeWitt, B.S.†	Agricultural Engineering Assistant, Pee Dee Station
L. O. Drew, Ph.D.°†	Associate Professor
T. H. Garner, Ph.D.°†	Associate Professor
W. E. Garner, M.S.†	Agricultural Engineer (USDA)
W. P. Gladden, B.S.††	Assistant Extension Agricultural Engineering—Cotton Ginning
F. H. Hedden, M.S.†	Extension Agricultural Engineer
C. E. Hood, Ph.D.†	Assistant Professor
W. H. Jenkins, B.S.†	Agricultural Engineering Assistant
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H. P. Lynn, B.S.†	Extension Agricultural Engineer
M. C. McKenzie, B.S.†	Leader, Extension Agricultural Engineering Work
R. H. Ramsey III, M.S.°†	Instructor
E. B. Rogers, Jr., M.S.°†	Associate Professor
J. F. Thornton, Ph.D.†	Agricultural Engineer, Pee Dee Station (USDA)
B. K. Webb, Ph.D.†	Associate Professor
J. C. Webb, M.S.†	Agricultural Engineer, Pee Dee Station (USDA)
J. M. Williams, M.S.†	Agricultural Engineer (USDA)
T. V. Wilson, M.S.°†	Professor

Agronomy and Soils

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L. R. Allen, Ph.D.†	Extension Agronomist—Conservation
L. P. Anderson, M.S.†	Leader, Extension Agronomy
C. E. Bardsley, Jr., Ph.D.°†	Associate Professor
D. A. Benton, B.S.†	Extension Agronomist—Tobacco—Florence
G. R. Craddock, Ph.D.°†	Professor
R. E. Currin III, M.S.†§	Assistant, Pee Dee Station
E. B. Eskew, M.S.°†	Associate Professor
Z. T. Ford, B.S.†	Associate Agronomist, Pee Dee Station (USDA)
A. D. Fore, B.S.†	Assistant, Pee Dee Station
P. B. Gibson, Ph.D.†	Research Agronomist (USDA)
B. J. Gossett, Ph.D.°†	Associate Professor
W. D. Graham, Jr., Ph.D.°†	Assistant Professor
D. C. Harrell, B.S.†	Associate Agronomist, Pee Dee Station (USDA)
F. M. Harrell †	Supervisor, Pee Dee Station
L. H. Harvey, M.S.††	Assistant Professor, Extension Agronomist—Cotton
C. M. Jones, Ph.D.°	Professor
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K. S. LaFleur, Ph.D.°†	Associate Professor
E. F. McClain, M.S.†	Assistant Professor
Alfred Manwiller, Ph.D.†	Associate Professor, Pee Dee Station
H. L. Musen, Ph.D.†	Associate Professor, Edisto Station
C. N. Nolan, Ph.D.†	Extension Agronomist—Weed Control
T. C. Peele, Ph.D.°†	Professor
J. B. Pitner, Ph.D.†	Superintendent and Professor, Pee Dee Station
D. E. Purvis, B.S.†	Assistant, Pee Dee Station
W. H. Rhodes, B.S.†	Superintendent, Sandhill Station
H. V. Rogers, M.S.†	Acting Leader, Extension Agronomy Work
R. L. Stephens, B.S.†§	Assistant Extension Agronomist
R. F. Suman, M.S.†	Associate Professor, Edisto Station
J. R. Woodruff, Ph.D.°†	Assistant Professor
J. A. Wright, Ph.D.†	Assistant Professor

° Teaching staff.

† Research staff.

‡ Extension staff.

§ On leave.

Animal Science

R. F. Wheeler, Ph.D.*†	Head of Department, Professor
C. W. Ackerman, M.S.†	Extension Animal Science Specialist—Swine
L. F. Cato, M.S.†	Acting Leader, Extension Animal Science Work
R. L. Edwards, Ph.D.*†	Associate Professor
W. C. Godley, Ph.D.*†	Professor
D. L. Handlin, M.S.*†	Assistant Professor
J. R. Hill, Jr., Ph.D.*†	Associate Professor
S. W. Kennedy †	Assistant
S. L. Moore, D.V.M.†¶	Assistant State Veterinarian
R. M. Rauton, B.S.†	Assistant
R. R. Ritchie, M.S.*†	Professor
G. C. Skelley, Jr., Ph.D.*†	Associate Professor
B. M. Valentine, B.S.†	Assistant
J. F. Wise, M.S.†	Extension Animal Science Specialist—Marketing
S. G. Woods, B.S.†	Assistant Professor, Edisto Station

Botany, Bacteriology, and Plant Pathology

W. M. Epps, Ph.D.*†	Head of Department, Professor
R. P. Ashworth, Ph.D.*	Professor
Ann W. Baxter, Ph.D.*†	Assistant Professor
L. W. Baxter, Ph.D.*†	Associate Professor
E. G. Beinhart, Jr., Ph.D.*†§	Lecturer, Plant Physiologist (USDA)
C. W. Blackmon, Ph.D.†	Assistant Professor, Edisto Station
J. H. Bond, M.S.*	Associate Professor
N. D. Camper, Ph.D.*†	Assistant Professor
D. F. Cohoon, Ph.D.†	Superintendent and Associate Professor, Edisto Station
G. E. Dillard, Ph.D.*†	Assistant Professor
W. M. Dowler, Ph.D.*†	Lecturer, Plant Pathologist (USDA)
T. W. Graham, Ph.D.†	Plant Pathologist, Pee Dee Station (USDA)
J. E. Halpin, Ph.D.*†	Associate Professor
Barbara Illman, M.A.†	Assistant
R. K. Jones, M.S.†	Extension Plant Pathologist—Chemical Use
G. C. Kingsland, Ph.D.*†	Associate Professor
A. C. Mathews, Ph.D.*	Professor
W. C. Nettles, M.S.†	Leader, Extension Entomology and Plant Disease Work
D. H. Petersen, Ph.D.†	Plant Pathologist (USDA)
J. M. Rush, Ph.D.*	Professor
R. W. Rutledge, Ph.D.*	Professor
W. R. Sitterly, Ph.D.†	Professor, Truck Station
F. H. Smith, M.S.†	Extension Plant Pathologist
J. B. Whitney, Jr., Ph.D.*	Professor
Wesley Witcher, Ph.D.*†	Associate Professor

Crop Pest Commission

J. H. Cochran, Ph.D.*†	State Entomologist
W. M. Epps, Ph.D.*†	State Plant Pathologist
L. H. Senn, M.S.†	Assistant State Entomologist
R. C. Fox, Ph.D.*†	Associate Professor
C. D. Gordon, B.S.†	Assistant Entomologist
F. J. Howard, Jr., M.S.†	Research Assistant
H. B. Jackson, M.S.†	Assistant Entomologist
L. R. Morgan, B.S.†	Entomology Assistant
D. C. Weeks, M.S.†	Assistant Entomologist
Wesley Witcher, Ph.D.*†	Associate Professor

* Teaching staff.

† Research staff.

‡ Extension staff.

¶ Part time.

Dairy Science

W. A. King, Ph.D.*†	Head of Department, Professor
G. W. Brandt, Ph.D.†	Associate Professor
C. C. Brannon, B.S.*†	Associate Professor
W. V. Chalupa, Ph.D.*†	Associate Professor
J. H. Clark, Ph.D.†	Post Doctorate Research Associate
W. C. Cook, B.S.†	Herdsman
J. F. Dickey, Ph.D.*†	Assistant Professor
R. W. Henningson, Ph.D.*†	Professor
Victor Hurst, Ph.D.*†	Professor
J. J. Janzen, Ph.D.*†	Associate Professor
J. W. Kelly, M.S.†	Assistant Professor
J. T. Lazar, Jr., Ph.D.*†	Professor
C. H. Lomas, M.A.†	Extension Dairy Science Specialist
S. L. Moore, D.V.M.†‡	Assistant State Veterinarian
W. L. Northern, M.S.†	Leader, Extension Dairy Science Work
G. D. O'Dell, M.S.†§	Assistant Professor
F. E. Pardue, M.S.†	Associate Extension Dairy Science Specialist
C. B. Reeves, M.S.†	Extension Dairy Science Technologist

Entomology and Zoology

J. H. Cochran, Ph.D.*†	Head of Department, Professor
T. R. Adkins, Jr., Ph.D.*†	Associate Professor
H. R. Agee, M.S.†	Research Entomologist, Pee Dee Station (USDA)
Norman Allen, M.S.†	Entomologist, Pee Dee Station, (USDA)
G. W. Anderson, D.V.M., M.S.*—	Associate Professor of Zoology and Veterinary Medicine
J. V. Bell, M.S.†	Research Mycologist, Truck Station (USDA)
C. S. Creighton, B.S.†	Research Entomologist, Truck Station (USDA)
F. P. Cuthbert, Jr., B.S.†	Research Entomologist, Truck Station (USDA)
Augustine Day, B.S.†	Entomologist, Truck Station (USDA)
Ann J. Dunipace, Ph.D.*	Lecturer
J. A. DuRant III, Ph.D.†	Assistant Professor, Pee Dee Station
R. C. Fox, Ph.D.*†	Associate Professor
F. E. Giles, Ph.D.†	Research Entomologist, Truck Station (USDA)
J. P. Hardister, M.S.†	District Supervisor, Bureau of Sport Fisheries and Wildlife
Ruth L. Hays, Ph.D.*	Assistant Professor
S. B. Hays, Ph.D.*†	Assistant Professor
A. R. Hopkins, M.S.†	Research Entomologist, Pee Dee Station (USDA)
W. S. Kinard, B.S.†	Assistant Entomologist, Pee Dee Station (USDA)
I. B. Kissam, Ph.D.†	Extension Entomologist—Chemical Use
E. W. King, Ph.D.*†§	Professor
Frances McAlister, B.A.†	Entomology Assistant
R. F. Moore, Jr., Ph.D.†	Research Entomologist, Pee Dee Station (USDA)
W. C. Nettles, M.S.†	Leader, Extension Entomology and Plant Disease Work
G. C. Packard, Ph.D.*†	Assistant Professor
L. E. Priester, Jr., Ph.D.*†	Assistant Professor
Rudolph Prins, Ph.D.*†	Assistant Professor
J. K. Reed, Ph.D.*†	Professor
W. J. Reid, Jr., B.S.†	Research Entomologist, Truck Station (USDA)
L. M. Sparks, Jr., M.S.†	Extension Entomologist
H. M. Taft, Ph.D.†	Leader, Cotton Insects Investigations, Pee Dee Station (USDA)
C. A. Thomas, Jr., Ph.D.†	Extension Entomologist—Chemical Use
A. S. Tombes, Ph.D.*†	Associate Professor
S. C. Turnipseed, Ph.D.†	Associate Professor, Edisto Station

* Teaching staff.

† Research staff.

‡ Extension staff.

§ Part time.

§ On leave.

R. E. Ware, B.S.°	Associate Professor
L. G. Webb, Ph.D.°†	Associate Professor, Leader, Clemson Wildlife Research Project
W. K. Willard, Ph.D.°†	Assistant Professor

Farms

John S. Evans, B.S.†	Head of Department
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Food Science and Biochemistry

W. P. Williams, Ph.D.°†	Head of Department, Associate Professor
R. F. Borgman, D.V.M., Ph.D.°†	Associate Professor
L. Crook, Ph.D.°†	Assistant Professor
W. C. Mickelberry, Ph.D.°†	Associate Professor
J. H. Mitchell, Jr., Ph.D.†	Professor
A. L. Shewfelt, Ph.D.°†	Professor

Forestry

Koloman Lehotsky, Ph.D.°†	Head of Department, Professor
R. M. Allen, Ph.D.°†	Belle W. Baruch Professor
W. J. Barker, B.S.†	Leader, Extension Forestry Work
M. H. Bruner, M.F.°†	Associate Professor
B. M. Cool, Ph.D.°†	Professor
N. B. Goebel, M.F.†	Associate Forester
C. W. Hall, B.S.†	Extension Forester, Columbia
C. L. Lane, M.S.°†	Assistant Professor
W. H. D. McGregor, Ph.D.°†	Associate Professor
S. A. Marbut, B.S.†	Extension Forester
L. D. Reamer, B.S.†	Assistant
R. E. Schoenike, Ph.D.°†	Associate Professor
W. A. Shain, Ph.D.°†	Associate Professor
A. T. Shearin, B.S.†	Assistant
J. R. Warner, D.F.°†	Professor

Four-H Club Work

J. B. Williams, B.S.†	State 4-H Club Agent
G. H. Baker, B.S.†	Associate 4-H Club Agent, Florence
Wayman Johnson, M.S.†	Associate 4-H Club Agent
Altamese B. Pough, B.S.†	Assistant 4-H Club Agent
E. Joyce Richardson, M.S.†	Assistant 4-H Club Agent
Georgia T. Roberson, M.Ed.†	Associate 4-H Club Agent
J. T. Rogers, B.S.†	Associate 4-H Club Agent

Home Economics

Julia B. Taylor, M.S.†	Extension House Furnishings Specialist
Marie S. Hindman, M.S.†	Extension Nutritionist
Frances H. Odom, M.A.†	Extension Housing Specialist
Vela M. Smith, M.S.†	Extension Clothing Specialist
Ann N. Rogers, M.Ed.†	Rural Civil Defense Specialist
Judith B. Turkett, B.S.†	Extension Consumer, Information Specialist, Columbia
W. L. Yates, M.S.†	Extension Family Life Specialist

Horticulture

T. L. Senn, Ph.D.°†	Head of Department, Professor
P. M. Alexander, Ph.D.°†	Assistant Professor
W. C. Barnes, Ph.D.†	Superintendent and Professor, Truck Station
R. A. Baumgardner, Ph.D.†	Extension Food Processing Specialist
Guy L. Buckner†	Horticultural Assistant, Truck Station

° Teaching staff.
† Research staff.
‡ Extension staff.

W. P. Cook, M.S.†	Extension Horticulturist—Truck Crops, Truck Station
J. H. Crawford, M.S.†	Assistant Professor
R. J. Ferree, M.S.†	Leader, Extension Horticulture Work
J. P. Fulmer, M.S.*†	Assistant Professor
C. E. Gambrell, Jr., M.S.†	Assistant Horticulturist, Sandhill Station
J. T. Garrett, M.S.†	Extension Horticulturist—Vegetables
M. G. Hamilton, Ph.D.†	Associate Professor, Edisto Station
M. B. Hughes, Ph.D.†	Professor, Edisto Station
W. S. Jordan, Ph.D.*	Assistant Professor
J. A. Martin, B.S.†	Associate Professor
L. C. Miller, M.S.†§	Extension Horticulturist—Ornamentals
W. L. Ogle, Ph.D.*†	Professor
R. R. Rothenberger, Ph.D.*†	Assistant Professor
H. J. Sefick, M.S.*†	Associate Professor
E. T. Sims, Jr., Ph.D.*†	Associate Professor
B. J. Skelton, Ph.D.*†	Assistant Professor
G. E. Stembridge, Ph.D.*†	Associate Professor
F. W. Thode, M.S.*	Associate Professor
C. W. Thompson, M.S.†	Area Agent—Ornamentals, Truck Station
L. O. Van Blaricom, M.S., Ch.E.*†	Professor

Marketing (Headquarters, Columbia)

S. B. Walker, B.S.†	Leader, Extension Marketing Work
D. C. Hutchins, B.S.†	Marketing Information Specialist
J. F. Pittman, M.S.†	Extension Marketing Specialist
E. W. Siedschlag, A.B.†	Extension Marketing Specialist
R. D. Steer, B.S.†	Extension Cooperative Marketing Specialist, Greenwood
W. A. Tuten †	Extension Marketing Specialist

Poultry Science

B. D. Barnett, Ph.D.*†	Head of Department, Professor
B. W. Bierer, V.M.D.†	Professor, Laboratory Director, Columbia
A. Boone, Ph.D.†	Professor
J. B. Cooper, M.S.*†	Associate Professor
Douglas Hamm, Ph.D.†	Leader, Extension Poultry Science Work
B. L. Hughes †	Poultry Science Assistant
C. F. Risher, B.S.†	Extension Turkey Specialist, York
J. F. Stephens, Ph.D.*†	Assistant Professor
T. C. Stewart, Sr., B.S.†	Extension Poultry Science Specialist
K. L. Swiney, Ph.D.†	Associate Extension Poultry Science Specialist
D. E. Turk, Ph.D.*†	Assistant Professor
W. S. Walker, M.Ed.†	Extension Poultry Science Specialist, Columbia

Seed Certification

R. H. Garrison, B.S.†	Head of Department, Associate Plant Breeder
J. O. Black, Jr., M.S.†	Assistant Agronomist
R. A. Jameson, M.S.†	Assistant Agronomist

Statistical Services

W. P. Byrd, Ph.D.*†	Professor
W. E. Johnston, M.S.*†	Assistant Professor
C. B. Loadholt, M.S.†§	Assistant Statistician
D. R. Russell, B.S.†	Assistant Statistician

° Teaching staff.
† Research staff.
‡ Extension staff.
§ On leave.

COUNTY AGENTS

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Abbeville	L. H. Bull, B.S.	Abbeville
Aiken	J. H. Evans, B.S.	Aiken
Allendale	W. H. Funchess, M.S.	Allendale
Anderson	H. D. Maret, B.S.	Anderson
Bamberg	D. W. Howe, B.S.	Bamberg
Barnwell	J. B. Griffith, B.S.	Barnwell
Beaufort	W. L. Johnson, M.S.	Beaufort
Berkeley	M. C. Mason, B.S.	Moncks Corner
Calhoun	R. N. Chastain, B.S.	St. Matthews
Charleston	B. S. Lawrimore, B.S.	Charleston
Cherokee	W. A. Ridgeway, B.S.	Gaffney
Chester	D. C. Wylie, Jr., B.S.	Chester
Chesterfield	J. C. Willis, B.S.	Chesterfield
Clarendon	A. D. Grainger, B.S.	Manning
Colleton	J. R. White, B.S.	Walterboro
Darlington	W. J. Gray, B.S.	Darlington
Dillon	W. D. Witherspoon, B.S.	Dillon
Dorchester	D. E. Epps, B.S.	St. George
Edgefield	J. W. Gilliam, Jr., B.S.	Edgefield
Fairfield	M. H. Lynn, B.S.	Winnboro
Florence	H. F. Livingston, Jr., B.S.	Florence
Georgetown	H. B. Hardee, B.S.	Georgetown
Greenville	J. K. Jones, B.S.	Greenville
Greenwood	T. J. Bryson, B.S.	Greenwood
Hampton	E. C. Wallace, M.S.	Hampton
Horry	G. H. Liebenrood, M.Ed.	Conway
Jasper	E. G. Tate, Jr., B.S.	Ridgeland
Kershaw	R. R. Montgomery, B.S.	Camden
Lancaster	F. W. Cannon, B.S.	Lancaster
Laurens	Maret Outz, B.S.	Laurens
Lee	V. F. Linder, B.S.	Bishopville
Lexington	M. A. Bouknight, B.S.	Lexington
McCormick	J. R. Meredith, M.S.	McCormick
Marion	J. L. King, B.S.	Marion
Marlboro	E. C. Abrams, M.Agr.	Bennettsville
Newberry	A. F. Busby, B.S.	Newberry
Oconee	J. C. Morgan, B.S.	Walhalla
Orangeburg	J. C. King, B.S.	Orangeburg
Pickens	J. R. Wood, B.S.	Pickens
Richland	R. W. Bailey, B.S.	Columbia
Saluda	W. H. Craven, Jr., B.S.	Saluda
Spartanburg	W. J. Martin, B.S.	Spartanburg
Sumter	T. O. Bowen, B.S.	Sumter
Union	J. L. Cochran, B.S.	Union
Williamsburg	L. B. Harrington, B.S.	Kingstree
York	J. D. Miller, B.S.	York
Area Agent—Livestock	J. E. Barker, M.S.	Anderson
Area Agent—Ornamentals	C. W. Thompson, M.S.	Charleston
Area Agent—Forestry	J. H. Phillips, Jr., M.S.	Chester
Area Agent—Livestock	H. L. Eason, B.S.	Chester
Area Agent—Poultry	J. F. Welter, M.S.	Greenville
Area Agent—Livestock	G. W. Dean, M.S.	Orangeburg
Area Agent—Livestock	B. W. Sherer, B.S.	Spartanburg
Area Agent—Farm Management	J. D. Williams, B.S.	York

ASSOCIATE AND ASSISTANT COUNTY AGENTS

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Abbeville	J. S. Jones, B.S.	Abbeville
Aiken	F. M. Lollis, B.S.	Aiken
Aiken	W. A. Beasley, Assoc., M.S.	Aiken
Aiken	T. A. Hammond, Assoc., B.S.	Aiken
Allendale	C. E. Thrailkill, B.S.	Allendale
Anderson	N. C. Anderson, Assoc., B.S.	Anderson
Anderson	R. C. McDaniel, Assoc., M.S. §	Anderson
Anderson	G. W. Stewart, Assoc., B.S.	Anderson
Anderson	W. R. Roberts, B.S.	Anderson
Bamberg	E. D. Dean, Assoc., M.S.	Bamberg
Bamberg	A. L. Padgett, Assoc., M.S.	Bamberg
Barnwell	B. R. Stepp, B.S. §	Barnwell
Barnwell	J. M. Stout, M.S.	Barnwell
Beaufort	P. T. Seabrook, Assoc., M.S.	Beaufort
Berkeley	R. C. Bacote, Assoc., M.S.	Moncks Corner
Berkeley	C. P. Goodyear, Assoc., B.S.	Moncks Corner
Berkeley	W. C. Clinkscales, B.S. §	Moncks Corner
Charleston	J. L. Cowdy, B.S.	Charleston
Charleston	L. M. Muldrow, B.S.	Charleston
Cherokee	H. B. Pasley, B.S.	Gaffney
Cherokee	E. V. Jones, M.S.	Gaffney
Chester	M. M. Sitton, Assoc., M.S.	Chester
Chester	C. N. Strange, Assoc., B.S.	Chester
Chesterfield	D. D. Pruitt, B.S.	Chesterfield
Chesterfield	W. P. Yates, B.S.	Chesterfield
Chesterfield	H. K. George, B.S.	Chesterfield
Clarendon	H. C. Scoville, B.S.	Manning
Clarendon	R. D. McNair, Assoc., B.S.	Manning
Colleton	J. J. Mitchell, Assoc., M.S.	Walterboro
Colleton	W. A. Gamble, B.S.	Walterboro
Darlington	C. H. Gray, B.S.	Darlington
Darlington	R. C. DuBose, Assoc., B.S.	Darlington
Darlington	R. C. Smith, Jr., Assoc., B.S.	Darlington
Dorchester	Eugene Frederick, Assoc., B.S.	St. George
Dorchester	F. O. McAlhany, B.S.	St. George
Edgefield	C. R. Tuten, Assoc., B.S.	Edgefield
Fairfield	D. G. Belton, Jr., B.S.	Winnaboro
Fairfield	A. D. Boggs, Assoc., B.S.	Winnaboro
Florence	J. S. Boswell, Jr., B.S.	Florence
Florence	A. J. Kinder, B.S.	Florence
Florence	J. M. Parnell, Assoc., B.S.	Florence
Florence	Amos Wells, Jr., B.S.	Florence
Georgetown	K. P. Williams, B.S.	Georgetown
Greenville	C. K. Palmer, Assoc., B.S.	Greenville
Greenville	G. D. Butler	Greenville
Greenville	F. D. Garrett, Assoc., B.S.	Greenville
Greenville	H. G. Oates, B.S.	Greenville
Greenwood	E. M. Middleton, Assoc., M.S.	Greenwood
Greenwood	H. B. Gray, B.S. §	Greenwood
Greenwood	R. L. Ables, B.S.	Greenwood
Hampton	J. A. Spruill, Assoc., M.S.	Hampton
Horry	Cleveland Sanders, B.S.	Conway
Horry	W. P. Johnson, Assoc., B.S.	Conway
Horry	J. W. Pruitt, B.S.	Conway
Horry	J. L. Brewer, B.S.	Conway
Jasper	H. E. Wilson, B.S.	Ridgeland
Kershaw	B. T. McIntosh, Assoc., M.S.	Camden

§ On leave.

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Kershaw	R. D. Hunter, B.S.	Camden
Lancaster	D. R. Gowan, Assoc., M.S.	Lancaster
Lancaster	C. N. Wilson, Assoc., B.S.	Lancaster
Laurens	E. L. Hagan, Jr., B.S.	Laurens
Laurens	J. D. Ridley, M.S.	Laurens
Laurens	A. F. Williams, M.S.	Laurens
Lee	L. S. Livingston, Assoc., B.S.	Bishopville
Lee	John Mott, B.S.	Bishopville
Lexington	R. L. Boozer, Assoc., M.Ed.	Lexington
Lexington	W. C. Jones, Jr., B.S.	Lexington
Marion	C. A. Brown, Assoc., B.S.	Marion
Marion	M. J. Carter, Assoc., B.S.	Marion
Marlboro	R. C. Smith, Assoc., B.S.	Bennettsville
Newberry	J. O. Donkle, Assoc., B.S.	Newberry
Newberry	B. J. Gill, Assoc., B.S.	Newberry
Oconee	M. S. Cely, Jr., B.S.	Walhalla
Orangeburg	J. L. Hayden, Assoc., B.S.	Orangeburg
Orangeburg	Reuel McLeod, B.S.	Orangeburg
Orangeburg	Q. J. Smith, Assoc., M.S.	Orangeburg
Orangeburg	J. E. Yonce, B.S.	Orangeburg
Pickens	F. M. Fleming, Assoc., B.S.	Pickens
Richland	O. F. Huff, Assoc., B.S.	Columbia
Richland	Charlie Bronson, Jr., Assoc., M.S.	Columbia
Saluda	J. W. Riser, Assoc., B.S.	Saluda
Spartanburg	G. W. Bowen, Jr., Assoc., B.S.	Spartanburg
Spartanburg	Crayton McCown, Assoc., B.S.	Spartanburg
Spartanburg	R. N. Smith, Assoc., B.S.	Spartanburg
Sumter	Arthur Sanders, Assoc., B.S.	Sumter
Sumter	T. B. Tillman, Jr., Assoc., B.S.	Sumter
Sumter	D. C. Carraway, B.S.	Sumter
Williamsburg	R. M. Johnston, Assoc., B.S.	Kingstree
Williamsburg	J. F. Fitts, B.S.	Kingstree
York	J. G. Bowman, Assoc., B.S.	York
York	C. H. Fant, Assoc., B.S.	York
York	J. W. Pridmore, B.S.	York

EXTENSION HOME ECONOMISTS

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Abbeville	Sara M. Glenn, B.S.	Abbeville
Aiken	Alpha C. Jenkins, B.S.	Aiken
Allendale	Laura C. Johnson, B.S.	Allendale
Anderson	Nancy H. Williams, B.S.	Anderson
Bamberg	Carolyn R. Hiers, B.S.	Bamberg
Barnwell	Nancy E. Smith, B.S.	Barnwell
Beaufort	Vivian C. Gibson, B.S.	Beaufort
Berkeley	Matilda B. von Lehe, B.S.	Moncks Corner
Calhoun	Mary Faye Sheppard, B.S.	St. Matthews
Charleston	Lillian R. Goldberg, B.S.	Charleston
Cherokee	Lucille B. Alsing, B.S.	Gaffney
Chesterfield	Lillian D. Rivers, B.S.	Chesterfield
Clarendon	Miriam F. Rigby, B.S.	Manning
Colleton	Isobel P. Heaton, B.S.	Walterboro
Darlington	Sara E. Roper, B.S.	Darlington
Dillon	Barbara S. Berry, B.S.	Dillon
Dorchester	Isobel P. Heaton, Acting, B.S.	St. George
Edgefield	Dorothy O. Herlong, B.S.	Edgefield
Fairfield	Theresa Beckham, B.S.	Winnsboro
Florence	Eleanor M. Foster, B.S.	Florence
Greenville	M. Myrtle Nesbitt, B.S.	Greenville

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Greenwood	A. Louise McColl, B.S.	Greenwood
Hampton	Darlana D. Mixson, B.S.	Hampton
Horry	Susan K. Brown, B.S.	Conway
Jasper	Elizabeth B. Berry, B.S.	Ridgeland
Kershaw	Dean H. Lucas, B.S.	Camden
Lancaster	Nancy C. Patterson, B.S.	Lancaster
Laurens	Belvia M. Hegler, B.S.	Laurens
Lee	Carolyn Meares, B.S.	Bishopville
Lexington	Margaret G. McFadden, B.S.	Lexington
Marion	Sallie M. Smith, B.S.	Marion
Marlboro	Louise Heriot, M.Ed.	Bennettsville
Newberry	Mildred K. Holliday, B.S.	Newberry
Oconee	Hazle D. Wise, B.S.	Walhalla
Orangeburg	Huldah P. McKnight, B.S.	Orangeburg
Pickens	Sarah G. Cureton, B.S.	Pickens
Richland	Jean E. Thomas, M.S.	Columbia
Saluda	Catherine S. Boozer, B.S.	Saluda
Spartanburg	Nancy M. Rasor, B.S.	Spartanburg
Sumter	Evangeline T. Thompson, B.S.	Sumter
Union	Judith A. Collins, B.S.	Union
Williamsburg	Mary A. Thompson, B.S.	Kingstree
York	Jennie M. Riddle, B.S.	York
Area Agent—Consum. Mgt.	Judith B. Turkett, B.S.	Charleston

ASSOCIATE AND ASSISTANT EXTENSION HOME ECONOMISTS

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Aiken	Lonieal H. Jackson, Assoc., B.S.	Aiken
Aiken	Kathy L. Littlefield, B.S.	Aiken
Allendale	Annie M. Butler, Assoc., B.S.	Allendale
Anderson	Joyce G. Banks, B.S.	Anderson
Anderson	Mary W. Jones, B.S.	Anderson
Anderson	Cynthia W. Williford, Assoc., M.S.	Anderson
Bamberg	Lillie J. Limehouse, Assoc., B.S.	Bamberg
Barnwell	Edna K. DuPree, Assoc., B.S.	Barnwell
Beaufort	Lillie B. Crosby, Asst., B.S.	Beaufort
Berkeley	Doris T. Dauphiney, B.S.	Moncks Corner
Charleston	Dorthula B. Bonds, B.S.	Charleston
Cherokee	Leota S. Littlejohn, B.S.	Caffney
Chesterfield	Phyllis Bradham, B.S.	Chesterfield
Chesterfield	Queen E. Bowman, B.S.	Chesterfield
Clarendon	Claudette L. Greene, B.S.	Manning
Colleton	Emily E. Bridges, B.S.	Walterboro
Colleton	Gussie M. Goudlock, Assoc., B.S.	Walterboro
Darlington	Martha D. George, B.S.	Darlington
Darlington	Barbara G. Haywood, B.S.	Darlington
Dorchester	Bernice H. Brown, Assoc., M.S.	St. George
Edgefield	Mary H. Ouzts, B.S.	Edgefield
Fairfield	Coy Smith M.Ed.	Winnsboro
Florence	Judith E. Spiers, B.S.	Florence
Florence	Joyce D. Byrd, B.S.	Florence
Florence	Hattie P. Lowery, Assoc., M.S.	Florence
Florence	Sallie M. Moore, B.S.	Florence
Georgetown	Janie Lancaster, M.S.	Georgetown
Greenville	Jeanette M. Childs, B.S.	Greenville
Greenville	Alma A. Devore, B.S.	Greenville
Greenwood	Madge W. Hardy, Assoc., B.S.	Greenwood
Hampton	Leona B. Mungin, Assoc., B.S.	Hampton

<i>County</i>	<i>Name</i>	<i>Post Office</i>
Horry	Mary L. Kantanie, B.S.	Conway
Horry	Marian M. Watson, Assoc., B.S.	Conway
Kershaw	Adell W. Watson, Assoc., B.S.	Camden
Lancaster	Jessie J. Shannon, B.S.	Lancaster
Laurens	Helen C. Camp, B.S.	Laurens
Lee	Bessie C. Gist, B.S.	Bishopville
Lexington	Jeralyn K. Fallaw, B.S.	Lexington
Lexington	Eleanor B. Whitesides, B.S.	Lexington
Marion	Claire M. Baker, Assoc., B.S.	Marion
Marion	Shirley M. Patterson, B.S.	Marion
Marlboro	Margarette Jones, B.S.	Bennettsville
Newberry	Suzanne D. Weber, B.S.	Newberry
Newberry	Lillian G. Saunders, Assoc., B.S.	Newberry
Oconee	Frances Anne Garner, B.S.	Walhalla
Orangeburg	Rosa R. Odom, Assoc., B.S.	Orangeburg
Orangeburg	Rachel E. Anderson, B.S.	Orangeburg
Pickens	Bertha W. Stone, B.S.	Pickens
Richland	Gertrude H. Sanders, Assoc., B.S.	Columbia
Richland	Zella S. Carpenter, B.S.	Columbia
Saluda	Myrtice T. Boazman, Assoc., B.S.	Saluda
Spartanburg	Cammie F. Clagett, Assoc., B.S.	Spartanburg
Spartanburg	M. Andrea Talley, B.S.	Spartanburg
Sumter	Patricia G. Lee, B.S.	Sumter
Sumter	Jacqueline Miller, B.S.	Sumter
Union	Laura W. Jeter, Assoc., B.S.	Union
Williamsburg	Alice N. Milligan, B.S.	Kingstree
Williamsburg	Eva G. Lawrence, Assoc., B.S.	Kingstree
York	Johnnie G. Sloan, Assoc., B.S.	York
York	Julia D. Herron, B.S.	York

EXTENSION SERVICE EMERITI

Lora Warner Alford, B.S.	County Agent Emeritus
Caroline Simonton Alston	Home Demonstration Agent Emeritus
John Chipley Anthony, B.A.	County Agent Emeritus
Delphena Wilkerson Arnold, L.I., Assoc.	Home Demonstration Agent Emeritus
Ophelia Sue Barker, B.S.	Home Demonstration Agent Emeritus
Benjamin Barnwell	Associate County Agent Emeritus
George Washington Bonnette, B.S.	County Agent Emeritus
Hugh Asbury Bowers, M.S.	Extension Horticulturist—Truck Crops Emeritus
Elizabeth DuBose Boykin, A.B.	Home Demonstration Agent Emeritus
Harry Gilmore Boylston, B.S.	Extension Cotton Improvement Specialist Emeritus
Lillian Watts Brown, L.I.	Associate Home Demonstration Agent Emeritus
Odil Williams Cain, B.S.	County Agent Emeritus
Charles Babb Cannon, B.S.	County Agent Emeritus
Claude William Carraway, B.S.	County Agent Emeritus
Eleanor DeVaux Carson, A.B., M.S.	Home Demonstration Agent Emeritus
Mattie Lee Cooley, B.S.	Home Demonstration Agent Emeritus
Carl Golden Cushman, B.S.	Leader Emeritus, Dairy Extension Work
George Washington Daniels, L.I.	Associate County Agent Emeritus
James Ervin Dickson, B.S.	Associate County Agent Emeritus
Spencer Cholier Disher, L.I.	Associate County Agent Emeritus
Augustus Lowery DuRant, B.S., M.S.	Leader, Livestock Work Emeritus
James Malcolm Eleazer, B.S.	Extension Information Specialist Emeritus
Silas Wightman Epps, B.S.	County Agent Emeritus
Samuel Ernest Evans, B.S., M.S.	County Agent Emeritus
Paul Bryson Ezell, B.S.	County Agent Emeritus
Margaret Barron Fewell, B.A.	Home Demonstration Agent Emeritus
Rosa Gibbs Gadson, L.I.	Associate Home Demonstration Agent Emeritus

Minnie Estha Gandy	Associate Home Demonstration Agent Emeritus
Paul Matthew Garvin, B.S.	County Agent Emeritus
Percy Harold Gooding, B.S., M.S.	Leader, Poultry Extension Work Emeritus
William Roy Gray, B.S.	County Agent Emeritus
Mary Catherine Haynie, B.A.	Home Demonstration Agent Emeritus
Elizabeth Herbert, B.A.	Home Demonstration Agent Emeritus
Ellie Lanham Herrick, B.S.	Family Life Specialist Emeritus
Jesse Howard Hopkins, Sr., B.S.	County Agent Emeritus
Julia Stebbins Howerton	Home Demonstration Agent Emeritus
Ralph Alexander Jackson, B.S.	County Agent Emeritus
Harriett Frazier Johnson, A.B., B.S., M.A.	State Girls' Club Agent Emeritus
Vernon Morris Johnston, B.S.	County Agent Emeritus
Jane Ketchen, B.A.	Assistant State Home Demonstration Agent Emeritus
Lönnny Inge Landrum, B.S.	State Home Demonstration Agent Emeritus
Jamie Tarlton Lazar, B.S.	District Agent Emeritus
Thomas Brougham Lee, B.S.	County Agent Emeritus
Robert Howe Lemmon, B.S.	County Agent Emeritus
Janie Letitia McDill, A.B., B.S., M.S.	Nutritionist Emeritus
Henry Abner McGee	Extension Tobacco Specialist Emeritus
Colin McLaurin, B.S.	County Agent Emeritus
Elizabeth McNab, A.B.	Home Demonstration Agent Emeritus
John Doby Marshall, B.S.	Associate County Agent Emeritus
Margaret Martin, B.A., M.A.	Extension Food Production and Conservation Specialist Emeritus
Booker Talifero Miller, B.S.	Associate County Agent Emeritus
Izora Miley	Home Demonstration Agent Emeritus
T. W. Morgan, M.S.	Associate Director of Extension Emeritus
Sallie P. Musser, B.A., M.A.	State Home Demonstration Agent Emeritus
Juanita Henderson Neely, A.B., M.S.	State Home Demonstration Agt. Emeritus
Marian Baxter Paul, B.S.	Assistant in Home Economics Extension Emeritus
Houston Stafford Person, B.S.	Associate County Agent Emeritus
Theodosia Dargan Plowden	District Agent Emeritus
Portia Seabrook, A.B., M.S.	Extension Clothing Specialist Emeritus
Etta Sue Sellers, B.A.	Home Demonstration Agent Emeritus
Mahala Jane Smith, B.S.	Home Demonstration Agent Emeritus
Stiles Conger Stribling, B.S.	Agriculture Editor Emeritus
Lena Elizabeth Sturgis	Home Demonstration Agent Emeritus
Marguerite Spearman Summer, B.S.	Home Demonstration Agent Emeritus
Van Buren Thomas, B.S.A.	Assistant County Agent Emeritus
William Thompson, B.S.	Associate County Agent Emeritus
Carrie Carson Tomlinson, B.S., M.A.	Home Demonstration Agent Emeritus
Ernest Craig Turner, B.S.	Extension Conservationist Emeritus
Larkin Vandiville Walker, B.S.	Associate County Agent Emeritus
Audley Hoffman Ward, B.S., M.S.	District Agent Emeritus
Mabel Price Washington, B.S.	Associate Home Demonstration Agent Emeritus
David Wayne Watkins, B.S., M.A.	Director Emeritus
Ernest Nesbit Williams, B.S.	Assistant in Agricultural Extension Emeritus

LIVESTOCK-POULTRY HEALTH DEPARTMENT

P. O. Box 1771

COLUMBIA, SOUTH CAROLINA 29202

Director and State Veterinarian

C. E. Boyd, D.V.M. Columbia

State Associate Director

John B. Thomas, D.V.M. Columbia

Federal Assistant Director

John A. Kimsey, D.V.M. Columbia

Meat Inspection Program

George D. Batcheldor, Sr., D.V.M., Chief.....	Columbia
<i>Supervisory Area Veterinarians—Meat Inspection Program</i>	
A. F. Allison, D.V.M.	Florence
William Ginn, D.V.M.	Columbia
A. R. Griffith, D.V.M.	Orangeburg
H. A. Hayes, D.V.M.	Spartanburg

Assistant State Veterinarians

O. E. Baker, D.V.M.	Columbia
Bert W. Bierer, V.M.D.	Columbia
Walter T. Carll, D.V.M.	Columbia
W. R. Chastain, D.V.M.	Columbia
T. H. Eleazer, D.V.M.	Columbia
D. E. Goodman, D.V.M.	Turbeville
S. L. Moore, D.V.M.	Clemson
H. S. Powell, D.V.M.	Columbia
W. H. Rhodes, D.V.M.	Columbia

State Laboratory Assistants

Lidia M. Casanovas, M.D.	Columbia
Haskell Marsh	Columbia
Furman Peake	Columbia

State Livestock Law Enforcement Officers

James C. Epps, Jr., B.Sc.	Columbia
Charles L. Fleming, B.Sc.	Columbia
Charles E. Grant, B.Sc.	Columbia

State Livestock Quarantine Officers

J. H. Cope, B.Sc.	Cope
Laurie D. Morris	Hemingway

Livestock Inspectors

Jake P. Ginn, Jr., B.Sc.	Varnville
DeWitt W. Maxey	Spartanburg
P. M. Snowden	Hemingway

State Clerical

Chester B. Collins	Columbia
L. Gayle Goodwin	Columbia
Ann R. Grigsby	Columbia
Shelby R. Furtick	Columbia
Cecil Jones	Columbia
John B. Klugh	Columbia
I. Lee Motley	Columbia
E. Donna Steele	Columbia

Federal Veterinary Livestock Inspectors

G. A. Baker, D.V.M.	Columbia
John N. Dalton, D.V.M.	Bamberg
M. L. Gunnels, Jr., D.V.M.	Walterboro
Joseph B. Hendricks, D.V.M.	Columbia
H. A. Jordan, D.V.M.	Florence
J. M. Love, D.V.M.	Chester
Herbert Racoff, D.V.M., M.S.	Columbia
Thomas J. Wheelin, D.V.M.	Saluda
K. N. Wiser, D.V.M.	Greer

Federal Serologist

James E. Corley, B.Sc. Columbia

Federal Laboratory Assistants

Jack C. Fortner Columbia
 Evelyn M. Goff Columbia
 Wayne Lovette Columbia

Federal Livestock Inspectors

James W. Crowder, Jr. Rock Hill
 Thomas R. Davis Clinton
 Everett L. Davison Cheraw
 Herbert W. Mitchell Belton
 Julian L. Morris Lake City
 Bernard B. Oswald Lexington
 Johnny Lee Powers Timmonsville
 James A. Ritter, Jr. Walterboro
 John G. Smith, B.Sc. Orangeburg
 Roy D. Wingard, B.Sc. Columbia

Federal Clerical

Francis L. Eargle Columbia
 Virginia C. Ingram Columbia
 Ida B. Strickland Columbia
 Blanche T. Truesdale Columbia
 Tommy Ray Wages Columbia
 Elizabeth T. Webster, A.B. Columbia
 Maude E. West Columbia
 Gothedon H. Wheat Columbia

State-Federal Accredited Veterinarians

Leslie H. Ahrens, D.V.M. Columbia
 E. C. Anderson, D.V.M. Clemson
 Henry M. Anderson, D.V.M. Florence
 James T. Anderson, D.V.M. Chester
 R. E. Atkinson, D.V.M. Kingstree
 N. J. Ayers, D.V.M. Greer
 O. E. Ballenger, D.V.M. Easley
 W. R. Beasley, D.V.M. Batesburg
 R. W. Beaty, Jr., D.V.M. Sumter
 W. K. Best, D.V.M. Lancaster
 James E. Brehm, D.V.M. Surfside Beach
 Wayne Brooks, D.V.M. Greenville
 David L. Brown, Jr., D.V.M. Florence
 Harry T. Brown, D.V.M. Camden
 T. E. Brown, D.V.M. Spartanburg
 Jones W. Bryan, D.V.M. Fairfax
 R. L. Bryan, D.V.M. Luray
 Stuart E. Burnett, D.V.M. Sumter
 T. L. Burriss, D.V.M. Anderson
 W. S. Carr, D.V.M. Aiken
 F. P. Caughman, B.Sc., D.V.M. Columbia
 F. P. Caughman, Jr., D.V.M. Columbia
 George Cofer, D.V.M. West Columbia
 C. W. Colquitt, D.V.M. Barnwell
 J. D. Cottingham, D.V.M. Manning
 W. C. Cottingham, D.V.M. Kingstree
 Jack R. Cox, D.V.M. Myrtle Beach
 M. D. Culpepper, D.V.M. Chester
 J. W. Dantzler, D.V.M. Orangeburg

J. T. Dickson, D.V.M.	Rock Hill
C. M. Dotson, D.V.M.	Lancaster
F. E. Ducey, Jr., D.V.M.	Ridgeland
Will T. Dunn, D.V.M.	Greenville
H. P. Dyches, D.V.M.	Aiken
R. M. Edwards, Jr., D.V.M.	Columbia
James A. Eidson, Jr., D.V.M.	Columbia
Raymond C. Elam, D.V.M.	West Columbia
Wm. S. Fairey, D.V.M.	Orangeburg
P. R. Fidler, D.V.M.	Sumter
J. C. Frazier, D.V.M.	Greenville
Edwin L. Freeman, Jr., D.V.M.	Sumter
H. L. Frieze, D.V.M.	Gaffney
T. F. Fussell, D.V.M.	Spartanburg
S. P. Galphin, D.V.M.	Holly Hill
J. G. Gibson, D.V.M.	Florence
W. H. Giddens, D.V.M.	Saluda
L. H. Hardy, D.V.M.	Camden
C. C. Harmon, D.V.M.	Columbia
J. W. Hawk, D.V.M.	North Augusta
Hugh A. Hayes, D.V.M.	Spartanburg
Carlos Helms, D.V.M.	Crescent Beach
Wm. S. Hicks, D.V.M.	Columbia
W. G. Hill, D.V.M.	Abbeville
C. R. Hinson, D.V.M.	Bennettsville
R. R. Hirshberg, D.V.M.	Sumter
T. P. Hoffmeyer, D.V.M.	Florence
E. G. Horres, D.V.M.	Charleston
E. B. Hubster, D.V.M.	Walterboro
Kenneth L. Huggins, D.V.M.	Dillon
James W. Hutto, D.V.M.	Holly Hill
W. S. Jackson, D.V.M.	Greenville
C. V. Jameson, D.V.M.	Anderson
T. H. Jamison, D.V.M.	Orangeburg
Preston B. Jones, D.V.M.	Anderson
William L. Jones, D.V.M.	Anderson
S. J. Kellett, Jr., D.V.M.	Seneca
R. H. Kemmerlin, D.V.M.	Charleston
H. B. Kinard, Jr., D.V.M.	Greenwood
H. W. Kinard, D.V.M.	Bamberg
G. R. Kitchen, D.V.M.	Sumter
R. Lee Land, D.V.M.	Pageland
T. E. Lanham, D.V.M.	Edgefield
G. J. Lawhon, Sr., B.Sc., D.V.M.	Hartsville
G. J. Lawhon, Jr., D.V.M.	Hartsville
J. S. Lide, D.V.M.	Newberry
C. B. Lowman, D.V.M.	Newberry
Earl A. McDowell, D.V.M.	Greenville
G. A. McElmurray, D.V.M.	Aiken
Carl D. McElveen, D.V.M.	Columbia
Wayne McGee, D.V.M.	Anderson
B. K. McInnies, M.D., D.V.M.	Charleston
B. G. McLean, V.M.D.	Aiken
S. R. McMaster, D.V.M.	Rock Hill
F. A. McWilliams, D.V.M.	Greenville
W. K. Magill, B.Sc., D.V.M.	Chester
W. H. Matthews, D.V.M.	Rock Hill
W. D. Mayfield, D.V.M.	Laurens
J. W. Miller, D.V.M.	Winnsboro
A. S. Moore, D.V.M.	Walterboro
G. E. H. Moore, D.V.M.	Walterboro

John G. Murray, D.V.M.	Charleston
E. E. Nissen, D.V.M.	Marion
F. B. O'Neal, D.V.M.	Anderson
D. E. Orr, D.V.M.	Clinton
J. H. Petty, D.V.M.	Manning
A. B. Pittman, D.V.M.	Springfield
Neil D. Porter, D.V.M.	West Columbia
Bruce G. Pratt, D.V.M.	Beaufort
Thomas F. Proctor, Jr., D.V.M.	North Augusta
Petro Pshyk, D.V.M.	Summerville
G. D. Radford, D.V.M.	Beaufort
Paul E. Ramsey, D.V.M.	Spartanburg
W. F. Rawlinson, D.V.M.	Manning
T. M. Rhodes, D.V.M.	Charleston Heights
E. A. Richardson, D.V.M.	Seneca
H. E. Riddle, D.V.M.	Greenville
L. D. Rodgers, D.V.M.	Greenwood
R. R. Salley, D.V.M.	Orangeburg
W. Everette Salley, D.V.M.	Orangeburg
J. W. Sample, Jr., D.V.M.	Charleston Heights
Jack Scott, D.V.M.	Hemingway
W. H. Shirer, D.V.M.	Georgetown
T. J. Shirley, Jr., D.V.M.	Pendleton
F. L. Shuler, D.V.M.	St. George
J. O. Shuler, D.V.M.	Mt. Pleasant
G. K. Smith, D.V.M.	Spartanburg
G. M. Smith, D.V.M.	Greenville
J. S. Smith, D.V.M.	Conway
D. H. Spearman, D.V.M.	Greenville
Terry W. Staggs, D.V.M.	Landrum
Anton M. Stender, D.V.M.	Charleston
A. Fred Stringer, Jr., D.V.M.	Anderson
Otto M. Strock, D.V.M.	Charleston
E. D. Stuart, D.V.M.	Greenville
Pat Suber, D.V.M.	Columbia
E. R. Van de Grift, D.V.M.	Columbia
D. B. Verdin, D.V.M.	Fountain Inn
Pierre Wait, D.V.M.	Denmark
D. B. Walrath, D.V.M.	North Augusta
H. A. Webb, D.V.M.	Georgetown
L. R. Wempe, D.V.M.	Greenville
Brunson M. Westbury, D.V.M.	Summerville
U. E. Whatley, D.V.M.	Dillon
C. Jack Wheeler, D.V.M.	Saluda
W. E. White, D.V.M.	Bennettsville
J. M. Williams, D.V.M.	Moncks Corner
R. L. Willis, D.V.M.	Charleston
S. M. Witherspoon, B.Sc., D.V.M.	Marion
R. E. Wright, D.V.M.	Greer
L. E. Young, D.V.M.	Columbia
Martin Zarnett, D.V.M.	Aiken

Technical Livestock Committee

C. E. Boyd, D.V.M., <i>Chairman</i>	Box 1771, Columbia
W. L. Abernathy	Charleston Highway, Orangeburg
Harold D. Jackson	Cheraw
T. C. Moss	Cameron
W. C. Smith	Shop Road, Columbia
Hart Spears	Darlington
John Warner	Greenwood

THE SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

The South Carolina Agricultural Experiment Station is the research branch of the College of Agriculture and Biological Sciences. The nucleus of its research planning and efforts are performed by scientists in 16 departments and two special units located on the campus at Clemson. Each department conducts specific research projects in its own field. The findings from these projects are made known to the public through special publication and news releases. Seven branch experiment stations, each located in a different area of the state, operate as separate units under the direction and organization of the Clemson station.

The goal of the station is to provide, through research, needed materials, techniques, and information which can result in more effective agricultural production and marketing. The farmer's work can be made easier, cheaper, and more profitable by applying the information obtained through research designed to learn what effect current farm practices have on the financial return he gets. Newer agricultural methods, not yet put into use by farmers, are also studied with the appropriate release of findings.

The opportunity is available, to a limited number of undergraduate students in most of the departments, to work and gain experience in research methods and procedures. Many of the departments also offer Graduate Research Assistantships to students interested in working on a research program while pursuing a graduate degree program in the corresponding discipline.

Laboratories of the station are open for inspection by students, farmers, and the public in general. Information may be requested on any specific problem encountered in Agriculture by writing to the station Director. A full report of the work and expenditures of the South Carolina Agricultural Experiment Station is published annually. This and other publications of the station will be sent, upon request, free of charge.

FOUNDATION SEED AND SEED CERTIFICATION

The South Carolina Foundation Seed Association is charged with the responsibility of increasing breeder seed of adapted Experiment Station and USDA varieties to foundation and registered seed in order that seedsmen and farmers might obtain these varieties at the earliest possible time. There are 16 crops and 55 varieties in the Foundation Seed Program.

The South Carolina Crop Improvement Association inspects and certifies fields for farmers where foundation and registered seed is planted in order that certified seed can be produced.

FERTILIZER INSPECTION AND ANALYSIS

The Fertilizer Inspection and Analysis Division functions as one of the five divisions in the College of Agriculture and Biological Sciences, Clemson University. Since 1893 this division has been procuring official samples and analyzing them to see that the guaranteed analysis has been met, inspecting for proper bag printing and weights of fertilizer. Before any fertilizer is offered for sale in South Carolina, it must be registered with the Fertilizer Inspection and Analysis Division. The director and eight part-time inspectors, who are also deputized as insecticide inspectors, visit all fertilizer and insecticide manufacturing plants. Samples are procured at plants, farms and dealers' warehouses, and as far as possible, in proportion to the sales of individual companies.

Some 6,400 fertilizer samples and 1,800 to 2,000 insecticide samples are procured annually. Normally, the percentage of samples deficient in analysis for fertilizers averages about 8 to 12 per cent, with refunds amounting to some \$50,000. The penalty refund is made to the ultimate user. In the case of a deficiency in nitrogen the penalty is three times the actual value of the shortage, while for phosphoric acid and potash it is four times the value of the shortage.

The Annual Bulletin contains the following principal items: Fertilizer usage data; the average analytical findings by brand and grades of those samples meeting the guarantee and those not meeting the guarantees—deficient—along with the names, addresses and telephone numbers of all inspectors.

The Agricultural Chemical Services Department performs the analytical work for both fertilizers and insecticides.

THE CLEMSON UNIVERSITY EXTENSION SERVICE

The Clemson University Extension Service is a branch of Clemson University and is a cooperative service supported by the counties, the State, and the Federal government. The Extension Service is responsible for conducting, with all people of South Carolina, the cooperative educational and demonstration programs in agriculture and home economics of Clemson University and the United States Department of Agriculture.

The function of the Extension Service is to make available to farmers, homemakers, and rural boys and girls, through on-the-farm service, demonstrations, meetings, newspaper articles, publications, radio and television broadcasts, and other suitable methods, the results of research and successful farm and home experience. The Service also assists, through interpretation, practical demonstrations and otherwise, in applying and using this information to improve farms, farm homes, and communities, to the end that a safe, sound, and progressive rural life and agriculture may be built.

The annual plan of agricultural and home economics extension work is developed and carried out with close cooperation between the Extension Service and the farm and home leadership of the State, the counties, and the rural communities and neighborhoods.

The Staff of Agricultural Extension Workers includes the director, 2 associate directors, 3 district supervisory agents, an administrative assistant, an assistant in agricultural extension, 46 county agents—one in each county, 8 area agents, 56 associate county agents, 53 assistant county agents, and 60 agricultural specialists in agricultural economics, agricultural engineering, agronomy, 4-H club work, dairying, crop insects and diseases, cotton ginning, forestry, horticulture, animal science, marketing, poultry and turkeys, publications, community and resource development, soil conservation, visual instruction, and television.

The Extension Home Economics Staff includes a state home economics leader, 3 associate district supervisory agents, an assistant in home economics extension, 1 area agent, consumer management, 46 home economists—1 in each county—21 associate home economists, 44 assistant home economists, and 11 specialists in clothing, family life, food production and conservation, 4-H club work, home management, consumer information, rural civil defense, nutrition, housing, and house furnishings.

LIVESTOCK-POULTRY HEALTH DEPARTMENT

The Clemson University Livestock-Poultry Health Department is consolidated under one Director with the United States Department of Agriculture, Agricultural Research Service, Animal Disease Eradication Division, and is known as the State-Federal Livestock Disease Eradication Program. This department is charged with the control and eradication of contagious, infectious and communicable diseases of livestock and poultry, and with the inspection of meat and meat by-products at slaughtering and processing plants under

state inspection. When requested investigations are made, consultations are held and assistance in diagnosis is rendered. This department further organizes, develops, and carries on education programs for the control and eradication of diseases. Quarantine measures are employed to prevent, as far as possible, the introduction or spread of livestock diseases into this state.

The Clemson Livestock Laboratory, a fully equipped modern laboratory staffed with highly trained personnel, is maintained 14 miles northeast of Columbia on U. S. Highway No. 1, at the site of the Sandhill Experiment Station. This laboratory is prepared to assist veterinarians and owners of livestock and poultry in making post-mortem laboratory examinations and bacteriological and pathological studies to aid in the diagnosis of diseases. If necessary, sufficient equipment can be sent into the field to diagnose and control disease on the spot.

The administrative office is located in the Livestock Laboratory. Adequate records and identification of livestock are kept. A staff of veterinarians works from the Columbia office, and field veterinarians are located in various sections of the State. In addition to the regular field force of veterinarians directly connected with the Columbia office, practicing veterinarians are commissioned as State-Federal Accredited Veterinarians and assist in the eradication of infectious diseases of livestock. At present there are 132 veterinarians so commissioned and their locations are such that the Clemson University Livestock-Poultry Health Department is in a position to control and eradicate disease promptly and completely in all sections of the State.

This department is required by legislative enactment and supported by legislative appropriation.

THE SOUTH CAROLINA STATE CROP PEST COMMISSION

The act creating the State Crop Pest Commission was passed by the legislature in 1912. According to the act, five members of the Board of Trustees of Clemson University shall compose the Commission.

The purpose of the Commission is to prevent, as far as possible, the introduction into South Carolina of injurious plant pests and to limit the spread of those already within the State. The Commission is also charged with the enforcement of the Bee Disease Act and the South Carolina Economic Poison Law.

The work is performed by the promulgation and enforcement of certain rules and regulations which in the judgment of the Commission are necessary to protect the agricultural interest of South Carolina. The enforcement of the regulations is the responsibility of the State Entomologist, State Plant Pathologist, and their agents.

THE OFFICE OF ENGINEERING RESEARCH

The Office of Engineering Research of Clemson University was established in the College of Engineering in July 1962. Its purpose is to coordinate and stimulate the research activities in the College of Engineering. These activities include the contribution of new knowledge in engineering science by prosecuting a vigorous program of basic research, the conduct of programs of developmental and applied research as a service to the industries of the State, and the determination of uses for the material resources of the State and thereby to encourage the growth of new industries.

The active research staff consists essentially of the faculty members of the College of Engineering and other divisions of the University. The laboratories of all departments, as well as other special purpose space, are available to the Office of Engineering Research in its investigations.

Research is the foundation for progress in a technological society. The well-equipped physical facilities and the thoroughly competent professional staff available to the Office of Engineering Research constitute extremely valuable resources for continuing and expanding this research effort.

OFFICE OF INDUSTRIAL AND MUNICIPAL RELATIONS COLLEGE OF ENGINEERING

Seminars, workshops, institutes, short courses, and conferences are conducted for engineers of South Carolina and neighboring states. These activities are designed to keep the engineer abreast of changes in modern technology through a non-credit continuing engineering education program sponsored by the Departments of the College of Engineering.

The Office of Industrial and Municipal Relations, in close relation with the Engineering Departments, determines the current need and coordinates the various programs.

Seminars, institutes, and short courses presented to date include: "A Survey of Digital Computing," "Why Machine Parts Fail," "Value Analysis for the Utilities," "Experimental Stress Analysis,"

"Problems Associated with Processing Non-Newtonian Fluids," "Graphics for Schools and Industry," "Simulation and Control of Power Systems," "Junior Engineers Scientists' Summer Institute" (JESSI), "Air and Water Pollution Control," "Flame Spraying Systems," and "Engineering Education for High School Counselors."

A total of 469 individuals have participated in these programs during the first year of operation, representing 130 industries, 31 utilities, and 88 schools from 15 states.

TEACHER EDUCATION

Agricultural Education. The members of the staff of Agricultural Education visit all beginning teachers for the purpose of assisting them on the job and also for the purpose of collecting information which may prove helpful in improving the work of teacher education at the University. In addition, conferences of teachers are held and consulting services made available in the interest of the professional growth of agricultural teachers, the rendering of service to agricultural communities, and the development of leadership among agricultural youth through the program of the Future Farmers of America.

Information concerning any phase of the in-service education activities in Agricultural Education may be secured by contacting the Head, Department of Agricultural Education, Clemson University.

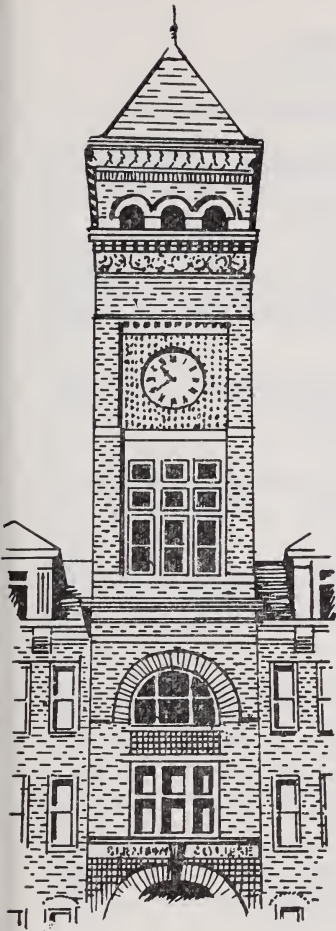
Trades and Industrial Education. The University, in cooperation with the State Department of Education, is glad to assist those who teach vocational subjects in day trade schools and evening trade and industrial classes by supplying a trained man to assist in the work of organizing classes, organizing courses of study, making plans for teaching evening classes, and actually teaching vocational subjects. Requests for information regarding this service should be addressed to Dr. A. F. Newton, Head, Department of Industrial Education, Clemson University, Clemson, South Carolina 29631.

SHORT COURSES AND CONFERENCES

The facilities of the University are made available for special meetings, such as farm groups, rural ministers, religious organizations, and scientific societies; and arrangements are made for special short courses in poultry science, beekeeping, food preservation, cotton classing, dairy science, forestry, water supply and sanitation, ornamental nurseries, etc. Such activities, undertaken in the interest of the general welfare, are encouraged by the University.

CERAMIC ENGINEERING FORUM

The Ceramic Engineering Department, in cooperation with North Carolina State University, sponsors an annual Ceramic Engineering Forum for Ceramic Manufacturers of the Southeast. The meeting place alternates between Clemson University and North Carolina State. This meeting is intended to provide the latest scientific and engineering developmnts pertinent to Ceramic Manufacturers and to provide a forum for the stimulation of creative thinking.



STUDENT REGISTER

PART VII

GRADUATES OF 1967

BACHELORS' DEGREES CONFERRED MAY 6, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

William Phillip Hardee.....Conway	Andy Divine Johnson.....Loris
James Alton Hiers.....Hampton	Henry Woodbury Moore, Jr. ....Columbia
Ronald Dennis Hunter.....Piedmont	James Frank Tullis.....London, Ohio

Agromony

Wooster LeRoy Atkinson.....Bishopville	David Bennett Ledbetter °.....Williamston
Robert Wallace Hardaway.....Dillon	Robert Allan Phelps °.....Scottsdale, Ariz.
Howard Duncan	Sharman III, Estill

Animal Science

Walter Lewis Dantzler.....Santee	Daniel Edward Ramage ....Pittsburgh, Pa.
Harry Eugene	Wilson, Lobeco

Biology

James Allen Altman.....Andrews	William King Manos .....California, Md.
Stephen Howard Best.....Fayetteville, N. C.	John David Palmer, Jr. ....Albany, Ga.
Claude Everette Cooper, Jr.—	Robert Boyd Spradley, Jr. ....Chapin
Bossier City, La.	George McDowell Templeton—
William Dusenberry Dean .....Clemson	Greensboro, N. C.

Dairy Science

Ollie Tyrone Gray °.....Cordova	James Corbitt Kelly °.....Monticello, Ga.
Elias Doar Tupper	II, Summerville

Entomology

Robert Edward Glenn.....Florence	Curtis Garren Hayes.....Central
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Forestry

Francis Thomas Brown.....Wedgefield	Neill Michael Hugg.....Columbia
James William Edwards, Jr.Georgetown	William Chafee Moore, Jr.North Augusta
Bentley Gibson Fishburne, Jr. ....Sumter	Robert Preston Neale.....Chevy Chase, Md.
Jack Brooks Hafner.....Miami, Fla.	Richard Camman Niederhof †.....Bonneau
Lawrence Albert Harmon.....Hopkins	John Carroll Taylor.....Winnsboro
James Gordon Williams, Jr., Ridge Spring	

Horticulture

Curtis Clarkson Graham, Jr.—	Karl-Heinz Segelken °—
Mount Ulla, N. C.	Hilgermisen, Germany
Carroll Theodore Stephens, ° North Augusta	

SCHOOL OF ARCHITECTURE

BACHELOR OF ARCHITECTURE DEGREE

William Russell Bethune.....Columbia	James Irving Martin.....Terrell, N. C.
Edward Ward Blakely.....Simpsonville	Paul Robert Miller.....Newburgh, N. Y.
John Hart Cable.....Pittsburgh, Pa.	John Lesesne Monteith °.....Columbia
Robert Arthur Engler.....Piscataway, N. J.	Noel Serwin Musial.....Elizabeth, N. J.
Carl Floyd III.....Ft. Lauderdale, Fla.	William Hantzsch Parsons, Jr.—
Michael McKinley Freeman Asheville, N. C.	Lutherville, Md.
Edwin Roy Lashley, Jr. ....Greensboro, N. C.	James Edgar Phillips.....Greenville
Michael Clay Long.....Saluda	James Clarke Plaxco.....Columbia

BACHELOR OF BUILDING CONSTRUCTION

Robert Keith Luckabaugh...Baltimore, Md.	Harry Corbett Tiller, Jr. ....Georgetown
--	--

° With honor.

† With high honor.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

Patricia Ann Abbott.....Seneca	James William Logan, Jr.....Sumter
Linda Sue Acree.....Mississippi City, Miss.	John Grow Maher.....Manhasset, N. Y.
Carl Truesdale Best Wurtsmith AFB, Mich.	Lucile Welborn Merritt.....Easley
Charles Julian Bethea, Jr.....McColl	Richard Edwin Miley.....Charleston
John Frank Biggers III.....Matthews, N. C.	Nancy McKeehan Miller.....Westminster
Dillard Watson Bray, Jr.....Clemson	John Dail Moore.....Glennville, Ga.
Douglas Alan Campbell.....Concord, N. H.	Mary Janis Moore.....Clemson
Sammie George Carros.....Spartanburg	DaCosta Muckenfuss, Jr.....Summerville
Ryan Cole Cobb.....Starr	Charles Gregory Nesmith.....Georgetown
Herbert Stuart Cotton, Jr.*.....Columbia	Lloyd Wayne Page.....Lake View
Peggy Joy Townsend Cruse.....Summit, N. J.	Ronald Jack Porter.....Rock Hill
Susan Libby Denberg.....Columbia	William Joseph Pridemore.....Union
Carol Dyar Dillard.....Clemson	Linda Marie Ramsay.....Madison
Nancy Evans Elrod.....Griffin, Ga.	James Whiten Rankin, Jr. Greensboro, N. C.
Charles William Fairbrother.....West Medway, Mass.	John Ranney.....Auburn, Ala.
Judith Marie Florie†.....North Augusta	Fuller Lyon Reese III.....Clinton
Theron Daniel Ford, Jr.....North Augusta	Dwight Raymond Reynolds.....Royal Oak, Mich.
James Childs Fort.....Anderson	Terry Edward Richardson, Jr.*.....Barnwell
James Monroe Gardner, Jr.....Walterboro	Robert James Rolli†.....Wayne, Pa.
Kenneth Lyle Gardner.....Cinnamonson, N. J.	Carolyn Ann Rowland.....Clemson
Terry Gilmore Gardner.....Lancaster	Elbert Manning Rozier, Jr.....Charleston
Steven Richard Goldstein.....Baldwin, N. Y.	Wilbur McPerry Rumph.....Camden
Michael Joslin Gordon.....Rock Hill	George Dexter Rush.....Ware Shoals
Graham Hill Gutting.....Alexandria, Va.	Joseph Andrew Sedlak, Jr.....Sparta, N. J.
William Neely Hannah.....Atlanta, Ga.	William Clayton Sharpe.....Mobile, Ala.
Henry Michael Herlong, Jr.....Edgefield	Wendell Griffith Shealy.....Little Mountain
Sandra Elaine Hicks†.....Liberty	Anna Margaret Gilmer Shivers.....Rock Hill
Charles Edward Hill.....Jackson	Donald Lemont Sikes.....Largo, Fla.
Carl Haller Huffman.....Aiken	Cody Walker Smith, Jr.....Fort Mill
Thomas Howard Hutchison.....Savannah, Ga.	Richard Donnell Smith.....Liberty
Terance Lee Jahnke.....Camden	Samuel David Smithyman†.....Spartanburg
Stanley Walter Jaskiewicz, Jr.....Charleston	Daniel Alvah Speights.....Hampton
Charles Richard Johnson.....Crewe, Va.	Joseph Carroll Stevenson, Jr.....Greenville
Melinda Hughes Johnson†.....Walhalla	John Wilbur Stoudenmire, Jr.....Sumter
William Harold Johnson, Jr.....Greenville	Sandra Lea Tarquino.....Weirton, W. Va.
Theodore Micheal Katana.....Latrobe, Pa.	George Everett Thompson, Jr.....Chesnee
Leon Godley Keirsted.....Oakhurst, N. J.	Thomas Seabrook Townsend II.....Wadmalaw Island
Patrick James Kenefick.....Schenectady, N. Y.	William Samuel Walker, Jr.....Nichols
Eugene Merrill Klein.....Bronx, N. Y.	Vernon Larry Walters.....Clemson
Nicholaos Philip Laskas.....Spartanburg	William Kennette Williams, Jr. Honea Path
James Calvin Linder.....Charleston Heights	Nancy Carol Wyatt.....Seneca

BACHELOR OF SCIENCE DEGREE

Arts and Sciences

Tony Marshall Hooper, Clemson

Chemistry

David Richard Bailey.....Anderson	William Carter Kneece, Jr.*.....Augusta, Ga.
Donald Allen Copeland.....Greenville	Nelson Boyd O'Bryan, Jr.†.....Salters
Joseph Lucas Ruzicka, Jr., North Augusta	

Geology

Ronald Norton Priddy.....Harleyville	Ralph O'Neil Richardson.....Myrtle Beach
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Mathematics

Miriam Bridges Ausburn†§.....Easley	Charles Felder Cottingham.....Dillon
Joseph Morris Biber.....Spartanburg	William Pickens Hannah.....Greenville
William Edward Branch.....Monmouth, N. J.	Susan Renfroe Moore†.....Columbia
William Charles Runnion,° Greenville	

Physics

James Malcolm Heller, Jr.*.....Sandy Springs	William Clarence Maddox, Jr.† Honea Path
Larry Vernon McWhorter.....Easley	Oliver Baker Morton.....Columbia
Ralph Eugene Painter, Jr.,° Gaffney	

° With honor.

† With high honor.

‡ With highest honor.

§ With departmental honors.

Pre-Medicine

James Harman Carson, Jr.*	Sumter	Raymond Van Grubbs	Fair Play
Frederick Fuessel Chisholm, Jr.	Greenville	Frank Adelbert Hoshall, Jr.	Charleston
Harold Minch Coombs, Jr.—		George Hilliard Knight	North Augusta
	Scotch Plains, N. J.	Harry Randolph Mahaffey*	LaGrange, Ga.
Frank Preston Copeland III	Darlington	Philip Frank Marion	Milmont Park, Pa.
Ellis Howard Dantzler	Cameron	John Douglas Matthew*	North Charleston
Richard Lee Denny*	Bishopville	Travis Lanier Moon	Lavonia, Ga.
Joseph William Donahoe*	Bethesda, Md.	Peter Evans Myers IV*	Moncks Corner
Barney Brown Easterling, Jr.	Kingsree	John Patrick Nemergut	Stratford, Conn.
Richard Elliott Eubanks	Wellford	Marvin Travis Runyon III	London, Ontario
Henry Miles Faris, Jr.†	Laurens	William Franklyn Shivers, Jr.	Marietta
Charles Ellis Felkel, Jr.*	Elloree	William Thomas Sprott, Jr.	Winnboro
Robert Perry Frady	Cowpens	James Lawrence Sutherland†	Clemson
James Blair Frazier IV	Winnboro	Stanley Edward Von Hofe†	Simpsonville
	Belton Edward Weeks, North Augusta		

ASSOCIATE OF ARTS DEGREE

Nursing

Sara Louise Barnett	Westminster	Willie Lura Ligon	Greenwood
Martha Gaynell Blackwell*	Seneca	Doris Elane Lowery	North Augusta
Claudia Ann Cheek†	Greenville	Helen Freize Mulkey†	Greenville
Brenda Loretta Fowler	Anderson	Doreen Kay Scruggs	Jackson
Helen Marie Hunnicutt	Clemson	Elizabeth Ann Shannon*	Greenwood
Rebecca Gail Kingsmore	Greenville	Barbara Campbell Shirley	Pendleton
Sandra Jeanette Lee†	Pendleton	Sandra Jean Walker	Greenwood

SCHOOL OF EDUCATION

BACHELOR OF SCIENCE DEGREE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

Charles Garry Helms	Pelzer	Peter Jack Newton, Jr.	McColl
James Theodore McClary, Jr.	Kingsree	James Wilson Pooser	Cameron
Billy LeRoy Morris, Jr.	Andrews	Edwin deBerry Rogers II	Nichols
	George Russell Sutton, Fort Mill		

Industrial Education

Michael Frederick Kelly	Little Silver, N. J.	Robert Vernon Weaver, Jr.	Murphy, N. C.
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Science Teaching

Evelyn Clark Elrod	Ware Shoals	Carol Jeanette Rostron	Clemson
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COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

Agricultural Engineering

(Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.)

Carl Emenecker Brown, Jr.	Aiken	Daniel Edward Burgner	Greeneville, Tenn.
	Robert Cunningham Richards, Macon, Ga.		

Ceramic Engineering

Denis Albert Brosnan*	Atlanta, Ga.	Donald Lee Hindman*	Walhalla
	George Patrick Lawrence, Charlotte, N. C.		

* With honor.

† With high honor.

‡ With highest honor.

Chemical Engineering

Frederick Charles Ayer III.....	Seneca	Harry Edward Lindler °.....	Laurens
Charles Gary Beaudrot.....	Greenwood	Frank Joseph Lutz III.....	Pittsburgh, Pa.
Leander Bartholomew Bowen.....	Iva	Rupert James McCormac III.....	Columbia
Ben Terry Clark III.....	Charleston	Frederick Bergen Moore.....	Kingsport, Tenn.
William Michael Click.....	Gainesville, Ga.	Theodore McGeachy Northrop †.....	Greenville
Edward Darrell Conner °.....	Timmonsville	Peter Gaillard Smith †.....	Johns Island
Dean Cudd Gaskins.....	Spartanburg	Eugene Preston Trotter, Jr.....	Easley
James Gordon Goodwin, Jr. †.....	Walterboro	Robert Miller Ward, Jr.....	Rock Hill
James Parker Haggett IV.....	Newton, N. J.	Alfred Charles Whitemore.....	Easley
Robert Anton Hudson.....	Seneca	Jack Lee Wilks, Jr.....	Charleston

Civil Engineering

Herman Woodrow Cauble, Jr.....	Columbia	Glenn Wade Phillips °.....	Tampa, Fla.
Norman Edwin Dowling †.....	Orangeburg	Jack Beverley Phillips, Jr.....	North Augusta
James William Epps.....	Clemson	David Thomas Seaman †.....	Bethlehem, Pa.
Robert Barnard Gordon.....	Edgewater, Md.	Ernest Harold Smith.....	Rock Hill
Donald Hugh Higgins.....	Asheville, N. C.	Donald Franklin Spencer.....	Greenville
David Alan Jones.....	Asheville, N. C.	Ronald Lee Spencer.....	Greenville
Terry Arnold Kingsmore °.....	Buffalo	Thomas Emmett Touchstone.....	Commerce, Ga.
Harold Joe Willson, °.....		Sumter	

Electrical Engineering

Richard Brown Bankhead, Jr.....	Cocoa, Fla.	Samuel Claude Martin °.....	Easley
John Herman Beckroge, Jr.....	Columbia	Samuel Arron Mitchum °.....	Charleston
Samuel McDonald Brice, Jr.....	Blackstock	Charles Blake Morgan.....	Union
David Raymond Crawford °.....	Greenville	George Mitchell Morris °.....	Greer
Andrew Calvin Dickert ° §.....	Lancaster	William Ricks Riggs °.....	Charleston
William Franklin Dorsey.....	Clemson	Emory Lamar Sheppard—	
Rodney Wilson Ducker.....	Charleston	Hendersonville, N. C.	
Edward Franklin Eison °.....	North Charleston	Patrick Laurence Slattery.....	Charleston
William John Ferrara III.....	Charleston	Charles Randolph Smith.....	Anderson
Richard Dean Franklin °.....	Clemson	Thomas Marion Smith †.....	Greenville
William Haskell Horton.....	Charleston	Kenneth Crawford Traynham °.....	Cheraw
William Albert Larsen, Jr. °.....	Greenville	James David Wasson, Jr.....	Laurens
James Travis Williamson, Salters			

Industrial Engineering

David Harold Cole.....	Columbia	Vernon LaRue Gaskins.....	Chesterfield
Charles Oliver Farnum III.....	Orangeburg	Stacy Lowell Hull.....	Charleston
John Frank Lee III, Atlanta, Ga.			

Mechanical Engineering

Douglas Eric Alexander °.....	Spartanburg	Lynn Morris Lynch.....	Pickens
Melvin Don Blanton, Jr.....	Gaffney	Richard Stanley McAdams.....	Clemson
Charles Austin Burdette.....	Simpsonville	Dennis Clinton McAlister.....	Pelzer
Edward Rutledge Gray.....	Charleston	David Warren MacAvoy.....	Brooklyn, N. Y.
Paul Michael Grieb.....	Winnsboro	Michael Jones Maxwell °.....	Greenville
Clarence Arthur Ham.....	Charleston	James Dahlevin Myers.....	Charleston
John Gordon Hammond, Jr.....	Sandy Springs	Charles Lynwood O'Cain.....	Orangeburg
Robert Lawrence Hill, Jr.....	Charleston Hgts.	Dale Wilson Reynolds °.....	Bedford, Mass.
Paul Philip Hok, Jr.....	Farmingdale, N. Y.	Martha Jean Robinson.....	Jacksonville, Fla.
Bruce Walter Holcombe.....	Lyman	William Robert Smith.....	Greenville
William Barker Kuykendal.....	Atlanta, Ga.	Robert Houston Stephens.....	Laurens
Allan Michael Lindsey.....	Pickens	James Myron Thompson.....	Atlanta, Ga.

° With honor.

† With high honor.

‡ With highest honor.

§ With departmental honors.

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

BACHELOR OF SCIENCE DEGREE

Industrial Management

James Garner Bagnal III.	Statesville, N. C.	Glenn Eugene McFarland.	Hartsville
Phillips McBride Brooks, Jr.	Newberry	Robert Richardson Martin, Jr.	Anderson
Michael Ernest Brown.	Dublin, Ga.	Charles Beaudrot Mauldin, Jr.	Greenwood
Lacy McAden Chatneuff.	Raleigh, N. C.	William Fritz Mays.	Allendale
Jimmy Don Clark.	Kissimmee, Fla.	Lever William Metts, Jr.	Orangeburg
Samuel Boyd Daniels, Jr.	Dillon	Ted Gary Moore.	Calhoun, Ga.
Robert William Dilworth, Jr.*	Walhalla	Thomas Arnold Pederson*	Greenville
George Gerry Doubleday.	Knoxville, Tenn.	William Jackson Ragsdale, Jr.	Easley
Donald Edgar Duncan.	Travelers Rest	Gregory Denny Roberts.	Aiken
Charles George Elfert, Jr.	Scranton	Edward Verner Schlaefer.	Columbia
Stephen Nash Gillespie.	Commerce, Ga.	Jimmy Wayne Spradley.	Wagener
Jerry Mack Gregory.	Union	Fred Ernest Stallworth.	Charlotte, N. C.
Bruce William Johnson.	Lawrence, N. Y.	Mark Keith Stewart.	Hartsville
Ben Eberhart Josey.	Milledgeville, Ga.	Charles David Thompson.	Rock Hill
Forest Edward Kinnett, Jr.	Lyman	James Edward Walton, Jr.	Sumter
Clinton Calhoun Lemon, Jr.	Barnwell	James Thomas Weaver.	Greenville
Maurice King Lopez, Jr.	Iva	Thomas Eugene Welborn.	Easley
John David McDaniel, Jr.	Liberty	Randall Pershing Windham.	Lamar

Textile Chemistry

Hubert Jennings Booth †	Hartsville	William Ryan Hovis.	Rock Hill
Patrick Day Braddy.	Aiken	Warren Sumner Perkins.	Elloree

Textile Management

Ronald Lee Boyce.	Cooleemee, N. C.	Roger Ellison Hood.	Williamston
Everett Max Cromer.	Greenville	Russell Lee Jordan.	Spartanburg
William Wiley Curtis, Jr.	Laurel, Miss.	Larry Kenneth Lott.	Vaughn
Ronald Lane Dance.	Lugoff	Roy Everett McAbee.	Inman
Ronald Lee Farley.	Gaffney	Ronald Wayne Rogers.	Anderson
Marion David Hiott.	Williamston	Jack William Sparks.	Gaffney

Textile Science

Tommie Woodrow James, Jr.	Sumter	Howard Gary Rogers †	Williamston
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MASTERS' DEGREES CONFERRED MAY 6, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE

Agronomy

Marvin Burruss Banton, Richmond, Va.

Horticulture

John Wallace Curnow.	Charlotte, N. C.	Maurice Edgar Ferree.	Clemson
	John Davis Ridley, Mountain Rest		

Zoology

George Francis R. Buletza, Jr., Fair Lawn, N. J.
Benny Dee Pate, Marion

* With honor.

† With high honor.

‡ With highest honor.

COLLEGE OF ARTS AND SCIENCES

MASTER OF ARTS DEGREE

English

Dixie Reed Gooch.....Clemson Mellie Clark LaRoche.....Columbia
Leonidas Constantine Smith III, Polkton, N. C.

History

Lynda Worley Skelton, Macon, Ga.

MASTER OF SCIENCE DEGREE

Chemistry

Joseph Henry Cecil.....Louisville, Ky. Billy Thomas Upchurch Rocky Mount, N. C.

Mathematics

Joann Barbee Barnhardt....Oakboro, N. C. James Roy Felker, Jr.Newberry
Norman Charles Schaffer, Ormond Beach, Fla.

SCHOOL OF EDUCATION

MASTER OF EDUCATION DEGREE

Mary Watford Gore, Pageland

COLLEGE OF ENGINEERING

MASTER OF SCIENCE DEGREE

Agricultural Engineering

(Agricultural Engineering is jointly administered by the College of Agriculture
and Biological Sciences and the College of Engineering.)

Wiboolsac AruninBangkok, Thailand Luke Atkinson Nance, Jr.Spartanburg

Ceramic Engineering

Cressie Earl Holcombe, Jr., Anderson
Ralph Benjamin Videtto, Adams Center, N. Y.

Chemical Engineering

Ronald Wayne Glass, Leachville, Ark.

Civil Engineering

Ayşe Nurseli Cezayirlioglu..Ankara, Turkey Refet CezayirliogluIskenderun, Turkey

Electrical Engineering

Chao-Ran Huang, Tainan, Taiwan

Engineering Mechanics

Conor Deane Johnson, Orange Va.

Environmental Systems Engineering

Albert Anthony Cannella, Cookeville, Tenn.

Mechanical Engineering

Frederick Adair Dunlap III....Rock Hill William Thomas Erwin....Memphis, Tenn.
Hal Owen Jones, Kingsport, Tenn.

DOCTORS' DEGREES CONFERRED MAY 6, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Agronomy

- Kenneth Edward Savage.....Proctor, Ark.
 B.S., Arkansas State; M.S., Clemson University
 Dissertation: Phenylurea Herbicide Behavior in Soil as Related to Calcium and Hydrogen Ion Activity

Entomology

- Gerhard Fred Fedde.....Asheville, N. C.
 B.S., New York State College of Forestry; M.S., Clemson University
 Dissertation: Comparative Analyses of Systematic Procedures and Biological Characteristics Relating to Pine Aphids of the Genus *Cinara* in Western South Carolina
- Jerry Allen Payne.....Upperville, Va.
 B.S., University of Tennessee; M.S., Clemson University
 Dissertation: A Comparative Ecological Study of Pig Carrion Decomposition and Animal Succession with Special Reference to the Insects

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Chemistry

- George Thomas Cochran.....New Lenox, Ill.
 B.S., University of Richmond; M.S., University of Tennessee
 Dissertation: A Study of the Coordination Compounds of $d\ 1-p$, p' —Diamino-2, 3-diphenylbutane with Selected Univalent Metal Ions

Physics

- Charles Malcolm Bowden.....Richmond, Va.
 B.S., University of Richmond; M.S., University of Virginia
 Dissertation: Electron Spin Resonance Studies of Tri-Valent Gadolinium in Calcium Fluoride Single Crystals Under Applied Stress
- William James Reid, Jr.Abbeville
 B.S., Erskine College; M.S., Duke University
 Dissertation: The Effect of Strain on the Superconducting Transition Temperature of Vacuum Deposited Indium Films

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY DEGREE

- Samuel John Kasley.....Wheeling, W. Va.
 B.S., West Virginia University; M.S., Clemson University
 Dissertation: Oxygen Transfer and Utilization Determinations for a Mathematical Model for the Submerged Fermentation of Glucose by *Pseudomonas ovalis* (Field of Specialization: Chemical Engineering.)

HONORARY DEGREES CONFERRED MAY 6, 1967

DOCTOR OF SCIENCE

- Charles Frederick Andrus.....Charleston
 J. George Harrar.....New York, N. Y.

DOCTOR OF LAWS

- Robert Thomas Coleman, Jr.Spartanburg
 James Gilliam Gee.....Huntsville, Texas
 Edwin Craig Wall.....Conway

EMERITUS TITLES CONFERRED MAY 6, 1967

Eugene Franklin Cartee
Professor Emeritus of Textiles
 Milton Dyer Farrar
Dean Emeritus, School of Agriculture;
Senior Scientist Emeritus of Agriculture and Biological Sciences
 Harold Homer Foster
Associate Professor Emeritus of Botany and Bacteriology
 Baxter Howard Hodges
Assistant Professor Emeritus of Chemistry
 Albert Raymond Reed
Associate Professor Emeritus of Physics
 Charles Albert Reed
Professor Emeritus of Physics
 Charles Morgan Stuart
Associate Professor Emeritus of Mathematics

BACHELORS' DEGREES CONFERRED AUGUST 5, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

John Emory Coates	Ocean Drive Beach	Francis Lawrence Kapp	Greenville
Samuel Hall Harden III	Columbia	Gordon Smith Wilson	Thomson, Ga.

Agronomy

William Edwin Dargan, Jr.	Darlington	Charles Bernard Hand	Washington, D. C.
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Animal Science

Edward Livingstone Hagan, Jr.	Due West	Charles Keith Myers	Eutawville
Joseph Kesler Kneece	Aiken	William Monroe Shirer, Jr.	Cameron

Biology

James Richard Cunningham— Black Mountain, N. C.	Warren Graybill McElmurray	Aiken
Charles Cameron Ferguson	Allen Dunkin Stevenson	Greenville
Douglas Holmes Hughes	Edward Houston Thomason	Olanta
	William Pierce Yates	Sumter

Food Science

James Bailey Dukes, Manning

Forestry

William Robert Corn	Union	Lory McLaurin Johnson, Jr.	Sumter
Edward Jackson Cornwell	Rock Hill	Kenneth Edward Merriman	Bishopville

Horticulture

Mary Olis Brooks	Loris	Hugh Webb Gilchrist	Greenville
	Gordon Frederick Kariger, Norfolk, Va.		

Poultry Science

Jimmy Lynn Moore, Woodruff

SCHOOL OF ARCHITECTURE

BACHELOR OF ARCHITECTURE DEGREE

Arthur Jacob DeLoach, Scotia

BACHELOR OF BUILDING CONSTRUCTION

George William Benedict,* Duquesne, Pa.

* With honor.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

Thomas Nathan Bagwell.....	Canton, Ga.	Sandra Gale Kytle.....	LaFrance
Romana Anna Maria Biezanski—		Dennis Dean Landreth.....	Springfield, Va.
Jackson Heights, N. Y.		John D. Lane, Jr.....	Clemson
Shirley Holland Biggs †.....	Clemson	Daniel Lee McConnell.....	Anderson
Marion Brabham Crooks, Jr.....	Newberry	Robert John Macanga.....	Roseland, N. J.
William Belmonte Cucolo.....	Suffern, N. Y.	Lee Vandiver Manatis.....	Spartanburg
Patricia Durham °.....	Jacksonboro	John Zeph Moseley III.....	Anderson
Harry Hastings Frampton III.....	Hartsville	John Michael Pushkar.....	Columbia
Lynn Roland Freeman, Jr.....	Easley	Charles Jeffrey Reese.....	Rock Hill
Edward Gerald Golubski.....	Greenwood	David Robert Schumpert, Jr.....	Columbia
John William Harper.....	Greenwood	Maurice Dale Smith.....	Celina, Ohio
Wayne Oliver Harris.....		Roy Oliver Smith.....	Pittsburgh, Pa.
Harry Joseph Hoppmann.....	Charleston	Donnie Hubert Terry.....	Seneca
Charles Eldridge Hughes, Jr.....	Greenville	William David West.....	Spartanburg
Janice Wilson Jackson.....	Decatur, Ga.	Carl Stephen Wilson.....	Fort Mill

BACHELOR OF SCIENCE DEGREE

Chemistry

Ralph Clarence Cottrell III.....	Orlando, Fla.	Clyde Marshall Long.....	Greenwood
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Geology

James Grey McWhorter, Rahway, N. J.	
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Mathematics

John McInnis III.....	Clio	Thomas Eugene Martin, Jr.....	Rock Hill
	Steven Terry, Ridgewood, N. J.		

Medical Technology

Gerald Kenneth Reubish, Jr., Charleston Heights	
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Physics

Ronald Edgar Swatek, Spartanburg	
----------------------------------	--

Pre-Medicine

Thomas Allen Bettis, Jr.....	Greenville	Robert Junius Haas °.....	Gaffney
William Wallace Bruner, Jr.....	Columbia	Ralph Shepard Rustin, Jr.....	Charleston
Joe David Burnette.....	Midwest City, Okla.	Michael David Schall.....	Columbia
Donald Winburn Shelley, †	Columbia		

ASSOCIATE OF ARTS DEGREE

Nursing

Karen Lee Amspacher.....	Greenville	Ann Maddox Miller.....	Black Mountain, N. C.
Jane Renee Ashley.....	Belton	Nell Jean Phillips.....	Pelzer
Rachel Crum Elrod.....	Easley	Brenda Ann Smith.....	Anderson
Jane Elizabeth Field.....	Seneca	Cynthia Delores Smith.....	Anderson
Trudy Lanford Grissom.....	Woodruff	Sandra Elizabeth Valencia.....	Walhalla
Barbara Ann McAlister.....	Easley	Sandra Lewis Weaver.....	Clemson
Janice Marie Wilson, Pendleton			

SCHOOL OF EDUCATION

BACHELOR OF SCIENCE DEGREE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

Douglas Carlyle Carraway.....	Olanta	Melvyn Wendell Johnson.....	Greenville
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Industrial Education

David Allen Camak.....	Hodges	John Gary Evans Harrison III.....	Varnville
James Jerome Rohrbach, Jr., †	Charleston		

° With honor.

† With high honor.

‡ With highest honor.

COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

Ceramic Engineering

John Walter Byers Chester John Timothy Frasier Seneca
John Benjamin Hardaway III, Greenville

Chemical Engineering

Alton McCoy Beasley Aiken Harrington Lee Lowder St. Stephen
James Carl Brown North Augusta John Raymond Luense Walterboro
James Thomas Haney * Lyman William Bryan Menees Anderson
William Charles Langford, Jr. Columbia Charles Waymon Rutland North Augusta
William Braxton Laycock Greenville Jonathan Dale Steele Lancaster

Civil Engineering

Henry Lee Holsouser, Jr. Charlotte, N. C. Mary Bell Trout * Coral Gables, Fla.

Electrical Engineering

Milas Henry Ballard, Jr. Hartsville Mumphord Holland Kendall, Jr. * -
Jerry Dean Brock Anderson Mars Hill, N. C.
William Clarence Cromer Anderson Joseph Luzzi Pleasant Valley, N. Y.
Lloyd Tyrone Crosby North Charleston Charles Thomas Martin, Jr. Sumter
Jerry Dean Guest Cowpens Leon Fred Moore Laurens
Tahir Hamid Karachi, Pakistan Dale Norris Murray Casar, N. C.
Donald Lawrence Harris Walhalla Henry John Reed Charleston
Joseph Warren Hudson Hendersonville, N. C. Jackie Donald Ruppe Gaffney

Industrial Engineering

William Michael Olsen, Red Bank, N. J.

Mechanical Engineering

Thomas Claude Brown, Jr. Greenville David Alexander Gray Spartanburg
William Barry Chisholm Clinton Winston David Holliday Kingstree
Thomas Layton Culbreth Spartanburg Michael Larry Hurt Spartanburg
Robert Blaine Gibbons Baltimore, Md. Robert Merrill Tindall Jacksonville, Fla.
Thomas Walter Glazener Brevard, N. C. Robert Preston Warne Greenville

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

BACHELOR OF SCIENCE DEGREE

Industrial Management

Randall Dean Amick Cayce James Nelson Mobley, Jr. North Charleston
Everett Ernest Bedenbaugh Ninety Six Dikran Ormekian Novi, Mich.
Warren John Bull III Canton, N. C. Lawrence Paul Preston Columbus, Ga.
Hansford Landis Carter Ruffin Deral Thomas Rackley Seneca
Mell Griffith Cunningham North Augusta Frank Latimer Robinson, Jr. Raleigh, N. C.
Danny James Goodwin Greenville Albert Leroy Sellars Pauline
Mac Richard Harley Barnwell Larry Richard Shaw Fort Mill
Kenneth David Holliday Goldsboro, N. C. Bruce Allen Sheriff Lyman
Ellison Smyth Kelly, Jr. Startex Frederick Enos Steiner Pittsburgh, Pa.
Donald Baker Little Columbia Cecil William Watkins Bishopville
Charles Edward McBride, Jr. Greer Paul Garvey Wright, Jr. Decatur, Ga.

Textile Management

Donald Jerry Denton Inman William Shirley Haynie Anderson
Charles Hubert Hatfield Moultrie, Ga. James Cecil Kay Williamston
Ernest Sylvester Knighton, Jr., Greenville

Textile Science

Robert Clayton Dyson, Jr., Mooresville, N. C.

* With honor.

MASTERS' DEGREES CONFERRED AUGUST 5, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE

Agricultural Economics

Robert Henry Elrod, Griffin, Ga.

Agronomy

Meei-Chih Chou Taipei, Taiwan Arlen Daryl Klosterboer Rock Rapids, Iowa

Entomology

Chester Darnal Gordon . . . Covington, Tenn. Von H. McCaskill Salisbury, N. C.

Horticulture

Frank James Howard, Jr., Clemson

Nutrition

Chen-Hau Poon, Hong Kong

Zoology

Robert Osborne Brown, Jr. Charleston John Houston Paxton Brevard, N. C.
William Edwin Gore, Jr. Columbia James Stephen Wright Gastonia, N. C.

COLLEGE OF ARTS AND SCIENCES

MASTER OF ARTS DEGREE

Economics

Marshall Burrell Richardson, Harrison, Ohio

English

Phyllis Richiedine Loadholt, Fairfax

MASTER OF SCIENCE DEGREE

Chemistry

James Robert Stout, Kure Beach, N. C.

Mathematics

Frank Edward Mixon . . . Ponchatoula, La. James Thomas Whitesell . . . Richmond, Va.

SCHOOL OF EDUCATION

MASTER OF EDUCATION DEGREE

Harold Walker Alley, Jr. Seneca Betty Mae Thames Manning

MASTER OF INDUSTRIAL EDUCATION DEGREE

Dove Henry Pate, Jr., West Columbia

COLLEGE OF ENGINEERING

MASTER OF SCIENCE DEGREE

Ceramic Engineering

Carol Lynne Oster Troy, N. Y. Richard Henry Smoak Rock Hill

Civil Engineering

Charles Henry King Bishopville Littleton Glasgow Lewis, Jr. . . Bishopville

Electrical Engineering

Owen Stirling Chambers.....Beaufort James Benjamin Cox, Jr.Anderson

Mechanical Engineering

Chan F. Lam, Kowloon, Hong Kong

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF SCIENCE DEGREE

Textile Chemistry

Philip Andrew Spanninger, Quakertown, Pa.

DOCTORS' DEGREES CONFERRED AUGUST 5,1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Agricultural Economics

John Michael MarrFayetteville, N. C.
B.A., Presbyterian College; M.S., Clemson University
Dissertation: An Analysis of Potential Farm Labor Mobility in the Northern Coastal
Plain Region of South Carolina.

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Chemistry

Edwin Platt HallAlexandria, Va.
B.S., Davidson College; M.S., Clemson University
Dissertation: Mechanistic Studies of the Pyrolysis of Alkyl N-Phenylchloroimides and
Alkyl N-Substituted Benzimidates

Physics

John Patrick KennyPeoria, Ill.
B.S., St. Louis University
Dissertation: Virial Coefficients and High Temperature Viscosity Coefficients for Seg-
mented Potential Models
John Calvin WhitsonErwin, Tenn.
B.S., East Tennessee State; M.A., East Tennessee State
Dissertation: A Numerical Analysis of the IP Shell Nuclides

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY DEGREE

William Stanley JohnsonCamden, Tenn.
B.S., University of Tennessee; M.S., Clemson University
Dissertation: Analytical and Experimental Study of the Pulsejet Ejector (Field of
Specialization: Mechanical Engineering)

CANDIDATES FOR COMMISSIONS AS SECOND LIEUTENANTS UNITED STATES ARMY RESERVE

Armor

Ralph Shepard Rustin, Jr.*
Artillery

Lawrence Paul Preston
Chemical

Lloyd Tyrone Crosby
Corps Engineers

William Edwin Dargan, Jr.
Kenneth Edward Merriman
Leon Fred Moore

Infantry

Lory McLaurin Johnson, Jr.†
Medical Service

Marion Brabham Crooks, Jr.*
Ordnance

Milas Henry Ballard, Jr.
Ronald Edgar Swatek
Quartermaster Corps
John Zeph Mosley III
Signal

Henry John Reed †

* Distinguished Military Graduate.

† Distinguished Military Graduate and Regular Army Selectee.

CANDIDATES FOR COMMISSIONS AS SECOND LIEUTENANTS UNITED STATES AIR FORCE RESERVE

Joe David Burnette
Charles Barnard Hand

James Thomas Haney
Harrington Lee Lowder

BACHELORS' DEGREES CONFERRED DECEMBER 16, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

BACHELOR OF SCIENCE DEGREE

Agricultural Economics

Harry Gresham Barker Conway
Holmes Parker Bishop Union
James Vernon Elliott Columbia

Hugh Lovell Huggins Hemingway
Stephen Pavlasek, Jr. Carlisle, Pa.
John Charles Rogers Lake View

Agronomy

Joseph Robertson Dyson... Washington, Ga.
Benjamin Nelson

John Arthur LeHecka..... Rock Hill
Stuckey, Nesmith

Animal Science

Ronald Bruce Beatson Sumter
William Judson Hendrix Duncan
Peter Eldon Shumway, Norristown, Pa.

Deryl Crawford Keese Westminster
Werner Bagwell McDannald... Halifax, Va.

Biology

Whiteford Carlyle Blakeney, Jr. Spartanburg
Robert Gordon Castles... Big Pine Key, Fla.
Eugenia Robinson Colcolough... Clemson
Pamela Jean Ely † Narberth, Pa.
Jay Dee Hair Newark, Del.
George Carlyle Henley Cheraw
William Eugene Jackson, Jr. Sumter
Roger Charles Sherman, Bordentown, N. J.

William Francis Krebs III... Picayune, Miss
George John Marcinko Marietta, Ga
Joseph Pinckney Mizzell, Jr. ... Orangeburg
Barbara Bridges Murray † Shelby, N. C
Robert John Persak Millbrook, N. Y
Charles Daniel Riddle Spartanburg
Jesse David Scott, Jr. Greenville

Dairy Science

James Andrew Moss, Forest City, N. C.

Food Science

Bobby Lee Brown Anderson
Thomas David Todd, Aiken

James Hoke Hammond Anderson

Forestry

Travis Coleman Cork III... Clermont, Fla.
Jeffrey Evan Cowles Silver Spring, Md.
Henry Glenn Sullivan, Jr., Anderson

George David Hunter, Jr. West Union
Philip Arch Royce Norwood, N. Y

† With high honor.

Horticulture

Archie Jefferson Lewis III * . . . McCormick Marvin Lanier Sanders Moncks Corner

Poultry Science

David Michael Holbrook, Candler, N. C.

SCHOOL OF ARCHITECTURE

BACHELOR OF ARCHITECTURE DEGREE

Jose Rafael Caban	San Sebastian, P. R.	Peter Johnston Davenport	Stratford, Conn.
Lynn George Craig	Bethesda, Md.	Harry Butler Goforth, Jr.	Rock Hill
	Charles Thomas	Smith, Greenville	

BACHELOR OF BUILDING CONSTRUCTION

Lloyd Graham Hooper, Gastonia, N. C.

COLLEGE OF ARTS AND SCIENCES

BACHELOR OF ARTS DEGREE

James Henderson Abrams, Jr.*	Whitmire	Patsy Sutton Kambhu *	Palmyra, Mo.
Jane Henrietta Amick †	Orangeburg	Robert Barclay Knowles	Silver Spring, Md.
Harry Beck Burchstead, Jr.	Reidville	Linda Crawford Lambert †	Memphis, Tenn.
Nancy Gibson Cartee	Chattanooga, Tenn.	James Edward Loughridge	Ardmore, Pa.
Julie Duran Craig †	Washington, D. C.	Otis Rutledge McCracken, Jr.	Columbia
Benjamin Eidson Drake	Laurens	Robert O'Bryan Moffat	Cheraw
Thomas Wilson Duke, Jr.	Bishopville	Reece Everson Poulton	Pittsburgh, Pa.
Nina Harriet Dulin	Columbia	Julius Daniel Rampey	Pickens
Edwin Alonzo Farnell III	Sumter	Gary Setzler Renwick	Myrtle Beach
Peggy Greene Fowler †	Athens, Ga.	Wanda Jo Reynolds †	Canon, Ga.
Mary Sue Speer Gibert *	Clemson	Mendel Harold Stewart	Pickens
Catherine Anne Goebel	Clemson	Jeffrey Parker Weaver	Jackson
James Eldon Henderson	Elwood, Ill.	Edward Thornton White, Jr.	Rock Hill
	James Henry Workman, Woodruff		

BACHELOR OF SCIENCE DEGREE

Chemistry

George Michael Hughes, Orangeburg

Geology

Chandler Ellis, Houston, Texas

Mathematics

James Harry Abercrombie	Charlotte, N. C.	Emory Dale Haselden	Charleston
Willie Thomas Evatt, Jr.	Liberty	Sherry Ann McKee	Greenwood
Juanita Koren Dyer Frick	Greenville	Ande Susan Mitchell †	Columbia
	Carl Lee Zeis, Westfield, N. J.		

Medical Technology

Kaye Simonton Little,* Anderson

Physics

Carl Edward Libby, Easley

Pre-Medicine

Richard Clifton Bell	Littleton, Colo.	Donnie Ray King	Seneca
Lindsay Johnson Forrester III	Greenville	Albert Roger Smarr	Columbia
	Robert Samuel Wells, Jr., Aiken		

* With honor.

† With high honor.

‡ With highest honor.

SCHOOL OF EDUCATION

BACHELOR OF ARTS DEGREE

Secondary Education

Ronnie Earl Bullock.....	Dillon	Jonas Neal Grissom, Jr.	Hendersonville, N. C.
Louis Fowler Foy, Jr.....	Mt. Pleasant	Norma Jeanne Hairston.....	Greenville
Julia Melville Freit †.....	Lakewood, N. J.	Benjamin Levi Knighton, Jr.....	Woodruff

BACHELOR OF SCIENCE DEGREE

Agricultural Education

(Agricultural Education is jointly administered by the College of Agriculture and Biological Sciences and the School of Education.)

George Franklin Baker.....	Clinton, Md.	James Frazier Love, Jr.....	McConnells
Carroll Odell Baldwin.....	Hendersonville, N. C.	William Otis Noffz, Jr.....	Ninety Six
Dan Marvin Connelly.....	Hampton	David Wayne Rhodes.....	Woodruff
George Elmore Gore, Jr.....	Loris	Floyd Thomas Rogers.....	Clyde, N. C.

Industrial Education

Jack David Belk.....	Pacolet	Joseph Stephen Hunter.....	Clemson
Charles Edward Carroll.....	Florence	Ronald Nelson Lacey.....	Ravenel
Earl Hansford Grubbs.....	Barnwell	Paul Edward Lehotsky.....	Clemson
John Francis Hartnett.....	Charleston	George Arnold Phillips.....	Niagara Falls, N. Y.
William Charles Hawkins, Jr.....	Columbia	Andrew Michael Ulmer.....	Walterboro
Oscar Napoleon Vick III.....	Georgetown		

Science Teaching

Frank Gilmore Garren.....	Taylors	Andrew LaPlaca.....	Pompton Plains, N. J.
David Richard Hill.....	Sumter	Everett Charles Thorsland.....	Teaneck, N. J.
Samuel Richard Vaughan.....	St. George		

COLLEGE OF ENGINEERING

BACHELOR OF SCIENCE DEGREE

Agricultural Engineering

(Agricultural Engineering is jointly administered by the College of Agriculture and Biological Sciences and the College of Engineering.)
Hubert Emanuel Shuler, Jr., Holly Hill

Ceramic Engineering

John Godwin Federline.....	Greenville	Jon Marvin Whitaker.....	Columbia
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Chemical Engineering

William Barkley Begg.....	Spartanburg	Nicholas Thomas Drake.....	Bennettsville
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Civil Engineering

John Ervin Anderson.....	Florence	Joe Adrian Glenn.....	Jenkinsville
Jerry Arthur Brannon.....	Union	William Thomas Knowles.....	Charleston
Richard Charles Bryan.....	Ivyland, Pa.	William Rodger McCombs.....	Surfside Beach
Carroll Edmondson Daniel.....	Gainesville, Ga.	Stanley Folger Massingill.....	Central
James Richardson DeLand, Jr.....	Key West, Fla.	John Lyndon Potts.....	Greenville
Alex Henry Gay III.....	McGuire AFB, N. J.	Larry Edwin Vincent.....	Charlotte, N. C.
Hayne Bell Workman, Jr.....	Kinards	William John Watson, Jr.....	Vero Beach, Fla.

Electrical Engineering

Michael Benjamin Bishop.....	Spartanburg	Edward Samuel Lukens III.....	Kinnelon, N. J.
Kenneth John Brown, Jr.....	Fairfax, Va.	John Gregg McGowan.....	Florence
Marshall Paul Childress.....	Salem	Larry Paul McPherson.....	Lisbon, Ohio
Joseph Terrell Cook.....	Greenville	Kenneth William Nettles.....	Walterboro
Barry Thomas Davilli.....	Feeding Hills, Mass.	Daniel Charles Stanzione.....	Hartsville
Charles Wrede Jager.....	Charleston	David Benjamin Tanner.....	Easley
Harry Anthony Joye, Jr.....	Charleston	Frederick Harvey Watkins III.....	Caldwell, N. J.
Donald Franklin Looney.....	Irmo		

° With honor.

† With highest honor.

Industrial Engineering

Deryl Edward Bullington.....	Franklin, N. C.	Ransom Jay Hicks.....	Florence
William Lee Clapper, Jr.....	North Charleston	Larry Wayne Lee.....	Spartanburg
David Anderson Deem.....	Rosemont, Pa.	Craig John Lorenzini.....	Dumont, N. J.
Asa Micael Gray.....	Greenville	David Edward Smith.....	North Charleston
Harlock Walter Harvey III.....	Hartsville	Robert Maxwell Stringer, Jr.....	Columbia
Robert Reid Henderson.....	Spartanburg	William Welker Thraves.....	Orangeburg
	Robert Paul Trainor, Jr., Beverly, Mass.		

Mechanical Engineering

Jefferson Albert Blanton.....	Gaffney	Charles Leroy Guest.....	Anderson
Roger Lee Deffenbaugh.....	Honea Path	Mohamed Nihad Hanano.....	Aleppo, Syria
Clayburn Burney Drake.....	Anderson	John Fletcher McBride III.....	Bennettsville
Craig Reed Fallon.....	Little Silver, N. J.	Joseph George Neuwirth, Jr.*.....	Greenville
Daniel Lawrence Ferguson.....	Charleston Hgts.	Lonnie Dowd Phifer.....	Fort Mill
Richard Phillip Fletcher.....	McColl	James David Redden.....	Hartsville
William Alan George.....	Baltimore, Md.	James Ennis Reeves, Jr.....	Greenville
Ernest Wayne Gibbons.....	Cincinnati, Ohio	William Allen Richter.....	Charleston
	Ronald Millard Wells, Darlington		

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

BACHELOR OF ARTS DEGREE

Arts and Sciences

Melton Delane Chasteen.....	Anderson	Luis Ernesto Lopez—	
Neal William Edwards.....	Rock Hill	San Salvador, El Salvador	
James Ralph Hill, Jr.....	Columbia	Harry L. Moore, Jr.....	Asheville, N. C.
Parris Michael Hughey.....	Piedmont	Eston Lee Rodgers, Jr.....	Greenville
James Chappell Hurst, Jr.....	Chesterfield	James Clinton Roets.....	Jupiter, Fla.
Robert McMillan Koger, Jr.....	Charleston	William Thomas Utter, Jr.....	Columbia
	James Ronald Vinson, Greenville		

BACHELOR OF SCIENCE DEGREE

Industrial Management

William Russell Adkins.....	Fort Mill	William Taft Mills, Jr.....	Monroe, N. C.
Gary Howard Anderson.....	Pickens	Roger Allen Muckenfuss.....	Charleston
John Leon Baker.....	Piedmont	Robert Morton Muldrow, Jr.....	Bennettsville
William Owen Bearden.....	Greenville	John Haigler Price.....	Woodleaf, N. C.
Phillip Harold Brown.....	North Charleston	James Ronald Rogers.....	Darlington
Thomas Michael Burriss.....	Anderson	John Peter Roquemore, Jr.....	Bishopville
Charles McDonald Cole.....	North Charleston	Horace Kenneth Sanders, Jr.....	Myrtle Beach
Eugene Albert DeLaddy, Jr.*.....	Spartanburg	Thomas Camden Shelton.....	North Charleston
Thomas Edward Durham.....	Greenville	Clifford Eugene Singleton.....	North Charleston
James Hugh Ellicott.....	Hampton, Va.	Melvin Loraine Smith.....	Hartsville
Gene Anthony Joe Finley.....	Pickens	Richard Lee Smith.....	Clemson
Daniel Knox Godfrey.....	Charleston Heights	William Gerald Stevens.....	Columbia
Larry Fulton Grant.....	Fort Mill	Ryan Smith Thrower.....	North Charleston
Danny Davis Holmes.....	Gaffney	James Elbert Turner.....	Marion
Ronald Dean Hughey.....	Gaffney	Frederic Parkman Warfield II—	Westfield, N. J.
Charles Henry Humphrey.....	Greenwood	Ralph Clayton Whitmire.....	Easley
John Harold Johnston.....	Greenville	George Hills Woodland, Jr.....	Milwaukee, Wis.
Andrew Brian Lord.....	Burlington, Vt.		

Textile Chemistry

Larry Richard Dannelly.....	Ehrhardt	Allen Oliver Norris.....	Walterboro
Samuel James Ervin, Jr.....	Hemingway	William Everett Poteat.....	Spartanburg

Textile Management

George William Boozer III.....	Walhalla	James Frederick McCurry.....	Belton
Lloyd Maxwell Eargle.....	Leesville	James King Maner, Jr.....	Garnett
Carlisle Richie Gibson.....	Gaffney	Carl Vaughan Schmidt.....	Greenville
George Beekman Hilton.....	Wyckoff, N. J.	Kenneth Woodward Shedd—	
Harold Horton Hunter, Jr.....	Silverstreet	Rockingham, N. C.	
Bruce Nichols Lanier, Jr.....	Lanett, Ala.	Jerry Joseph Sims.....	Donalds

* With honor.

MASTERS' DEGREES CONFERRED DECEMBER 16, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

MASTER OF SCIENCE DEGREE

Agricultural Economics

Gene Wallace Dukes Winnsboro William Augustus Ward Columbia

Animal Science

Carlos Federico Lam, Jr., Panama City, Panama

Dairy Science

Alexander Joseph Kutches, East Paterson, N. J.

Horticulture

Norman Jeff McFaddin, Jr., Sardinia

Plant Physiology

Mary Crystal Parks Pitts, Stone Mountain, Ga.

Poultry Science

William John Borst . . . West Caldwell, N. J. Larry Mendel Kowalski Anderson

Zoology

Diana Rae Runkle King Beltsville, Md. Neina Ellen Wansley Washington, Ga.

COLLEGE OF ARTS AND SCIENCES

MASTER OF SCIENCE DEGREE

Mathematics

David Albert Ott Ponchatoula, La. Francis Russell Richards . . . Shreveport, La.

*Physics*Wanda Randall Ferrell Crimora, Va. Barry Leeds Illman Bridgeport, Conn.
Clarence Rufus Green Butler, Tenn. Michael William Riley Kingsville, Md.

SCHOOL OF EDUCATION

MASTER OF AGRICULTURAL EDUCATION DEGREE

(Agricultural Education is jointly administered by the College of Agriculture
and Biological Sciences and the School of Education.)
Hugh Porter McClimon, Greer

MASTER OF EDUCATION DEGREE

Mary Alice Jackson Hayes Anderson Bobbie Ruth Leard Westminster
Sue Ann Little, St. Petersburg, Fla.

COLLEGE OF ENGINEERING

MASTER OF SCIENCE DEGREE

Agricultural Engineering(Agricultural Engineering is jointly administered by the College of Agriculture
and Biological Sciences and the College of Engineering.)
David Carroll Kenyon, Windsor, Vt.*Ceramic Engineering*James Charles Frederic, Jr. Columbia Allen Moorer Hobbs Bishopville
Wayland Lee Moore, Vienna, Va.

Chemical Engineering

Frank Louis Lambert Metairie, La. Pitner Alexander Traugbber Aiken

Civil Engineering

Byron Reed Bull, Jr. Cameron Thomas Steven Jamison Hanahan
James Martin Davis Greenville Deniz Yapanar Istanbul, Turkey

Electrical Engineering

George Campion Rush, Baltimore, Md.

Environmental Systems Engineering

David Carl Sanchez, Chicago, Ill.

Mechanical Engineering

Charles William Crawford Knoxville, Tenn. John Lyman Dean Anderson

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE

MASTER OF SCIENCE DEGREE

Industrial Management

Robert Jack Lowell North Charleston Terry Edward Richardson Barnwell
Benjamin Franklin Weeks III, Andrews, N. C.

Textile Chemistry

Kenneth Bedros Takvorian, Philadelphia, Pa.

DOCTORS' DEGREES CONFERRED DECEMBER 16, 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Agronomy

James Raymond Woodruff Newton Grove, N. C.
B.S., M.S., North Carolina State College
Dissertation: The Influence of Aurintricarboxylic Acid and Quercetin on the Availability of Phosphorus and Associated Cations in a Cecil Sandy Clay Loam

Entomology

John Francis Brown Fayetteville, Ark.
D.V.M., University of Georgia; M.S., Clemson University
Dissertation: Systemic Insecticide for Control of the Face Fly, *Musca autumnalis* De Geer

COLLEGE OF ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY DEGREE

Chemistry

James Victor Hartzog Reevesville
B.S., Clemson University
Dissertation: Surface and Electrical Properties of an Aromatic Polyamide
Earl Henry Wagener Clemson
B.S., Clemson University
Dissertation: Isomerization Rates of Iminocarbonates by Nuclear Magnetic Resonance

Chemical Physics

Peter Jawad Ashy Lattakia, Syria
B.S., University of Southwestern Louisiana; M.S., Clemson University
Dissertation: Mathematical Simulation for the Diffusion of Water Vapor and Deuterium Oxide Vapor in Polymers

Mathematics

- Bobby Joseph Prochaska Lafayette, La.
 B.S., University of Southwestern Louisiana; Colorado State University
 Dissertation: On Random Normed Spaces

Physics

- Bobby Earl Powell Moultrie, Ga.
 B.S., Georgia Institute of Technology; M.S., Clemson University
 Dissertation: Higher Order Isothermal Elastic Constants

COLLEGE OF ENGINEERING

DOCTOR OF PHILOSOPHY DEGREE

Engineering

- Robert Ned Brannock Orlando, Fla.
 B.S., Duke University; M.S., University of Missouri
 Dissertation: Thermal and Mechanical Stresses in Thin Circular Sandwich Shells (Field of Specialization: Civil Engineering)
- Joseph Lytle Campbell III Spartanburg
 B.S., M.S., Clemson University
 Dissertation: The Behavior of a Fluid in Elastic Tubing Containing Wave Reflection Sites (Field of Specialization: Mechanical Engineering)
- Lee Stephen Miller Asheville, N. C.
 B.S., Indiana Institute of Technology
 Dissertation: An Investigation of the Extension of Kalman Filtering to the Estimation of Stochastic Signals (Field of Specialization: Electrical Engineering)

DEGREES AWARDED IN 1967 BY MAJOR COURSES

ASSOCIATE DEGREES AWARDED IN 1967

COLLEGE OF ARTS AND SCIENCES	27
Nursing	27
TOTAL ASSOCIATE DEGREES AWARDED IN 1967	27

BACHELORS' DEGREES AWARDED IN 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES (Including Double Major)	*108
Agricultural Economics	16
Agronomy	10
Animal Science	12
Biology	30
Dairy Science	4
Entomology	2
Food Science *	4
Forestry	20
Horticulture	8
Poultry Science	2
SCHOOL OF ARCHITECTURE	25
Architecture	21
Building Construction	4
COLLEGE OF ARTS AND SCIENCES	217
Arts and Sciences	139
Chemistry	8
Geology	4
Mathematics	17
Medical Technology	2
Physics	7
Pre-Medicine	40

* Includes one student who formerly graduated in Animal Science.

SCHOOL OF EDUCATION	46
Agricultural Education	17
Industrial Education	16
Science Teaching	7
Secondary Education	6

COLLEGE OF ENGINEERING	199
Agricultural Engineering	4
Ceramic Engineering	8
Chemical Engineering	32
Civil Engineering	31
Electrical Engineering	54
Industrial Engineering	19
Mechanical Engineering	51

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE	144
Arts and Sciences	12
Industrial Management	93
Textile Chemistry	8
Textile Management	28
Textile Science	3

TOTAL BACHELORS' DEGREES AWARDED IN 1967	739
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MASTERS' DEGREES AWARDED IN 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES	27
Agricultural Economics	3
Agronomy	3
Animal Science	1
Dairy Science	1
Entomology	2
Horticulture	5
Nutrition	1
Plant Physiology	1
Poultry Science	2
Zoology	8

COLLEGE OF ARTS AND SCIENCES	20
Chemistry	3
Economics	1
English	4
History	1
Mathematics	7
Physics	4

SCHOOL OF EDUCATION	8
Agricultural Education	1
Education	6
Industrial Education	1

COLLEGE OF ENGINEERING	34
Agricultural Engineering	3
Ceramic Engineering	7
Chemical Engineering	3
Civil Engineering	8
Electrical Engineering	4
Engineering Mechanics	1
Environmental Systems Engineering	2
Mechanical Engineering	6

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE	5
Industrial Management	3
Textile Chemistry	2

TOTAL MASTERS' DEGREES AWARDED IN 1967	94
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DOCTORS' DEGREES AWARDED IN 1967

COLLEGE OF AGRICULTURE AND BIOLOGICAL SCIENCES	6
Agricultural Economics	1
Agronomy	2
Entomology	3
COLLEGE OF ARTS AND SCIENCES	11
Chemical Physics	1
Chemistry	4
Mathematics	1
Physics	5
COLLEGE OF ENGINEERING	5
Chemical Engineering	1
Civil Engineering	1
Electrical Engineering	1
Mechanical Engineering	2
TOTAL DOCTORS' DEGREES AWARDED IN 1967	22
TOTAL NUMBER DEGREES AWARDED IN 1967	882

TOTAL DEGREES AWARDED BY MAJOR COURSES, 1896-1967

ASSOCIATE

Major Course	
Nursing	27

BACHELORS'

Agriculture	244
Agriculture and Animal Industry	80
Agriculture and Chemistry	69
Agricultural Chemistry	102
Agricultural Economics	310
Agricultural Education	412
Agricultural Engineering	463
Agronomy	755
Animal Science	767
Applied Mathematics	34
Architectural Engineering	118
Architecture	561
Arts and Sciences	1,130
Bachelor of Science	3
Biology	98
Botany	12
Building Construction	10
Ceramic Engineering	190
Chemical Engineering	353
Chemistry	374
Chemistry and Geology	11
Chemistry-Engineering	43
Civil Engineering	1,320
Dairy Science	388
Education	242
Electrical Engineering	1,694
Engineering Industrial Education	70
Entomology	163
Food Science	6
Forestry	160
General Science	359
Geology	6
Horticulture	466

Major Course

Industrial Education	331
Industrial Engineering	120
Industrial Management	878
Industrial Physics	56
Mathematics	43
Mechanical Engineering	1,461
Mechanical and Electrical Engineering	489
Medical Technology	5
Metallurgical Engineering	2
Physics	72
Poultry Science	41
Pre-Medicine	376
Secondary Education	6
Science Teaching	10
Soils	9
Textile Chemistry	320
Textile Engineering	1,060
Textile Industrial Education	85
Textile Management	300
Textile Manufacturing	1,045
Textile Science	35
Veterinary Science	16
Vocational Agricultural Education	729
Weaving and Designing	42

Double Majors

Agricultural Chemistry and Arts and Sciences	1
Agricultural Chemistry and General Science	1
Agricultural Economics and Animal Husbandry	1
Agricultural Economics and Vocational Agricultural Education	1
Agricultural Engineering and Civil Engineering	2
Agricultural Engineering and Electrical Engineering	1
Agricultural Engineering and Mechanical Engineering	1
Agronomy and Agricultural Education	1
Agronomy and Vocational Agricultural Education	4
Animal Husbandry and Industrial Management	1
Animal Husbandry and Vocational Agricultural Education	5
Animal Husbandry and Agricultural Education	3
Animal Husbandry and Ceramic Engineering	1
Animal Husbandry and Dairy	2
Architectural Engineering and Architecture, five-year	1
Architecture and Architectural Engineering	11
Architecture and Civil Engineering	1
Architecture, four-year, and Architecture, five-year	18
Architecture, four-year, and Mechanical Engineering	1
Arts and Sciences and Agricultural Economics	1
Chemical Engineering and Chemistry and Chemistry-Engineering	3
Chemical Engineering and Chemistry-Engineering	1
Chemistry and Chemical Engineering	1
Chemistry and Chemistry-Engineering	1
Chemistry and General Science	1
Chemistry and Industrial Physics	1
Chemistry and Agricultural Chemistry	1
Civil Engineering and Architecture	1
Civil Engineering and Chemistry and Geology	2
Civil Engineering and Industrial Physics	1
Civil Engineering and Electrical Engineering	1
Civil Engineering and Mechanical Engineering	1
Electrical Engineering and Applied Mathematics	1
Electrical Engineering and Industrial Physics	1
Electrical Engineering and Mechanical Engineering	17

Major Course

Electrical Engineering and Textile Engineering	1
Entomology and Architecture, five-year	1
Entomology and Pre-Medicine	1
General Science and Ceramic Engineering	1
General Science and Education	1
General Science and Electrical Engineering	1
Horticulture and Agronomy	1
Horticulture and Architectural Engineering	1
Horticulture and Civil Engineering	1
Industrial Education and Architecture	1
Industrial Education and Electrical Engineering	1
Industrial Education and Forestry	1
Industrial Engineering and Mechanical Engineering	1
Mechanical Engineering and Textile Engineering	4
Poultry and Vocational Agricultural Education	1
Pre-Medicine and Arts and Sciences	1
Pre-Medicine and Textile Chemistry	2
Textile Chemistry and Civil Engineering	1
Textile Chemistry and Textile Manufacturing	1
Textile Engineering and Civil Engineering	1
Textile Engineering and Mechanical and Electrical Engineering ..	1
Textile Engineering and Textile Industrial Education	1
Textile Engineering and Textile Manufacturing	1
Textile Engineering and Weaving and Designing	1
Textile Manufacturing and Mechanical Engineering	1

MASTERS'

Agricultural Economics	64
Agricultural Education	79
Agricultural Engineering	32
Agronomy	23
Animal Science	18
Architecture	1
Bacteriology	6
Botany	1
Ceramic Engineering	44
Chemical Engineering	24
Chemistry	77
Civil Engineering	27
Dairy Science	17
Environmental Systems Engineering	9
Economics	2
Education	143
Electrical Engineering	30
Engineering Mechanics	4
English	7
Entomology	49
Forestry	1
History	1
Horticulture	43
Industrial Education	24
Industrial Management	18
Mathematics	48
Mechanical Engineering	51
Microbiology	1
Nuclear Science	3
Nutrition	1
Physics	45
Plant Pathology	12
Plant Physiology	2
Poultry Science	9

Major Course

Textile Chemistry	37
Textile Industrial Education	1
Water Resources Engineering	17
Zoology	38

DOCTORS'

Agricultural Economics	3
Agronomy	7
Chemical Engineering	5
Chemical Physics	1
Chemistry	28
Civil Engineering	1
Electrical Engineering	1
Entomology	13
Materials Engineering	1
Mathematics	1
Mechanical Engineering	2
Physics	8
Plant Pathology	6

TOTAL DEGREES AWARDED FROM 1896 THROUGH 1967.....19,778

County	Total	State or Country	Total
Abbeville	49	Delaware	19
Aiken	127	District of Columbia	8
Allendale	14	Ecuador	2
Anderson	385	El Salvador	1
Bamberg	17	England	3
Barnwell	30	Finland	1
Beaufort	32	Florida	122
Berkeley	37	France	1
Calhoun	18	Georgia	247
Charleston	338	Germany	1
Cherokee	60	Greece	2
Chester	64	Guatemala	1
Chesterfield	45	Hawaii	1
Clarendon	20	Illinois	23
Colleton	37	India	4
Darlington	71	Indiana	7
Dillon	37	Iowa	1
Dorchester	43	Israel	1
Edgefield	27	Japan	1
Fairfield	20	Kansas	1
Florence	92	Kentucky	11
Georgetown	33	Lebanon	3
Greenville	524	Louisiana	27
Greenwood	130	Maine	2
Hampton	25	Maryland	132
Horry	102	Massachusetts	24
Jasper	3	Michigan	8
Kershaw	53	Minnesota	3
Lancaster	44	Mississippi	5
Laurens	92	Missouri	3
Lee	19	Montana	1
Lexington	62	Netherlands, W. I.	1
Marion	27	New Hampshire	6
Marlboro	30	New Jersey	245
McCormick	11	New Mexico	3
Newberry	60	New York	142
Oconee	148	New Zealand	1
Orangeburg	119	North Carolina	293
Pickens	310	North Dakota	1
Richland	222	Ohio	44
Saluda	24	Oklahoma	5
Spartanburg	256	Oregon	2
Sumter	112	Pakistan	3
Union	41	Panama	3
Williamsburg	38	Pennsylvania	132
York	153	Puerto Rico	4
		Rhode Island	3
SOUTH CAROLINA TOTAL	4,201	South Carolina	4,201
		Switzerland	1
State or Country	Total	Sweden	1
Alabama	30	Tennessee	54
Alaska	2	Texas	11
Arkansas	3	Thailand	3
Australia	1	Turkey	2
Bolivia	2	Utah	1
Burma	1	Venezuela	1
California	7	Vermont	3
Canal Zone	4	Virginia	110
Chile	1	Washington	1
China	11	West Virginia	9
Colombia	1	Wisconsin	2
Colorado	4		
Connecticut	36	GRAND TOTAL	6,057

State or Country	Total	Sweden	
Alabama	30	Tennessee	54
Alaska	2	Texas	11
Arkansas	3	Thailand	3
Australia	1	Turkey	2
Bolivia	2	Utah	1
Burma	1	Venezuela	1
California	7	Vermont	3
Canal Zone	4	Virginia	110
Chile	1	Washington	1
China	11	West Virginia	9
Colombia	1	Wisconsin	2
Colorado	4		
Connecticut	36	GRAND TOTAL	6,057

ENROLLMENT BY COUNTIES AND STATES
FIRST SEMESTER, 1967-1968 (Greenville and Sumter Campuses)

<i>County</i>	<i>Greenville</i>	<i>Sumter</i>	<i>Total</i>	<i>State or Country</i>	<i>Greenville</i>	<i>Sumter</i>	<i>Total</i>
Aiken	2		2	California		1	1
Anderson	11		11	Florida	1		1
Beaufort	1		1	Illinois	1		1
Charleston	2		2	Japan		3	3
Clarendon		6	6	Maine	1		1
Darlington	1	2	3	New Jersey		1	1
Florence		6	6	Pennsylvania	2	1	3
Georgetown		1	1	South Carolina	232	172	404
Greenville	186		186	Tennessee	2		2
Greenwood	1		1	Virginia	1		1
Kershaw		7	7				
Laurens	5		5				
Lee		9	9				
Orangeburg		1	1				
Pickens	16		16				
Richland		1	1				
Spartanburg	6	1	7				
Sumter		134	134				
Williamsburg		4	4				
York	1		1				
TOTAL	232	172		TOTAL	240	178	
SO. CAROLINA TOTAL			404	GRAND TOTAL			418

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, FIRST SEMESTER, 1967-1968

Classification	Agriculture	Agrie. Economics	Animal Science	Biology	Dairy Science	Entomology	Food Science	Forestry	Horticulture	Poultry Science	Architecture	Bldg. Construction	Pre-Architecture	Arts and Sciences	Chemistry	Geology	Mathematics	Medical Technology	Nursing	Physics	Pre-Medicine	Pre-Pharmacy	Agricultural Educa.	Elementary Educa.	Industrial Educa.	Recrea. & Park Adm.	Secondary Education	Science Teaching	Agricultural Engr.	Ceramic Engr.	Chemical Engr.	Civil Engr.	Electrical Engr.	Industrial Engr.	Mechanical Engr.	Metallurgical Engr.	Economics	Industrial Mgt.	Textile Chemistry	Textile Mgt.	Textile Science	Textiles	Postgraduates	Graduates	Unclassified	Enrollment by Classes		
Senior	22	10	18	40	5	1	4	29	13	2	77	17	1	122	8	5	30	2	7	49	1	22	6	22	13	17	18	5	23	29	57	54	27	56	4	51	120	8	13	1	10	1,019		
Junior	..	17	8	13	52	4	3	2	17	12	3	8	62	22	1	142	15	7	38	1	14	64	1	25	29	25	68	31	15	7	17	37	72	65	4	44	6	84	158	5	2	18	1,218	
Sophomore	1	16	13	8	54	5	1	6	24	6	4	14	60	13	3	176	15	10	37	7	25	8	86	7	11	20	19	79	18	20	9	15	53	71	70	5	77	4	36	129	3	20	1,258
Freshman	6	12	12	5	38	4	8	70	12	5	50	19	10	72	249	34	3	67	17	34	15	130	17	28	33	20	66	49	4	17	35	85	144	141	143	8	36	137	19	38	14	1,892	
Postgrad.	14	
Graduate	636	
Unclassified	20
Total	7	67	43	44	184	18	5	20	140	43	218	62	77	689	72	25	172	27	59	44	329	26	86	88	86	226	115	57	38	90	204	344	330	36	320	22	207	544	35	15	1	86	14	636	20	6,057		

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, FIRST SEMESTER, 1967-1968 (Greenville Campus)

CLASSIFICATION	Enrollment by Classes																											
	Biology	Forestry	Pre-Veterinary	Arts and Sciences	Chemistry	Geology	Mathematics	Medical Technology	Pre-Medicine	Pre-Pharmacy	Agricultural Educa.	Elementary Educa.	Industrial Educa.	Recrea. & Park Adm.	Secondary Education	Science Teaching	Agricultural Engr.	Ceramic Engr.	Chemical Engr.	Civil Engr.	Electrical Engr.	Industrial Engr.	Mechanical Engr.	Economics	Industrial Mgt.	Textiles	Postgraduate	
Freshman	5	3	4	35	5	1	7	2	9	11	1	4	1	1	5	2	4	5	6	13	18	2	18	1	40	1	...	204
Sophomore	2	1	...	4	3	...	...	1	3	2	...	5	...	...	1	...	...	...	...	2	3	...	4	...	3	...	...	34
Postgraduate	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1
TOTAL	7	4	4	39	8	1	7	3	12	13	1	9	1	1	6	2	4	5	6	15	21	2	22	1	43	1	1	239

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, FIRST SEMESTER, 1967 1968 (Sumter Campus)

CLASSIFICATION	CURRICULUM																								Enrollment by Classes	
	Agriculture	Agrie. Economics	Dairy Science	Entomology	Forestry	Poultry Science	Pre-Veterinary	Arts and Sciences	Chemistry	Mathematics	Medical Technology	Physics	Pre-Medicine	Pre-Pharmacy	Agrie. Education	Elementary Educa.	Secondary Education	Chemical Engr.	Civil Engr.	Electrical Engr.	Mechanical Engr.	Economics	Industrial Mgt.	Textiles		Postgraduate	Unclassified
Freshman	2	2	1	1	6	1	3	30	2	6	3	3	7	6	4	17	7	5	7	11	9	2	13	1	1	145
Sophomore				1	1	1	1	9			1	1	1	2		1	2	2				2	4			28
Postgraduate																								2		2
Unclassified																									3	3
TOTAL	2	2	1	1	7	1	4	39	2	6	1	4	8	8	4	18	9	7	7	11	9	4	17	1	2	3178

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CLEMSON
UNIVERSITY
RECORD

SPECIAL APPENDIX

ENROLLMENT BY COUNTIES AND STATES, 1967-1968

<i>County</i>	<i>Total</i>	<i>State or Country</i>	<i>Total</i>
Abbeville	49	Delaware	19
Aiken	133	District of Columbia	9
Allendale	14	Ecuador	2
Anderson	415	El Salvador	1
Bamberg	17	England	3
Barnwell	32	Finland	1
Beaufort	32	Florida	125
Berkeley	37	France	1
Calhoun	19	Georgia	256
Charleston	346	Germany	1
Cherokee	61	Greece	2
Chester	67	Guatemala	1
Chesterfield	47	Hawaii	1
Clarendon	20	Hong Kong	1
Colleton	37	Illinois	23
Darlington	72	India	4
Dillon	38	Indiana	7
Dorchester	43	Iowa	1
Edgefield	28	Israel	1
Fairfield	21	Japan	1
Florence	97	Kansas	1
Georgetown	34	Kentucky	11
Greenville	548	Lebanon	3
Greenwood	134	Louisiana	28
Hampton	25	Maine	2
Horry	104	Maryland	135
Jasper	4	Massachusetts	24
Kershaw	56	Michigan	8
Lancaster	44	Minnesota	3
Laurens	92	Mississippi	5
Lee	20	Missouri	3
Lexington	64	Montana	1
Marion	28	Netherlands, W. I.	1
Marlboro	30	New Hampshire	6
McCormick	11	New Jersey	252
Newberry	62	New Mexico	3
Oconee	155	New York	146
Orangeburg	122	New Zealand	1
Pickens	350	North Carolina	307
Richland	233	North Dakota	1
Saluda	24	Ohio	47
Spartanburg	266	Oklahoma	5
Sumter	114	Oregon	2
Union	41	Pakistan	4
Williamsburg	41	Panama	3
York	159	Pennsylvania	133
		Puerto Rico	4
		Rhode Island	3
		South Carolina	4,386
		Sweden	1
		Switzerland	1
		Tennessee	57
		Texas	12
		Thailand	3
		Turkey	2
		Utah	1
		Venezuela	1
		Vermont	3
		Virginia	116
		Washington	1
		West Virginia	10
		Wisconsin	2
		GRAND TOTAL	6,305
SOUTH CAROLINA TOTAL	4,386		
<i>State or Country</i>	<i>Total</i>		
Alabama	33		
Alaska	2		
Argentina	1		
Arkansas	3		
Australia	1		
Bolivia	2		
Burma	1		
California	7		
Canal Zone	4		
Chile	1		
China	11		
Colombia	1		
Colorado	4		
Connecticut	36		

ENROLLMENT BY COUNTIES AND STATES, 1967-1968
(Greenville and Sumter Campuses)

<i>County</i>	<i>Greenville</i>	<i>Sumter</i>	<i>Total</i>	<i>State or Country</i>	<i>Greenville</i>	<i>Sumter</i>	<i>Total</i>
Aiken	2		2	Alabama		1	1
Anderson	11		11	California		1	1
Beaufort	1		1	Florida	1		1
Charleston	3		3	Illinois	1		1
Clarendon		6	6	Japan		3	3
Darlington	1	3	4	Kentucky		1	1
Florence	1	6	7	Maine	1		1
Georgetown		1	1	New Jersey		1	1
Greenville	206		206	North Carolina	1		1
Greenwood	1		1	Pennsylvania	2	1	3
Kershaw		7	7	South Carolina	257	183	440
Laurens	5		5	Tennessee	2		2
Lee		9	9	Virginia	1		1
Pickens	17		17				
Richland		1	1				
Saluda	1		1				
Spartanburg	7	1	6				
Sumter		143	143				
Williamsburg		5	5				
York	1		1				
TOTAL	257	183		TOTAL	266	191	
So. CAROLINA TOTAL			441	GRAND TOTAL			457

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, 1967-1968

Classification	Agriculture			Agric. Economics			Astronomy			Animal Science			Biology			Dairy Science			Entomology			Food Science			Forestry			Horticulture			Poultry Science			Pre-Veterinary			Architecture			Bldg. Construction			Pre-Architecture			Arts and Sciences			Chemistry			Geology			Mathematics			Medical Technology			Nursing			Physics			Pre-Medicine			Pre-Pharmacy			Agric. Education			Elem. Education			Industrial Education			Recrea. & Park Adm.			Secondary Education			Science Teaching			Agric. Engineering			Ceramic Engineering			Chemical Engr.			Civil Engineering			Electrical Engr.			Industrial Engr.			Mechanical Engr.			Metallurgical Engr.			Economics			Industrial Mgt.			Textile Chemistry			Textile Management			Textiles			Postgraduates			Graduates			Unclassified			Enrollment by Classes																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
	Senior	Junior	Sophomore	Freshman	Postgrad.	Graduate	Unclassified	Total	5	1	4	29	13	2	79	17	2	124	9	5	30	3	7	49	1	22	6	22	13	17	18	5	23	29	57	54	28	56	4	51	121	8	14	1	10

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, 1967-1968 (Greenville Campus)

CLASSIFICATION	Enrollment by Classes																												
	Biology	Forestry	Pre-Veterinary	Arts and Sciences	Chemistry	Geology	Mathematics	Medical Technology	Pre-Medicine	Pre-Pharmacy	Agric. Education	Elem. Education	Industrial Education	Recrea. & Park Adm.	Secondary Education	Science Teaching	Agricultural Engr.	Ceramic Engr.	Chemical Engr.	Civil Engineering	Electrical Engr.	Industrial Engr.	Mechanical Engr.	Economics	Industrial Mgt.	Textiles	Postgraduates	Unclassified	
Freshman	5	3	4	43	5	1	7	2	9	12	1	6	1	1	6	2	4	5	7	15	21	2	20	4	42	1	...	...	229
Sophomore	2	1	...	4	3	...	...	1	3	2	...	5	...	...	1	...	...	...	...	2	4	...	4	...	3	...	...	...	35
Postgraduate	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1
Unclassified	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	1	1
TOTAL	7	4	4	47	8	1	7	3	12	14	1	11	1	1	7	2	4	5	7	17	25	2	24	4	45	1	1	1	266

NUMBER OF STUDENTS MAJORING IN EACH CURRICULUM, 1967-1968 (Sumter Campus)

CLASSIFICATION																														
	Agronomy	Agriculture	Agric. Economics	Biology	Dairy Science	Entomology	Forestry	Poultry Science	Pre-Veterinary	Arts and Sciences	Chemistry	Mathematics	Medical Technology	Physics	Pre-Medicine	Pre-Pharmacy	Agric. Education	Elem. Education	Secondary Education	Engineering	Chemical Engr.	Civil Engineering	Electrical Engr.	Mechanical Engr.	Economics	Industrial Mgt.	Textiles	Postgraduate	Unclassified	Enrollment by Classes
Freshman	1	2	2	1	1	6	1	3	34	2	6	3	7	6	4	20	7	2	5	7	11	9	2	13	1	1	1	1	155	
Sophomore				1	1	1	1	1	9	1	1	1	1	1	2	1	3	2	2	5	2	5	2	2	5				31	
Postgraduate																											2	2	2	
Unclassified																												3	3	
TOTAL	1	2	2	1	1	1	7	1	4	43	2	6	1	4	8	8	4	21	10	2	7	7	11	9	4	18	1	2	3191	