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1963

## University of Windsor Graduate Calendar 1963-1964

University of Windsor

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*University of* WINDSOR

FACULTY OF  
GRADUATE STUDIES



1963 • 1964



# **UNIVERSITY OF WINDSOR**

WINDSOR, ONTARIO, CANADA

and its

Federated And Affiliated Colleges

ASSUMPTION UNIVERSITY

HOLY REDEEMER COLLEGE

CANTERBURY COLLEGE



FACULTY OF GRADUATE STUDIES

1963-64



FACULTY OF GRADUATE STUDIES

UNIVERSITY OF WINDSOR

FACULTY OF GRADUATE STUDIES, 1963-64

## FOREWORD

*"It is therefore as important to make no mistake in education, as it is to make no mistake in the pursuit of the last end, with which the whole work of education is intimately and necessarily connected. In fact, since education consists essentially in preparing man for what he must be and for what he must do here below, in order to attain the sublime end for which he was created, it is clear that there can be no true education which is not wholly directed to man's last end."*

*Pope Pius XI, Christian Education of Youth.*

# UNIVERSITY OF WINDSOR

is a full member of

The University Matriculation Board of Ontario

The National Conference of Canadian Universities and Colleges

The Association of Universities of the British Commonwealth

## 1963

1963		Calendar		1963	
<b>JANUARY</b>		<b>FEBRUARY</b>		<b>MARCH</b>	
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<b>OCTOBER</b>		<b>NOVEMBER</b>		<b>DECEMBER</b>	
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## 1964

1964		Calendar		1964	
<b>JANUARY</b>		<b>FEBRUARY</b>		<b>MARCH</b>	
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<b>APRIL</b>		<b>MAY</b>		<b>JUNE</b>	
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<b>JULY</b>		<b>AUGUST</b>		<b>SEPTEMBER</b>	
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<b>OCTOBER</b>		<b>NOVEMBER</b>		<b>DECEMBER</b>	
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18 19 20 21 22 23 24	22 23 24 25 26 27 28	20 21 22 23 24 25 26	20 21 22 23 24 25 26	20 21 22 23 24 25 26	20 21 22 23 24 25 26
25 26 27 28 29 30 31	29 30 . . . . .	27 28 29 30 31 . . . . .	27 28 29 30 31 . . . . .	27 28 29 30 31 . . . . .	27 28 29 30 31 . . . . .
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# ACADEMIC CALENDAR

## 1963

July 2, Tuesday, to August 10, Saturday (inclusive)	—Summer Session
September 11, Wednesday, to September 14, Saturday	—Registration
September 16, Monday	—Lectures begin
September 30, Monday	—Last day of registration for undergraduate courses
October 14, Monday	—Thanksgiving Day
October 18, Friday	—Senate Meeting
October 19, Saturday	—Fall Convocation
December 20, Friday	—Christmas recess begins at 10:00 p.m.

## 1964

January 3, 4, 6	—Mid-year final examinations
January 7, Tuesday	—Second semester lectures begin
February 14, Friday	—Senate meeting
March 25, Wednesday, to March 30, Monday (inclusive)	—Easter Recess
April 11, Saturday	—Last day of lectures
April 16, Thursday	—Spring final examinations
May 22, Friday	—Senate meeting
May 23, Saturday	—Spring Convocation



# UNIVERSITY OF WINDSOR

## BOARD OF GOVERNORS

### Member ex officio:

Rev. E. Carlisle LeBel, C.D., C.S.B., M.A., LL.D., Vice-Chancellor  
and President

### Elected Members:

John J. Stuart, B.Comm., Chairman  
H. Clifford Hatch, Vice-Chairman  
Anthony F. Fuerth, K.S.S., Chairman, Executive Committee  
Eli C. Goldin, LL.D.  
William T. Grant, B.Comm.  
Raymond J. Lyons  
G. Malcolm Morton, B.A., M.D., M.Sc., F.R.C.S. (C), F.A.C.S.  
John M. Page, C.A.  
Ronald W. Todgham  
William R. Waddell, M.D.  
Richard T. Waddington, B.A.Sc., P. Eng.  
George R. Weller  
John W. Whiteside, B.A.

### Members Appointed by Assumption University:

Rev. Cornelius P. Crowley, C.S.B., Ph.D.  
Miss Helen M. McTague, Q.C.  
Rev. Hugh V. Mallon, C.S.B., M.A.  
Rev. Daniel J. Mulvihill, C.S.B., Ph.D.  
Rev. E. Arthur Roberts, C.S.B., B.A., S.T.B.  
Rev. Norbert J. Ruth, C.S.B., M.A.

### Members Appointed by the Alumni Association:

Joseph R. Deane, LL.B.  
James A. Holden, B.A.

### Members Appointed by the Lieutenant Governor in Council:

Alphonse Gignac  
Richard A. Graybiel, B.A.  
Jerome R. Hartford, B.A.  
Clare R. MacLeod, B.A., B.Paed.

## THE SENATE

### Members ex officio:

- The Vice-Chancellor and President, Chairman
- The Registrar, Secretary
- The Executive Vice-President
- The Academic Vice-President
- The Dean and Associate Dean of each Faculty
- The Director of Each School
- The Academic Heads of affiliated or federated Colleges
- The Executive Director of Student Affairs
- The Director of Extension
- The Librarian
- The Head or Chairman of each Department in the Faculties of Arts and Science and Applied Science

### Elected Members:

- Two members from the teaching staff of each Faculty

### Appointed Members:

- Two members appointed by the Alumni Association

# ASSUMPTION UNIVERSITY

Federated with the University of Windsor

## BOARD OF GOVERNORS (1962-1963)

### Members ex officii:

Rev. E. Carlisle LeBel, C.D., C.S.B., M.A., LL.D., Vice-Chancellor and President, *Chairman*

Rev. E. J. McCorkell, C.S.B., M.A., LL.D., Superior

Rev. Hugh Vincent Mallon, C.S.B., M.A., Executive Vice-President.

Rev. E. Arthur Roberts, C.S.B., B.A., S.T.B., Treasurer.

Very Rev. Joseph C. Wey, M.A., Superior-General of the Basilian Fathers.

### Elected Members:

Rev. Norbert J. Ruth, C.S.B., M.A., Dean of Arts and Science and Principal, University College.

Rev. Daniel J. Mulvihill, C.S.B., Ph.D., Vice-President, Development.

Rev. C. P. Crowley, C.S.B., Ph.D., Dean of Graduate Studies.

John W. Whiteside, B.A., Chairman, Essex College Board of Directors.

### Representatives:

One representative appointed by each of the affiliated colleges.

## HOLY REDEEMER COLLEGE

### BOARD OF DIRECTORS

Very Rev. Charles F. DeVine, C.Ss.R., S.S.L., **Principal**, *Chairman*.

Very Rev. George T. O'Reilly, C.Ss.R., *Vice-Chairman*.

Rev. Victor C. Crean, C.Ss.R., *Secretary-Treasurer*.

## CANTERBURY COLLEGE

### BOARD OF DIRECTORS

The Right Reverend George N. Luxton, B.A., B.D., LL.D., D.D.,  
Bishop of Huron, *Chairman*.

Gordon E. Hunt, *President*.

Lt.-Col. George Y. Masson, E.D., F.R.A.I.C., A.I.A., *First Vice-President*.

The Rev. A. D. Munro, B.Comm., *Second Vice-President*.

A. E. Garrioch, *Secretary*.

L. F. Ounsworth, M.Sc., *Treasurer*.

The Ven. M. C. Davies, B.A., Archdeacon of Essex.

The Rev. Canon R. C. Brown, M.A., D.D.

The Rev. Canon R. S. Rayson, M.A., S.T.B., D.D.

Rev. Canon Bertram A. Silcox, B.A., L.Th.

Rev. Canon John H. Whealen, B.A., L.Th.

The Rev. Derwyn D. Jones, B.A., L.Th.

Mrs. Wallace R. Campbell, O.B.E., LL.D.

Luther C. Clarke, B.A.

E. Forbes Geddes, Q.C.

Clifford H. Musson

Warwick Plumb

W. Glyn Rogers

S. J. Stodgell

Robert G. Waldron, B.S.

## OFFICERS OF ADMINISTRATION

(Assumption University of Windsor — 1962-1963)

### Chancellor

His Excellency the Most Reverend John Christopher Cody, D.D.,  
LL.D., Bishop of London.

### Vice-Chancellor and President

Rev. Eugene Carlisle LeBel, C.D., C.S.B., M.A., LL.D.

### Executive Vice-President

Rev. Hugh Vincent Mallon, C.S.B., M.A.

### Vice-President, Development

Rev. Daniel Joseph Mulvihill, C.S.B., Ph.D.

### Dean of Arts and Science

Rev. Norbert Joseph Ruth, C.S.B., M.A.

### Dean of Applied Science

Frank A. DeMarco, Ph.D., F.C.I.C.

### Dean of Graduate Studies

Rev. C. P. J. Crowley, C.S.B., Ph.D.

### Dean of Theology

Rev. D'Arcy Lawrence Egan, C.Ss.R., S.T.L.

### Principal of Holy Redeemer College

Very Rev. Charles Frederick DeVine, C.Ss.R., S.S.L.

### Principal of Canterbury College

The Rev. Canon Robert Spencer Rayson, M.A., S.T.B., D.D.

### Director of the School of Business Administration

Gilbert Richard Horne, Ph.D.

### Director of the School of Nursing

Florence Martina Roach, R.R.C., Reg.N., B.S., R.R.L.

### Director of Extension and Summer School

Rev. Edward Cecil Pappert, C.S.B., Ph.D.

### Registrar

Barbara Helen Birch, M.A.

**Treasurer**

Rev. Edward Arthur Roberts, C.S.B., B.A., S.T.B.

**Accountant**

Joseph E. Schiller, B.A.

**Librarian**

William F. Dollar, M.A., A.M.L.S.; Assistant Librarians: J. Emery Kanyasi, B.Sc., A.M.L.S., Technical Services Division; Albert V. Mate, M.A., A.M.L.S., Humanities and Social Sciences Division.

**Director of Student Affairs and Dean of Men**

Rev. John Alphonse Malone, C.S.B., Ph.D.

**Dean of Women**

Evelyn Grey McLean, B.A.

**Director of Development and Public Relations**

John Edward Thompson, M.C., B.A.

**Alumni Secretary**

Terrance J. Kennedy, B.A.

**Director of Christian Culture Series**

Rev. J. Stanley Murphy, C.S.B., M.A.

**Director of Dramatics**

Daniel Patrick Kelly, M.A.

**Athletic Staff**

Rev. John Michael Hussey, C.S.B., M.A., Chairman, Board of Athletics.

Richard James Moriarty, M.A., Director of Athletics.

Elizabeth Thomson (Mrs. W.), Assistant Director of Athletics (Women).

**Director of the University Centre**

Herbert Wilshire, B.S., M.S.

**Superintendent of Buildings and Grounds**

Charles William Morgan, B.Sc., P.Eng.

# THE UNIVERSITY AND ITS COLLEGES

## LOCATION

The University of Windsor is situated at Windsor, Ontario, on a beautiful hundred-acre campus on the south bank of the historic Detroit River and east of the Ambassador Bridge, which forms a physical link between Canada and the United States.

## EARLY FOUNDATIONS

The University of Windsor traces its origin to the inception of Assumption College, which opened its doors on February 10, 1857. The foundation stone of the first building had been laid on June 17, 1855, largely through the efforts of Father Pierre Point, S.J., pastor of Assumption parish in Sandwich. This parish, established as a mission in 1748 and raised to the dignity of a parish in 1767, is the oldest in Canada west of Montreal. M. Theodule Girardot was the first instructor at "Le College de l'Assomption" in 1857.

The College was incorporated by a public Act of the Legislature of the province of Canada which received Royal Assent August 16, 1858. The Corporation consisted of the Bishop of London and the faculty of the College. The Act gave the corporation "full power to make and establish such and so many rules, orders and regulations (not being contrary to the laws of the country or this Act) as they shall deem useful or necessary, as well concerning the system of education in as for the conduct and government of the said College, and of any other institution or school connected with or dependent on the same" (22 Victoria 136).

This Act was passed during the Superiorship of the Basilian Father, Joseph Malbos, who guided the College for one year. After his departure the Jesuits, the Benedictines, and the secular clergy were in charge successively. Finally the Basilians returned in 1870, and the vigorous administration of Father Denis O'Connor (later Bishop of London, and Archbishop of Toronto) laid the foundations of the steady progress that has continued to this day.

The curriculum consisted originally of the classical and commercial courses. To these Father O'Connor added two years of Philosophy, giving the institution a complete high school and Arts course. For many decades the prime concern of Assumption was preparing students for admittance to theological seminaries, although many of her alumni entered business and professional spheres.

## AFFILIATION WITH THE UNIVERSITY OF WESTERN ONTARIO

Early in the present century more formal institutions were established in the area for the training of the clergy, and hence a change of emphasis came in the purpose and curricula of the College. The change led in 1919 to affiliation with Western University,

London, Ontario (now the University of Western Ontario). By mutual agreement Assumption College became an integral part of the University's Faculty of Arts and Science. From this time on, Assumption students undertook the same courses and examinations as those in other parts of this Faculty, and received their degrees from the University. During the next thirty years the curriculum was broadened to include General and Honours Courses in Arts and Science, leading to Bachelor of Arts and Bachelor of Science degrees, graduate work in Philosophy leading to the Master of Arts degree, as well as pre-professional programs such as pre-engineering, pre-law and pre-medicine. In this way the College was enabled to prepare its students for many walks of life.

## BEGINNING OF CO-EDUCATION

Opportunities for higher education were extended to the women of this area through the opening in 1934 of Holy Names College by the Sisters of the Holy Names of Jesus and Mary, long prominent in local education. From its inception the new College for women was affiliated with Assumption College, which contributed lectures and general supervision. After occupying space for sixteen years in St. Mary's Academy, South Windsor, Holy Names College moved to the main campus of Assumption, which now became co-educational through the merging of the faculties and student bodies of both institutions. In 1962 the Holy Names Sisters withdrew from campus, their residences for women being purchased by Assumption University.

## UNIVERSITY STATUS

In 1953 the Ontario Legislature passed an Act amending the original Act of 1858. This legislation established a new government for the College, consisting of a Chancellor, President, Board of Governors and Senate. It stated further, "The College shall have university powers, including: (a) The power to establish and maintain such faculties, schools, institutes, departments, chairs and courses of instruction as may be determined by the Board; (b) The power to confer university degrees and honorary degrees and awards in any and all branches of learning." As a result, affiliation with the University of Western Ontario came to an end, and Assumption College resumed operation as an independent institution, July 1, 1953.

In June, 1954, the College was admitted to full membership in the National Conference of Canadian Universities, and later the same year, to the University Matriculation Board of Ontario and the Association of Universities of the British Commonwealth. In March, 1956, the Ontario Legislature passed an act which ratified the affiliation of Essex College, and changed the name of Assumption College to Assumption University of Windsor.



## **ASSUMPTION UNIVERSITY OF WINDSOR**

In 1956 the responsibility for the academic work of the University was divided between two corporations. University College, under the direct control of the Board of Governors of the University, retained responsibility for courses in the departments of English, Modern Languages, Philosophy, Religious Knowledge, Economics and Political Science, Psychology, Music, Fine Arts, History, and Home Economics, and relinquished the fields of the natural sciences, Mathematics, Engineering, Business Administration and Nursing to the newly formed Essex College.

Essex College was incorporated in 1954 under the direction of a Board consisting of a representative group of Windsor citizens. In 1956 it affiliated with the University. Operating as a non-denominational institution, Essex College offered courses in Biology, Chemistry, Physics, Mathematics, Geography, Geology; Chemical, Civil, Electrical and Mechanical Engineering; Engineering Physics, Business Administration and Nursing.

## **HOLY REDEEMER COLLEGE**

Holy Redeemer College, the Seminary of the Redemptorist Fathers, was affiliated with the Faculty of Arts and Science in February, 1956, and authorized to give instruction in courses leading to the Bachelor of Arts degree. By an amendment to this affiliation agreement, signed November 30, 1959, the Faculty of Theology was established at the College, and empowered to teach courses leading to the Bachelor of Sacred Theology degree. The College is situated on a large tract of land in South Windsor approximately six miles from the main campus of the University.

## **CANTERBURY COLLEGE**

In November, 1957, Canterbury College, an Anglican liberal arts college, was affiliated with the University and empowered to offer its own courses of instruction in Philosophy, Religious Knowledge and Mediaeval History.

## **THE UNIVERSITY OF WINDSOR**

In order to unify the government of the University under one Board, widely representative of the Windsor community, and to enable the University to expand to meet the needs of the rapidly growing student body by qualifying for grants from the Provincial government, in the Fall of 1962 the Board of Governors of Assumption University, the Board of Directors of Essex College, and the Board of Regents of Assumption University petitioned the Ontario Government for the incorporation of a new University, called the University of Windsor, under a non-denominational Board.

This petition was granted by the passing of the University of Windsor Act 1962-63 by the Ontario Legislature on December 19, 1962.

By the provisions of this Act, Essex College merged with the University of Windsor; Assumption University, while continuing to exist as a corporation, federated with the University of Windsor, and agreed to hold its degree-granting power in abeyance except for degrees in the Faculty of Theology; Holy Redeemer College and Canterbury College affiliated with the new University.

Effective July 1, 1963, the staff and academic departments formerly in the Faculties of Arts and Science, Applied Science and Graduate Studies in Assumption University and Essex College became the initial staff and departments in these same Faculties of the University of Windsor. Thus, the University of Windsor, while new in its foundation and charter, is already old in its traditions and experience.

## GENERAL INFORMATION

### UNIVERSITY LIBRARY

The present University Library was completed in 1958. Modular in plan, it is 90 feet wide, 190 feet long, and four stories high. It provides shelving for 350,000 volumes and has a seating capacity of five hundred. The open stack arrangement follows the modern practice of placing readers among books.

Special library facilities for faculty and students include study carrells in the stack area, browsing and display areas, seminar rooms, faculty studies. A combined audio-visual and lecture room on the third floor provides all necessary audio-visual equipment and seating for 200 persons. Here the Library Science lectures are given and other lectures when 16 mm. films, filmstrips, pictures or book displays are required.

The Library is intended for purposes of reading and serious study; quiet must be observed at all times. Since smoking space has been provided, smoking is not allowed in the reading and reference rooms, seminar rooms or stairways. Failure to maintain a suitable standard of conduct in the Library, or failure to observe any of the Library regulations may lead to cancellation of Library privileges.

### UNIVERSITY CENTRE

The University Centre honours many friends of the University of Windsor who generously contributed to its construction. It is located at the centre of the University campus. In many ways it is the "heart of the campus," because its activities are closely integrated with the interests and activities of the entire University family — students, faculty, alumni, and friends.

It is the goal of the University Centre staff to create a student program which will supplement and implement the University's curriculum. Social and recreational activities, so necessary to the leisure time of students, are balanced with cultural and educational programs to further assist in the intellectual development of students.

The Centre offers faculty and alumni facilities for dining, meetings, social, and cultural activities.

The University Centre contains the University bookstore and provides food service for all students of the University, resident and non-resident. There is also a private dining room for the faculty.

### CHRISTIAN CULTURE SERIES

The University brings each year to the campus a group of distinguished lecturers and artists in its Christian Culture Series. This series, established in 1934, is non-profitting, and is supported

by subscriptions and donations. The University makes this contribution to the cultural life of the Windsor-Detroit area. The Series is under the direction of a member of the faculty of the University.

### RESIDENCE FACILITIES

**Men:** Assumption University offers on-campus residence for students from out-of-town in either of two Residence Halls, St. Michael's Hall and the newly completed Cody Hall, with a combined capacity of approximately 350 students. The University feels that the experience in social living thus obtained is an integral part of contemporary education, and so obliges all students not living at home or with close relatives to live in residence for at least one year. This period may be lengthened at the discretion of the Board of Governors as more facilities become available. In addition, a student from out-of-town receiving any financial award within the jurisdiction of the University is obliged to live on-campus during the academic year for which the award is made. By making application for residence, each student implicitly agrees to abide by all regulations. A copy of the general regulations for resident students is available on request.

**Women:** A residence is maintained by Assumption University on the campus. For details, reservations, etc., contact the Director of Electa Hall, 265 Patricia Road, Windsor, Ontario.

For Senior students, men or women, who wish to live off campus, the University maintains a directory of suitable homes which provide room and board or room only. The directory is available in the office of the Dean of Men or the Dean of Women; each student must live in a house listed in the official directory, and must inform the Dean of his choice of residence and of any subsequent change.

### DISCIPLINE

While student activities are democratically conducted with a view to the personal participation of the students in the actual running of affairs, nevertheless the Senate recognizes its responsibility to maintain discipline and enforce regulations in matters affecting the academic progress and the conduct of students. The Senate delegates the Deans of Faculties as its representatives in matters academic, and the Dean of Men and the Dean of Women as its representatives in all other disciplinary matters.

## General Information

The name of the University may not be used in any publications without the permission of the President. No class or group of students may engage in any public effort as a body representing the University or any organization within the University, without the permission of the President.

The constitution of any proposed club or society must be presented to the Board of Governors for its approval by the Students' Administrative Council before such organization can be recognized.

## STUDENTS' ADMINISTRATIVE COUNCIL

The Students' Administrative Council directs and administers all extra-curricular activities and publications in which the interest of students at the University of Windsor is involved. The Council receives and administers all funds accruing from the fees collected by the University for student activities, and promotes inter-university functions when deemed advisable.

The Students' Administrative Council encourages and subsidizes various clubs and societies which offer opportunities to each student to explore the various realms in which he is especially interested. For the musically inclined there are the Glee Club, the Music Appreciation Society, and occasional Musical Evenings. The University Players present three-act plays and a festival of one-act plays each year, plus minor offerings during the year at various functions. There are also the Law Club with its affiliations with Windsor lawyers and law courts, the German Club, the French Club, the Biology Club, the Chemistry Club, and the Psychology Club.

In addition there are organizations which offer inter-university cooperation such as the United Nations Club, World University Students (W.U.S.), National Federation of Canadian University Students. The students, in cooperation with the faculty and international agencies, have conducted several successful seminars on Canadian-American relations, as well as inter-university model assemblies of the United Nations. To students interested in Journalism, the Student's Council offers a chance for active participation and experience on the school paper, the "Lance," and the Year Book, the "Ambassador." The democratic nature of student activities is well illustrated by the production of these publications. The students control their own finances and are responsible for advertising as well as the newsgathering and literary aspects of publishing.

One of the striking characteristics of this University's life is the close and friendly cooperation of students and faculty on a level which transcends the artificial barriers that sometimes lie between faculty and student on the university level. The intimacy that

results serves to round out and integrate the education that the student receives in the lecture hall.

## HEALTH SERVICES

An infirmary with a nurse and a visiting staff doctor is provided for the administration of first aid and the treatment of minor ills; the Windsor hospitals are also available for more serious ailments.

Prior to initial registration, each full-time student is required to submit, on a personal health record form, provided by the Registrar's office, a certificate of medical examination performed by his family physician. No student may participate in any athletic activities unless his physician has certified his physical fitness.

The University is not responsible for expenses incurred as the result of injuries sustained by students while participating in athletic activities. Information regarding available accident insurance may be had on request from the Treasurer's office.

## INSURANCE

All students from out of town, whether in residence or living off campus, must have hospital insurance. They must present proof of such insurance before admission or sign a document relieving the University of responsibility in case of illness.

Students who are not from Canada or from the United States must have complete insurance as provided by World University Service.

## EMPLOYMENT AND PLACEMENT

A placement bureau provides assistance in the obtaining of summer work and permanent employment upon graduation, and to a limited extent part-time employment during the academic year. The Student Placement Bureau cooperates closely with the Civil Service Commission of Canada and the National Employment Service, which appoints a Placement Officer on campus.

The University recognizes that some students must supplement their income by part-time employment during the academic year; it wishes to point out, however, that unless such employment is kept to a minimum, both the student's health and academic standing may suffer. In any case students who must work long hours do not derive full benefit from their university experience and may be required to take a reduced program of studies. A student in such circumstances would be better advised to obtain a loan, or alternatively to postpone his university education until such time as he can afford to devote his full time to the many facets of university life.

## COUNSELLING AND GUIDANCE

Each student on registration is assigned a member of the staff as a counselor, who is prepared to give advice on academic matters. Students are free to approach any member of the administrative or instructional staff of the University regarding their education programs, their choice of careers, and their own personal problems. The Psychology department in particular is prepared to offer technical assistance in vocational guidance. Lectures on specific occupational fields are arranged from time to time.

Each new student in the regular winter session may be required, in addition, to take scholastic aptitude tests, as part of the counselling and guidance program, at a time and place designated by his Dean. In the event that a student fails to appear for such tests he may be required to take them at a later date at his own expense.

## RELIGIOUS ACTIVITIES

A traditional feature of education at this University is the vitalising influence of religion in the life of the students. Students are encouraged to practise their religion. Religious services and organizations are provided for specific groups.

Catholic students are encouraged to attend Mass daily in Assumption University Chapel at 12:00 noon, and in Assumption Church at 5:00 p.m. They may also participate in the activities of the Legion of Mary and the Sodality.

The Canterbury Club and the United Church Club foster the religious programs of the Anglican and United Church students respectively.

## ATHLETIC FACILITIES

The athletic program offers a varied array of intramural and intercollegiate athletics. Eighteen intramural sports in all are offered: Fall program — golf, tennis, track and field, sailing, football, soccer; Winter program — hockey, curling, bowling, basketball, water-polo, swimming, judo, weightlifting, fencing, ping-pong and badminton. Championship intramural teams participate in the International Extramural Conference against representatives from the University of Detroit, Detroit Institute of Technology, and Lawrence Institute of Technology.

In the intercollegiate field, University teams participate in golf, tennis, sailing, track and field, badminton, curling and basketball. Assumption is a full-time member of the Ontario-Quebec Athletic Association, competing with the University of Western Ontario, the University of Toronto, McMaster University, Queen's University and McGill University. Within the framework of the

Ontario Intercollegiate Athletic Association, University teams meet representatives from McMaster, Waterloo, Osgoode, Ontario Agricultural College, Royal Military College, and Ryerson.

St. Denis Hall, the athletic building, houses one of the finest gymnasiums in Canada, with a 90 x 50 basketball court and seating capacity for upwards of 3,000 spectators. Its efficient facilities enable the University to continue as one of the country's leading basketball powers. Equipment is available for weightlifting, badminton, volleyball and judo. A large swimming pool and convenient dressing rooms are available to the students. The campus provides ample space for football, tennis and other sports. These athletic facilities are augmented by the off-campus use of nearby bowling alleys and the Windsor Hockey Arena.

For women on campus, there is an extensive intramural program consisting of basketball, swimming, bowling, tennis, badminton and volleyball. Intercollegiate competition is undertaken with other Ontario universities.

## MILITARY TRAINING

Students may apply for training in one of the three Armed Services: the University Naval Training Division, the Canadian Officers' Training Corps, and the RCAF University Squadron. Suitable candidates for each service will be trained for commissioned rank.

Under the ROTP, undergraduates who are successful applicants are enrolled in the service of their choice, as Naval Cadets in the Royal Canadian Navy, Officer Cadets in the Canadian Army, and Flight Cadets in the Royal Canadian Air Force. For further information, students are urged to apply to the service of their choice:

### University Naval Training Division

Lt. Commander C. John Metcalfe, R.C.N.(R), B.A., Commanding Officer.

Lt. Commander W. J. Waldron, R.C.N., Staff Officer.

Lt. Robert M. Ryall, R.C.N., Supply Officer.

### Canadian Officers Training Corps

Major P. A. Deneau, B.A., Officer Commanding.

Capt. G. S. Kells, B.A., Resident Staff Officer.

Capt. G. A. Mascaro, B.A., Training Officer.

### Royal Canadian Air Force University Squadron

S/L W. G. Benedict, B.S.A., Ph.D., Faculty Air Force Representative U. of W.

F/L G. F. Loucks, Staff Officer, U.W.O.



# FEES AND FINANCIAL AID

## FEES

Fees are subject to change without notice. All fees are for the academic year, except where otherwise indicated.

### Full Time

The following schedule lists the minimum amounts payable, including registration, tuition, library, laboratory, examination, graduation, university centre and student activities fees.

Engineering .....	\$550.00
All other courses (undergraduate).....	465.00
(graduate).....	412.50

### Part Time Day (undergraduate or graduate)

Tuition, per hour of instruction a week.....	35.00
Science laboratory fee, per subject.....	30.00
Language laboratory fee, per subject.....	10.00
Psychology laboratory fee, per subject.....	10.00

### Miscellaneous fees (payable by all students as incurred)

Late Registration: Full-time.....	20.00
Part-time.....	5.00
Graduation "in absentia" .....	10.00
Civil Engineering Camp C.E. 401.....	50.00
Special and supplemental examination, per subject:	
Regular time and place.....	10.00
Outside regular time and/or place.....	20.00
Change of course.....	2.00
Transcript of record (Official).....	1.00
(Unofficial).....	.50
Evaluation of documents .....	10.00

Non-resident fee (applies to all foreign students except those whose parents have taken up permanent residence in Canada)

\$20 per subject to a maximum of.....	\$100.00
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- N.B. (i) Any student taking four courses or more will be charged the fee for full time attendance.
- (ii) Graduate students do not pay Student Administrative Council fees. Part-time graduate students pay appropriate fees each year; part-time graduate students will not, however, pay more nor less in total than they would have paid if they had proceeded towards degrees as full-time students.

**Residence Fees**

Room and Board, per academic year:

Women's Residence - private room.....	\$715.00
double room .....	700.00
Men's Residence.....	700.00

An extra charge of \$15 is made if the residence fee is paid in two instalments.

Each student who wishes to live on campus must send to the Office of the Director of Residence prior to September 1st a deposit of \$25, which will be used as a caution fee. A deposit will be refunded if the reservation is cancelled prior to September 1st.

The Residence Council has a right to place a levy against the caution fee for the social and miscellaneous needs of the residences.

A student who withdraws from residence during the academic year may receive a refund only when such withdrawal is occasioned by circumstances beyond the control of the student and has the prior approval of the Dean of Men or of the Dean of Women.

**Payment of Bills**

Unless otherwise requested, the University presents its bills directly to the student, who assumes responsibility for their payment when due. All fees for the academic year are due and payable on the first day of registration. However, on special arrangements with the Treasurer's Office, fees may be paid in two instalments. A carrying charge is made of \$5.00 for full-time students, or \$2.00 per subject for part-time or evening division students. The first instalment is due at the time of registration; the second instalment on January 7, 1964, without further notice. ONE PER CENT PER MONTH, OR ANY PART THEREOF, WILL BE CHARGED IN

## **Fees**

**ADDITION TO THE ABOVE CARRYING CHARGES ON ALL OVERDUE ACCOUNTS. REGISTRATION MAY NOT BE COMPLETED UNTIL FEES ARE PAID OR THE ABOVE SPECIAL ARRANGEMENTS MADE WITH THE TREASURER'S OFFICE.**

Failure to pay an outstanding account will bar a student from writing examinations or obtaining credits for previous work.

A reduction is made in the tuition fees of brothers and sisters attending the University simultaneously as full-time students.

## **Withdrawal and Refund Policy**

Students who are forced to withdraw from a course or from the University, are required to notify the Registrar in writing and to give their reasons for withdrawal. The obligation of teaching and accommodating a student rests on the University on a yearly basis. Hence:

- (1) All tuition credits or refunds shall be made entirely at the discretion of the university.
- (2) Credits or refunds will be made in the following cases only:  
(a) Cash refunds may be granted in cases where students are compelled to withdraw on account of serious and continued personal illness. (b) Cash refunds may also be granted in cases where the student is compelled to withdraw for other personal reasons provided these are satisfactory to the University authorities.
- (3) The portion of the fee refunded is determined by the date application for refund is received in the Registrar's Office—NOT THE DATE OF WITHDRAWAL. If the application is made during the first week of the semester, a refund of 90% of the semester fees will be returned; during the second week, 80%; during the third week, 60%; during the fourth week, 40%. After the fourth week of each semester no refund will be given. Cheques for refunds will be available only six weeks after withdrawal.

## POSTGRADUATE AWARDS

**Fellowships** — A number of fellowships varying in value from \$500 to \$2,500 are available for graduate students. For details, consult the Dean of Graduate Studies or the Head of the department concerned.

**Assistantships** — A number of assistantships varying in value from \$1,500 to \$2,500 are available for graduate students. For details, consult the Dean of Graduate Studies or the Head of the department concerned.

**The Canadian Federation of University Women Fellowships** — For information and application forms consult the Registrar's Office.

**National Research Council Bursaries and Studentships** — These are awarded in open competition to students in the fields of Biology, Chemistry, Physics, Geology, Mathematics, Engineering and Experimental Psychology. The bursaries, valued at \$2,000 for twelve months, are normally awarded to applicants who have had no postgraduate research experience. The studentships, valued at \$2,400 for twelve months, are awarded to applicants who have had at least one year's graduate research experience. Application should be made directly to the National Research Council in consultation with the department concerned, before February 1. Further information may be obtained from the Awards Officer, National Research Council, Ottawa 2, Ontario, or from the appropriate department.

**The Province of Ontario Graduate Fellowships** — A number of fellowships varying in value from \$1,500 to \$2,000 will be provided by the Government of Ontario to graduate students who plan careers in university teaching. For details consult the Dean of Graduate Studies.

For detailed information regarding fellowships and scholarships open to graduates of the University of Windsor in Canada and abroad the following publications may be consulted in the Registrar's Office:

**Awards for Graduate Study and Research**

(Dominion Bureau of Statistics)

**Canadian Universities and Colleges**

(National Conference of Canadian Universities and Colleges)

**United Kingdom Postgraduate Awards**

(The Association of Universities of the British Commonwealth)

**Study in France**

(French Embassy, Ottawa)

**Study Abroad**

(United Nations Educational, Scientific and Cultural Organization)

## ACADEMIC INFORMATION

1. **Admission requirements:** A candidate for the Master's Degree must be a graduate of a recognized college or university with a good academic record (B standing or its equivalent) in his major subject. Graduates of this or other recognized colleges or universities may be accepted as candidates for the degree after they have presented to the Committee on Admissions for Graduate Studies official evidence of graduation and have satisfied the Head of the Department concerned as to their qualifications. Students lacking such qualifications may be admitted under such conditions as the Graduate Committee on Admissions may determine.

An applicant who wishes to transfer at any level from another college or university must arrange for a complete transcript of his record and a statement of honorable dismissal to be sent to the Registrar directly by each institution previously attended.

An applicant who has attended another college or university and who is not eligible to re-register therein may not be admitted to this University.

Every student will be required to complete at least one full year or the equivalent at this University, including at least two courses in his major field, before qualifying for a degree.

A student whose mother tongue is not English will be required to take the Michigan English Language Institute test as part of his requirements for application.

### 2. **Application:**

Each person seeking admission to the University should apply to: The Registrar,  
The University of Windsor,  
400 Huron Line,  
Windsor, Ontario, Canada.

The Registrar will send the appropriate forms which should be filled out and returned.

In the case of those seeking admission to the regular winter session, this should be done prior to July 1. Earlier application, however, is strongly recommended.

Students who do not have the recommended requirements for regular admission to their program will not be given consideration after September 1; therefore all required documents must be in the Registrar's Office before that date.

A student from outside continental North America must have his application complete and in the Registrar's Office before July 1.

**3. Change Of Registration:** Once a student has registered, he may not change his course, or add or drop subjects without permission from his Dean, or, in the case of students in the Extension Division, without permission of the Director of Extension. The student must notify the Registrar's Office and the instructor(s) concerned of the change that has been approved, before the change becomes effective.

If any change in fees, or refunds, are involved the student will also see the Cashier's Office. (see page 24).

Any subject dropped without the permission of the Dean will be regarded as a failure.

Students who are forced to withdraw from the University or from a course must notify the Registrar's office in writing, giving the reason for the withdrawal.

**4. Period of Study:** The duration of the course will be adjusted individually for each candidate. A minimum of one year in residence will be required of candidates who have graduated from Honours courses. For graduates of general courses and Honours courses in areas other than the graduate specialization desired, a minimum of two years will be required. The content of the first year, which will usually consist of undergraduate courses, will be determined in consultation with the Head of the Department concerned. If more than six hours a week are spent in teaching or other departmental duties, additional time will be required.

**5. Course of Study:** The choice of subjects must be approved by the Head of the Department in which the student is majoring and by the Dean of Graduate Studies. Each graduate student may be required to undergo training in methodology at the discretion of the Department.

Within one month after a candidate's registration, the Head of his Department shall appoint his committee, to consist of his chief advisor, as chairman, and two others (one of whom shall belong to a department other than the one in which the student is majoring). The Head of the Department will then report to the Faculty Council on the composition of each candidate's committee.

Copies of the candidate's prospectus (outlining the subject of the proposed research) shall be submitted to the Head of his Department and to the Faculty Council at least six months before he proposes to take his final examination.

If a candidate does not maintain a satisfactory standing in all his work, his committee may at any time recommend that he discontinue his course.

**6. Language requirements:** It is essential that the candidate for the Master's Degree in Arts or in Science have a reading knowledge of at least one language other than English. The language shall be chosen in consultation with the Head of the Department in

which the student is majoring. The candidate must furnish evidence of such reading knowledge by passing an examination conducted by the language department concerned at the commencement of the student's graduate studies. If the nature of a candidate's research makes it desirable, a department may require him to show reading knowledge of a second foreign language.

7. **Thesis:** A thesis, incorporating the results of an investigation in the field of the major subject, is required of candidates for the M.Sc. degree in Biology, in Chemistry, and in Experimental Physics, and of candidates for the M.A. degree who have chosen the first course of studies mentioned below.

The candidate, when requested, shall submit to his chief advisor from time to time portions of his thesis and a complete draft on a date specified by his advisor. He shall make final revisions demanded by his advisor or committee and place THREE typewritten copies of the completed thesis (FOUR copies for M.Sc. candidates) in the hands of his advisor FOUR weeks before convocation. The members of the candidate's committee should sign the thesis, when approved, on a page immediately following the title page. He shall submit with his thesis three (or four) copies of an abstract of not more than three hundred words and three (or four) copies of a vita. The abstract will be bound with the thesis immediately following the certificate of approval; the vita at the end of the work. The candidate should consult the University Librarian regarding its form.

The Head of the Department, in consultation with the chairman of the candidate's committee, may request that a thesis be read by an external examiner.

Candidates will be provided with definite instructions regarding approved methods of typewriting, bibliography, footnotes, etc. An acceptable format may be consulted in the University Library. The regulations of the Library as to binding, quality of paper, title page and margins must be fulfilled. Arrangements for binding copies of the thesis shall be made by the candidate with the Librarian and the fee of \$4.00 a copy for binding paid to the Library. If the candidate wishes to have an additional copy bound for his own use, the Librarian will make the necessary arrangements on the payment of an additional \$4.00.

If approved, the thesis shall become the property of the University. Two copies of the thesis, the original and the first carbon copy, will be filed in the University Library and one copy (or two copies) in the Department.

The regulations contained herein concerning the thesis apply, *mutatis mutandis*, to the major paper required of candidates.

8. **Examinations:** A department may require oral or written examinations or both and may decide in the case of the individual candidate the type of examination required. A department may, at its discretion, require a comprehensive examination.

Notice of the type of examination shall be given by the Head of the Department to the candidate at least two months before the date on which the examination is to be held.

Each candidate who writes a thesis or major paper shall be required to appear before the Faculty Council of Graduate Studies for an oral examination on his thesis or major paper. The candidate's committee will conduct the oral examination with the committee chairman acting as chairman of the examination. A candidate must obtain a standing of at least 66% on his thesis as well as on all written and oral examinations in his major subjects. A candidate for the Master's degree who does not obtain 66% in any course may repeat the course once only, and he may not repeat more than one course.

The Master's degree with Honours may be granted to a candidate on the recommendation of the committee in charge of the candidate's research and with the approval of the Faculty Council of Graduate Studies. It will be granted not on the basis of any specific percentage but only in recognition of outstanding achievement.

9. **Conduct of Students during Examinations:** A candidate writing an examination will write on the paper provided for him; he may not talk to another candidate; he may not copy from another nor allow another to copy from him; he may not bring into the examination room any printed or written material (except such aids as may be specifically permitted for a candidate writing a particular subject).

Any violation of these rules will be regarded as a serious offence, and may lead to the cancellation of the paper(s) of the offending student and even to his expulsion from the University.

10. **Appeals:** (i) **Aegrotat Standing:** A student who wishes to receive consideration on account of serious illness or bereavement or other grave reason prior to or during the examination should communicate with the Registrar's office before the close of the examination period and should submit supporting documents (e.g., a medical certificate) within a week. In such cases



the Committee on Academic Standing may grant standing in the subject or subjects concerned on the basis of the term mark alone.

(ii) **Other Appeals:** While all papers in failed subjects are re-read before the grades are submitted to the Registrar's office, and every care is taken to record marks accurately, any student who considers that some factor affecting the final mark on the examination was not considered by the examiner, may appeal to have the subject reviewed. This request should be submitted in writing to the Registrar's office within two weeks of the official publication of student grades, together with a fee of \$10.00. In the event that the grade is changed as a result of the appeal, the fee will be refunded.

Appeals should be addressed to the Secretary of the appropriate Faculty Council, and sent to the Registrar's office.

11. **Graduation:** In order to allow the necessary time for the printing of the diploma and the Convocation program, the candidate's completed work must be approved by the Faculty Council of Graduate Studies and his thesis accepted by the Library two weeks before Convocation.

Registration in any program does not constitute an application for a degree or diploma.

An official application for graduation must be filled out and filed in the Registrar's Office 30 days prior to the Convocation at which the applicant hopes to graduate.

In cases in which credit is sought for work done elsewhere, official transcripts or other documentary evidence required by the Registrar's Office, not already submitted, must be conveyed to the Registrar's Office prior to the same date. Failure to comply with these regulations will disqualify the student for graduation at the Convocation concerned.

Each prospective graduate must be present in person at Convocation in order to receive his degree, unless excused for a serious reason by his Dean, and unless arrangements have been made with the Registrar to receive the degree in absentia.

12. **Fees:** Before a candidate is eligible for his degree he must have paid his complete tuition fee, and the fee of \$4.00 a copy to the Library for the binding of his thesis.

13. **Departmental Regulations:** The various departments of the University may enforce additional regulations which have been approved by the Faculty Council of Graduate Studies. See pp. 38 ff for these particular requirements.

### Regulations for the Doctor's Degree

For particular requirements for the degree of Doctor of Philosophy, see pp. 45, 52 and 59.

## THE FACULTY OF GRADUATE STUDIES

### Faculty Council

The Dean of Graduate Studies, **Chairman**; the **President**; the **Executive Vice-President**; the **Registrar**; the **Dean of each Faculty** and **Director of each School** offering a graduate program; one representative from each department of the University which offers graduate work, as follows:

G. R. Horne, Ph.D. **Director of the School of Business Administration.**

Maurice Adelman, Ph.D., Professor and Head, Department of **Chemical Engineering.**

W. G. Benedict, Ph.D., Associate Professor of **Biology.**

L. L. Campbell, Ph.D., Associate Professor of **Mathematics.**

V. C. Chrypinski, Ph.D., Associate Professor of **Political Science.**

W. G. Colborne, M.Sc., Associate Professor and Head, Department of **Mechanical Engineering.**

J. N. Deck, Ph.D., Assistant Professor of **Philosophy.**

Rev. R. C. Fehr, C.S.B., Ph.D., Associate Professor and Head Department of **Psychology.**

H. R. Fletcher, M.A.Sc., Assistant Professor and Head Department of **Electrical Engineering.**

H. P. Herbich, D.Sc., Professor and Head, Department of **Civil Engineering.**

H. H. G. Jellinek, Ph.D., Professor and Head, Department of **Chemistry.**

Lucjan Krause, Ph.D., Associate Professor and Head, Department of **Physics.**

Rev. D. J. Mulvihill, C.S.B., Ph.D., Professor and Head, Department of **History.**

J. F. Sullivan, Ph.D., Associate Professor of **English.**

### Admissions Committee (Arts, Science, Commerce):

The Dean of Graduate Studies, the Dean of Arts and Science, the **Executive Vice-President**, the **Registrar**, the **Head of the Department concerned**, or delegate.

### Admissions Committee (Applied Science):

The Dean of Graduate Studies, the Dean of Applied Science, the **Executive Vice-President**, the **Registrar**, the **Head of the Department concerned** or delegate.

**Officers of Instruction**

(The year of first appointment to the University is given).

- John Abramowich; B.Sc. (Alberta), M.A. (Toronto), Ph.D. (California). Assistant Professor of Mathematics—1960.
- Maurice Adelman; B.A.Sc. (Toronto), M.A.Sc. (ibid.), Ph.D. (ibid.). Professor and Head, Department of Chemical Engineering—1956.
- Rev. Elliot B. Allen, C.S.B.; B.A. (Toronto), M.A. (ibid.), M.S.L. (Pont. Inst. of Med. Studies), Ph.D. (Toronto). Associate Professor of Philosophy—1962.
- Haralambos A. Apostolopoulos; B.Civ.Eng. (Minnesota), M.S.C.E. (ibid.). Assistant Professor of Civil Engineering—1960.
- Lucio Artiaga; B.A. (Zaragoza), M.Sc. (Dalhousie). Assistant Professor of Mathematics—1962.
- George Borys Babiy; B.Sc. (Manitoba), M.Sc., M.E. (ibid.). Assistant Professor of Mechanical Engineering—1960.
- Winfred Gerald Benedict; B.S.A. (Toronto), Ph.D. (ibid.). Associate Professor of Biology—1957.
- Robert Gordon Billinghamurst; B.A.Sc. (Toronto), M.A.Sc. (ibid.). Associate Professor of Chemical Engineering—1957.
- Cecil Mackintosh Birch; B.A. (Western Ontario), M.A. (Toronto), Ph.D. (ibid.). Associate Professor of Business Administration—1959.
- Rev. Frank John Boland, C.S.B.; B.A. (Toronto), M.A. (Detroit), Ph.D. (Ottawa). Associate Professor of History—1955.
- John Maxwell Brownlie; B.A. (Western Ontario), M.B.A. (Michigan). Assistant Professor of Business Administration—1958.
- \*Rev. John Francis Callaghan, C.S.B.; B.A. (Toronto), M.A. (ibid.). Assistant Professor of Economics—1957.
- Louis Lorne Campbell; B.Sc. (Manitoba), M.S. (Iowa State College), Ph.D. (Toronto). Associate Professor of Mathematics—1958.
- Vladimir Bohdan Cervin; B.A. (Vienna), B.Sc. (ibid.), D.S.S. (Brussels), Ph.D. (Prague). Associate Professor of Psychology—1961.
- Eric Wyllis Channen; B.A. (Hons.) (Toronto), Ph.D. (ibid.). Assistant Professor of Chemistry—1960.
- \*On leave, 1962-63.

## Graduate Studies — Faculty

- Vincent Casmere Chrypinski; M.L. (Catholic U. of Lublin (Poland)), M.A. (Wayne), Ph.D. (Michigan). Associate Professor of Political Science—1957.
- William George Colborne; B.Sc. (Queen's), M.Sc. (ibid.). Associate Professor and Head, Department of Mechanical Engineering—1958.
- Rev. Cornelius Patrick Joseph Crowley, C.S.B.; B.A. (Toronto), M.A. (Michigan), Ph.D. (ibid.). Dean of Graduate Studies, 1959. Professor and Head, Department of English—1944.
- Gabriel Tibor Csanady; Dipl.Ing. (Munich), Ph.D. (N.S.W.U.T.). Associate Professor of Mechanical Engineering—1961.
- Stanley B. Cunningham; B.A. (Manitoba), M.A. (Toronto). Lecturer in Philosophy—1961.
- John Norbert Deck; B.A. (Western Ontario), M.A. (ibid.), Ph.D. (Toronto). Assistant Professor of Philosophy—1957.
- Robert Joseph Doyle; B.A. (Western Ontario), M.A. (ibid.), M.S. (Michigan State), Ph.D. (Wayne State). Associate Professor of Biology—1948.
- Douglas Donald Duquette; B.A. (Western Ontario), M.S. (Michigan State), B.S. (ibid.). Assistant Professor of Civil Engineering—1952.
- Hermes Andrew Eliopoulos; B.Sc. (Salonika, Greece). M.Sc. (McGill), Ph.D. (Toronto). Associate Professor of Mathematics—1956.
- Zbigniew Marian Fallenbuchl; B.Sc. (London), M.A. (Montreal), Ph.D. (McGill). Associate Professor of Economics and Acting Head, Department of Economics and Political Science—1959.
- John Kevin Anthony Farrell; B.A. (Western Ontario), M.A. (ibid.), Ph.D. (Ottawa), F.R.S.A. Assistant Professor of History—1962.
- Rev. Donald Thomas Faught, C.S.B.; B.A. (Toronto), M.A. (Michigan). Associate Professor and Head, Department of Mathematics—1954.
- Rev. Robert Charles Fehr, C.S.B.; B.A. (Toronto), M.A. (Detroit), Ph.D. (Fordham). Associate Professor and Head, Department of Psychology—1951.
- Harold Ross Fletcher; B.A.Sc. (Toronto), M.A.Sc. (ibid.). Assistant Professor and Head, Department of Electrical Engineering—1958.
- Patrick Francis Flood; B.A. (Western Ontario), M.A. (ibid.). Associate Professor and Head, Department of Philosophy—1945.

- John Blake Gertz; B.S. (Detroit), M.B.A. (Ohio State). Assistant Professor of Business Administration—1957.
- William John Gillen; B.A., M.A. (Toronto). Assistant Professor of Economics—1959.
- Alex William Gnyp; B.A.Sc. (Toronto), M.A.Sc. (ibid.), Ph.D. (ibid.). Associate Professor of Chemical Engineering—1958.
- Joseph Martin Graham; B.A. (Western Ontario), M.A. (ibid.), Ph.D. (Notre Dame). Assistant Professor of Philosophy—1959.
- Rev. Alexander John Grant, C.S.B.; B.A. (Toronto), M.A. (St. Bonaventure). Professor and Head, Department of Biology—1945.
- Edwin Emile Habib; B.Sc. (Birmingham), Ph.D. (McMaster). Assistant Professor of Physics—1959.
- Wilfred Hanson; B.Comm. (Saskatchewan), M.B.A. (Western Ontario). Assistant Professor of Business Administration—1958.
- James Paul Hartt; B.A.Sc. (Toronto), O.L.S., M.S.C.E. (Wayne State). Assistant Professor of Civil Engineering—1958.
- Nigel Edward Hedgecock; B.A. (British Columbia), M.A. (ibid.), Ph.D. (McMaster). Assistant Professor of Physics—1961.
- Henryk Pawel Herbich; Dipl. Ing. (Warsaw), D.Sc. (Eng.) (Edinburgh). Professor and Head, Department of Civil Engineering—1959.
- William John Holland; B.Sc. (Queen's), M.Sc. (Wayne), Ph.D. (ibid.). Assistant Professor of Chemistry—1960.
- Frank Holuj; B.Sc. (London, England), M.Sc. (McMaster), Ph.D. (ibid.). Assistant Professor of Physics—1961.
- Gilbert Richard Horne; B.A. (Western Ontario), M.A. (Michigan), Ph.D. (ibid.). Professor and Director, School of Business Administration—1931.
- Rev. Arthur Robert Howell, C.S.B.; B.Sc. (Saskatchewan), S.T.B. (St. Michael's, Toronto), M.A.Sc. (Toronto). Assistant Professor of Mechanical Engineering—1958.
- Hwei Piao Hsu; B.S. (National Taiwan U.), M.S. (Case Inst. of Technology), Ph.D. (ibid.). Assistant Professor of Electrical Engineering.
- John Huschilt; B.A. (Toronto), M.A. (ibid.), Ph.D. (Wayne State). Assistant Professor of Physics—1953.

Graduate Studies — Faculty

- Hu Hsien Hwang; B.Sc. (National Chiao-Tung (Shanghai)), M.S. (Lehigh), Ph.D. (ibid.). Assistant Professor of Electrical Engineering—1959.
- Hans H. G. Jellinek; Ph.D. (London, Imperial College), Ph.D. (Cambridge). Professor and Head, Department of Chemistry—1959.
- Surindra Nath Kalra; B.Sc. (Panjab), M.S. (Illinois), Ph.D. (ibid.). Associate Research Professor of Electrical Engineering—1962.
- Rev. George Watka Kosicki, C.S.B.; B.A. (Western Ontario), M.S. (Michigan), Ph.D. (ibid.). Assistant Professor of Chemistry—1956.
- Ihor Koszman; B.A. (Columbia), B.S. (ibid.), M.S. (Johns Hopkins), D.Eng. Sc. (ibid.). Assistant Professor of Chemical Engineering—1961.
- Aranka Eve Kovacs; B.A. (McMaster), M.A. (Toronto), Ph.D. (Bryn Mawr). Assistant Professor of Economics—1961.
- Lucjan Krause; B.Sc. (London, England), M.A. (Toronto), Ph.D. (ibid.), A.Inst.P. Associate Professor and Head, Department of Physics—1958.
- Calvin Charles Kuehner; B.Sc. (Ohio State), M.Sc. (ibid.), Ph.D. (ibid.). Associate Professor of Biology—1958.
- Eugene D. LeMire; Ph.B. (Detroit), M.A. (ibid.), Ph.D. (Wayne State). Assistant Professor of English—1962.
- Howard Douglas McCurdy; B.A. (Western Ontario), B.Sc., M.Sc. (Michigan State), Ph.D. (ibid.). Assistant Professor of Biology—1959.
- Eugene Joseph McNamara; A.B. (DePaul), M.A. (ibid.). Assistant Professor of English—1959.
- Rev. John Alphonse Malone, C.S.B.; B.A. (Western Ontario), M.A. (Toronto), Ph.D. (Fordham). Associate Professor of Psychology—1959.
- Mary J. Manley; B.A. (Western Ontario), M.A. (Yale), Ph.D. (ibid.). Associate Professor of English—1952.
- Sr. Marian Dolores, S.N.J.M.; B.A. (Marylhurst), M.A. (Loyola, Chicago), Ph.D. (ibid.). Visiting Professor of Psychology—1959.

- Reginald Albert Moore; B.Sc. (McMaster), M.Sc. (ibid.), Ph.D. (Alberta). Assistant Professor of Physics—1962.
- Marie Lucille Moss; B.S. (Nebraska), M.S. (Minnesota). Assistant Professor of Biology—1955.
- Rev. Daniel Joseph Mulvihill, C.S.B.; B.A. (Western Ontario), M.A. (Michigan), Ph.D. (ibid.). Vice-President, Development. Professor and Head, Department of History—1942.
- T. D. Nainan; B.Sc. (Travancore), M.Sc. (Bombay), Ph.D. (Indiana). Assistant Professor of Physics—1961.
- Ralph Carl Nelson; B.A. (DePaul), M.A. (ibid.), Ph.D. (Notre Dame). Assistant Professor of Philosophy—1961.
- Robert Joseph Niedzielski; B.S. (Aquinas), M.S. (Illinois), Assistant Professor of Chemistry—1962.
- Rev. John Patrick O'Meara, C.S.B.; B.A. (Toronto), M.A. (Wayne State), Ph.D. (Ottawa). Associate Professor of History—1959.
- George Arthur Padley; B.A. (Leeds), Dip.Ed. (ibid.), D. de l'U. (Paris). Assistant Professor of English—1960.
- Rev. Edward Cecil Pappert, C.S.B.; B.A. (Toronto), M.A. (Detroit), Ph.D. (Ottawa). Director of Extension, 1958. Assistant Professor of English—1950.
- Michael Luke Petras; B.Sc., M.Sc. (Notre Dame). Assistant Professor of Biology—1956.
- Brother Roger Philip, F.S.C. (William James Overend); B.A. (Toronto), M.A. (ibid.), Ph.D. (Catholic U. of America). Professor Emeritus of Psychology—1956.
- \*William Gregory Phillips; B.A. (Toronto), M.A. (ibid.), Ph.D. (ibid.). Professor of Economics and Head, Department of Economics and Political Science—1950.
- Stanley James Whitworth Price; B.A. (British Columbia), M.Sc. (ibid.), Ph.D. (Edinburgh). Assistant Professor of Chemistry—1959.
- Rev. Maurice Adrian Record, C.S.B.; B.A. (Western Ontario), M.A. (Toronto). Associate Professor of Psychology—1952.

\*On leave, 1962-63.

### Graduate Studies — Faculty

Kenneth Gerald Rutherford; B.A. (Western Ontario), Ph.D. (Wayne State). Associate Professor of Chemistry—1958.

Alfred Arthur Smith; B.A. (Queen's), M.A. (ibid.), Ph.D. (McGill). Associate Professor of Psychology—1959.

John Francis Sullivan; B.S. (Detroit), M.A. (ibid.), Ph.D. (Michigan). Associate Professor of English—1958.

Roger Joseph Thibert; B.A. (Western Ontario), M.S. (Detroit), Ph.D. (Wayne State). Associate Professor of Chemistry—1953.

Paul Alexander Vivian Thomas; B.Sc.Eng. (London), Ph.D. (Glasgow). Associate Professor of Electrical Engineering—1962.

Chi Tien; B.S. (National Taiwan U.), M.S. (Kansas State), Ph.D. (Northwestern). Assistant Professor of Chemical Engineering—1959.

Henry J. Tucker; B.Eng. (McGill), M.Eng. (ibid.). Assistant Professor of Mechanical Engineering—1960.

Arie van Wijngaarden; B.Sc. (McMaster), Ph.D. (ibid.). Assistant Professor of Physics—1961.

Sadanand Verma; B.Sc. (Patna), M.Sc. (Bihar), Ph.D. (Wayne State). Assistant Professor of Mathematics—1959.

Milorad Nicolas Vuckovic; B.A., M.A. Lecturer in History—1960.

Walter LeRoy White, D.F.C.; B.A. (Western Ontario), M.A. (Toronto). Associate Professor of Political Science—1956.

Tze Sun Wu; B.S. (National Chiao-Tung, Shanghai), M.S. (Washington), Ph.D. (Illinois). Associate Professor of Civil Engineering—1957.

Elias Zakon; Mgr. Phil. (Stefan Batory U., Wilno), Dr. Jur. (ibid.). Associate Professor of Mathematics—1957.

Michael Zin; B.Comm., M.B.A. (Michigan), Ph.D. (ibid.). Associate Professor of Business Administration—1956.



DEPARTMENT OF ECONOMICS AND POLITICAL SCIENCE

- Professor: \*W. G. Phillips, Ph.D.
- Associate Professor: V. C. Chrypinski, Ph.D.  
Z. M. Fallenbuchl, Ph.D.  
W. L. White, M.A.
- Assistant Professors: \*Rev. J. F. Callaghan, C.S.B., M.A.  
W. J. Gillen, M.A.  
A. E. Kovacs, Ph.D.

\*On leave, 1962-63.

*The Master of Arts Degree*

At the graduate level students will be expected to specialize in either Economics or Political Science. With the consent of the Department, however, a student specializing in either one of these fields may be permitted to take one graduate course in the other.

The graduate credit courses do not necessarily cover all of the material required for the Comprehensive Oral Examination. In addition all candidates are expected to prepare themselves, under the direction of a member of the Department, for the examination; and each will follow a course of reading recommended by his chief advisor, taking into consideration the subject of his thesis and his individual standing. Students who are required to take the "preparatory year" will start these studies in that year.

**Particular requirements:**

- (a) A thesis on some research subject approved by the Department.
- (b) A comprehensive oral examination in Economic Theory (including History of Economic Thought, Microeconomic and Macroeconomic Theory), and two other fields chosen from the following: Economic Policy, Economic History, Money and Banking, Labour Economics, International Economics, Public Finance, Economic Systems.

OR

A comprehensive oral examination in Political Theory and two other fields chosen from the following: International Politics, Canadian Government, Comparative Western European Systems, Soviet and Eastern European Governments and American Government.

- (c) The completion of two or three graduate credit courses each with at least 66% standing. The number of courses must be decided in consultation with the Department.
- (d) For language requirement, see p. 27.

## I. Economics

501. **Macroeconomics:** Neo-Classical, Marxist, Schumpeterian, Swedish, Keynesian and Post-Keynesian macroeconomic theories; determinants of the general levels of production, income, employment and prices; economic growth and fluctuations; conditions of economic progress; policies for economic growth and stability in mature and underdeveloped countries. (Prerequisite: Economics 406a and 406b). Professor Fallenbuchl.

2 hours a week (half year lectures, half year seminars).

510. **International Economics:** The theory of international economic policy; the interrelation between internal and external balance; economic growth and the balance of payments; international economic institutions; international aspects of economic development and anti-cyclical policies. (Prerequisite: Economics 301.) Professor Fallenbuchl.

2 hours a week (half year lectures, half year seminars).

520. **Labour Economics and Collective Bargaining:** The economic, social and legal background of bargaining in selected industries. (Prerequisite: Economics 336.) Professors Gillen and Kovacs.

2 hours a week (seminar).

530. **Economic Concentration:** An advanced study of the theory and institutional development of monopoly and monopolistic competition and government regulatory policies. (Prerequisite: Economics 221.) Professor Phillips.

2 hours a week (seminar).

## II. Political Science

501. **Modern Political Thought:** A critical study of selected theories which have influenced modern political philosophy. (Prerequisite: Political Science 452.) Professor Chrypinski.

2 hours a week (seminar).

510. **Problems in Canadian Government:** The development of Canadian autonomy, and its effect on the various institutions of government. (Prerequisite: Political Science 220.) Professor White.

2 hours a week (seminar).

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements for the first year of the two year graduate program, may be found in the General Announcement.

English, History — Graduate Studies

DEPARTMENT OF ENGLISH

Professor: Rev. C. P. J. Crowley, C.S.B., Ph.D.,  
Head of the Department.

Associate Professors: Mary J. Manley, Ph.D.  
John F. Sullivan, Ph.D.

Assistant Professors: E. D. LeMire, Ph.D.  
Rev. E. C. Pappert, C.S.B., Ph.D.  
Eugene J. McNamara, A.M.  
G. A. Padley, Dip.Ed., D.del'U.

*The Master of Arts Degree*

Particular requirements:

Either: (i) At least two and not more than three graduate courses,  
one of which may be in a cognate field, plus a thesis;  
Or: (ii) Three graduate courses, one of which must be a  
seminar course including a major paper upon which  
there shall be an oral examination.

501—Tutorial: Instructors to be assigned.

540—Major non-Chaucerian Middle English works and topics.

550—English Linguistics.

555—Chaucer and His Age.

560—Literary Criticism; principles and history to 1900.

561—Literature of the Renaissance (Non-Dramatic).

566—Renaissance Drama.

580—The Eighteenth Century.

585—The Romantic Period.

591—The Victorian Period.

595—American Literature.

597—Literature of Canada.

598—Contemporary Literary Criticism: theory and practice.

599—Recent Literature.

Undergraduate honours courses, which may be assigned at  
the discretion of the Department Head to form part or all of the  
requirements for the first year of the two year graduate program,  
may be found in the General Announcement.

DEPARTMENT OF HISTORY

Professor: Rev. D. J. Mulvihill, C.S.B., Ph.D., Head of the Department.

Associate Professors: Rev. F. J. Boland, C.S.B., Ph.D.  
Rev. J. O'Meara, C.S.B., Ph.D.

Assistant Professor: J. K. A. Farrell, Ph.D.

Lecturer: M. Vuckovic, M.A.

*The Master of Arts Degree*

Particular requirements:

Either: (i) At least two and not more than three graduate courses,  
one of which may be in a cognate field, plus a thesis;  
Or: (ii) Three graduate courses, one of which must be a  
seminar course including a major paper upon which  
there shall be an oral examination.

- 510—Historical Method, Historiography and Bibliography.  
520—History of Canada, 1867-1945.  
525—Canadian-American Relations 1785 to Present.  
530—British Political and Social Thought from 1832-1914. A seminar and selected reading course.  
540—American Political and Social Thought from 1820 to 1930. A seminar and selected reading course.  
550—Intellectual History of Russia. The Byzantine tradition; development and influences of Russian thought from 1801 to 1956. A seminar and selected reading course.

In special cases, seminars in other areas may be required and will be given by the members of the Department.

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements for the first year of the two year graduate program, may be found in the General Announcement.

#### DEPARTMENT OF PHILOSOPHY

- Associate Professors: Patrick Francis Flood, M.A., Head.  
Rev. E. B. Allen, C.S.B., Ph.D.  
Assistant Professors: John N. Deck, Ph.D.  
Joseph Martin Graham, Ph.D.  
R. C. Nelson, Ph.D.  
Lecturer: S. B. Cunningham, M.A.

#### *The Master of Arts Degree*

##### Particular requirements:

- Either: (i) At least two and not more than three graduate courses, one of which may be in a cognate field, plus a thesis;  
Or: (ii) Three graduate courses, one of which must be a seminar course including a major paper upon which there shall be an oral examination.

- 551—Problems in Metaphysics.  
552—Texts of St. Thomas Aquinas.  
553—History of Ancient Western Philosophy.  
554—Problems in History of Mediaeval Philosophy.  
555—Problems in History of Modern Thought.  
556—Philosophy of Education.  
557—Problems in Social Philosophy.  
558—Problems in Practical Philosophy.

DEPARTMENT OF PSYCHOLOGY

Associate Professors: Rev. R. C. Fehr, C.S.B., Ph.D., Head of Department.

V. B. Cervin, Ph.D.

Rev. J. A. Malone, C.S.B., Ph.D.

Rev. M. A. Record, C.S.B., M.A.

A. A. Smith, Ph.D.

Professor Emeritus: Brother R. Philip, F.S.C., Ph.D.

Visiting Professor: Sister Marian Dolores, S.N.J.M., Ph.D.

The course of study will be at least two and not more than three graduate credit courses, one of which may be in a cognate field, and a thesis.

*The Master of Arts Degree*

**Particular requirements:**

510—Advanced Experimental Psychology.

520—Research Methods in Psychology.

530—Modern Theories of Psychology.

540—Psychoanalysis and Related Fields.

550—Advanced Projective Techniques.

560—Counselling and Psychotherapy.

570—Clinical Practicum.

580—Advanced Social Psychology.

Undergraduate honours courses, which may be assigned at the discretion of the Department Head to form part or all of the requirements for the first year of the two year graduate program, may be found in the General Announcement.

## DEPARTMENT OF BIOLOGY

Professor: Rev. A. J. Grant, C.S.B., M.A., Head of Department.

Associate Professors: W. G. Benedict, Ph.D.  
R. J. Doyle, Ph.D.  
C. C. Kuehner, Ph.D.

Assistant Professors: H. D. McCurdy, Ph.D.  
M. L. Moss, M.S.  
M. L. Petras, M.Sc.

### *The Master of Science Degree*

#### Particular requirements:

In addition to the general requirements listed on page 26 ff. for the Master's degree, the candidate shall (1) successfully complete three full courses, one of which may be selected from a cognate field, (2) conduct a seminar each year of his registration, and (3) pursue original research work and embody it in a thesis.

Not all of the courses listed will necessarily be offered in any one year.

## I BOTANY

540a. **Plant Physiology:** An intermediate course in growth, morphogenesis, translocation and water relations.  
2 lectures, 3 laboratory hours per week; one semester (half course).

540b. **Plant Physiology:** An intermediate course in development and photosynthesis.  
2 lectures, 3 laboratory hours per week; one semester (half course).

541a. **Plant Pathology:** An intermediate course in the principles of pathogenesis in physiological, bacterial, fungal and virus diseases.  
2 lectures, 3 laboratory hours per week; one semester (half course).

541b. **Plant Pathology:** An intermediate course in the study of plant disease control.  
2 lectures, 3 laboratory hours per week; one semester (half course).

550y. **Seminar:** Presentation and discussion of brief reviews of current botanical literature.  
1 hour per week; (half course).

## II MICROBIOLOGY

529a. **Microbial Genetics:** An intermediate course in the genetics of bacteria.

2 lectures, 3 laboratory hours per week; one semester (half course).

529b. **Microbial Genetics:** An intermediate course in the genetics of fungi and protozoa.

2 lectures, 3 laboratory hours per week; one semester (half course).

540a. **Microbial Physiology:** An intermediate course in the cytochemistry, nutrition, metabolism and population kinetics of microorganisms.

2 lectures, 4 laboratory hours per week; one semester (half course).

540b. **Microbial Physiology:** Selected topics in microbial physiology with emphasis on the research techniques employed in the study of microbial metabolism.

1 lecture, 4 laboratory hours per week; one semester (half course).

550y. **Seminar:** Presentation and discussion of brief reviews of current literature in microbiology.

1 hour per week; (half course).

## III ZOOLOGY

529a. **Mammalian Genetics:** An advanced course in the genetic control of morphological and biochemical variants, qualitative traits and certain developmental phenomena in mammals.

3 lectures per week; one semester (half course).

529b. **Population Genetics:** An advanced course in the genetics of populations composed of bisexual organisms.

3 lectures per week; one semester (half course).

550y. **Seminar:** Presentation and discussion of brief reviews of current literature in the field of zoology.

1 hour per week; (half course).

## DEPARTMENT OF CHEMISTRY

- Professors: H. H. G. Jellinek, D.I.C., Ph.D.  
Head of Department  
F. A. DeMarco, M.A.Sc., Ph.D.
- Associate Professors: K. G. Rutherford, B.A., Ph.D.  
R. J. Thibert, M.S., Ph.D.
- Assistant Professors: E. W. Channen, B.Sc., Ph.D.  
W. J. Holland, B.S., M.S., Ph.D.  
S. J. W. Price, M.Sc., Ph.D.  
Rev. G. W. Kosicki, C.S.B., M.S., Ph.D.  
R. J. Niedzielski, M.S., Ph.D.

### *I. The Master of Science Degree*

#### Particular requirements:

In addition to the general requirements and stipulations listed on page 26 ff. for the Master's degree, the following course requirements must be met by all candidates; the successful completion of at least three and not more than five full courses, one of which must be in a cognate field. A seminar must be taken each year the candidate is registered, and original research work must be pursued and embodied in a thesis. All courses will be selected in consultation with the Department Head to suit the candidate's major field of study.

### *II. The Doctor of Philosophy Degree*

#### 1. Admission Requirements

A candidate for the degree of Doctor of Philosophy in Chemistry must be a graduate of a recognized College or University with at least an Honours degree or equivalent in the field of chemistry. He must present official evidence of satisfactory academic standing to the Admissions Committee of the Faculty of Graduate Studies and the Department Head before he can be accepted by the University.

#### 2. Period of Study

Normally a minimum of three calendar years' full-time study is required from the Honours degree or equivalent, with at least one year spent in residence, and a minimum of two calendar years from the Master's degree, also with at least one year in residence. No more than seven years should elapse before completion of the Ph.D. course.



**3. Course Work**

Candidates for the Ph.D. degree must successfully complete (B average) the following minimum course work:

- (a) Three full graduate courses in the major field.
- (b) Two full graduate chemistry courses outside the major field.
- (c) Two full courses in a cognate field or fields.
- (d) Seminar, to be taken each year the candidate is registered.

No candidate may elect to take more than ten courses, without the consent of the major advisor.

Any candidate who fails to maintain satisfactory standing in all course and thesis work may be asked to withdraw.

**4. Doctoral Committee:**

Within one month after a candidate's registration, the Head of the Department will, in consultation with the Dean of the Council of the Faculty of Graduate Studies, assign his doctoral committee. This committee will consist of six members, three of whom are to be chosen from the Chemistry Department (including the chief advisor), and three from outside the Department (two of whom should be from a cognate field), being appointed by the Dean of the Faculty of Graduate Studies. One of the latter three committee members will be appointed by the chairman to act as moderator of the thesis oral examination and of any meeting called by the Department Head to review a candidate's progress.

**5. Language Requirements:**

A candidate will be expected to demonstrate by written examination a reading knowledge of

- (a) German or Russian
- (b) another language as approved by the Department Head.

The language examinations will be offered annually in conjunction with the Language Department and must be successfully passed before admittance to the Doctoral Examination.

**6. Thesis:**

A thesis embodying the results of an original investigation in the field of the major subject is required of candidates for the Ph.D. degree.

The candidate, when requested, shall submit to his chief advisor from time to time portions of his thesis and a complete draft on a date specified by his advisor or committee, and place four typewritten copies of the completed thesis in the hands of his advisor at least six weeks before convocation. The members of the candidate's committee must sign the thesis, when approved,

on a page immediately following the title page. The candidate shall submit with his thesis four copies of an abstract of no more than 500 words and four copies of a vita. The abstract will be bound with the thesis immediately following the certificate of approval and the vita at the end of the thesis. An additional abstract is required for national bibliographical purposes. The candidate should consult the University Librarian as to the format of the thesis. Rules governing binding, quality of paper, etc., of thesis can be found on page 28.

## 7. Examinations:

In addition to language examinations and course work, all candidates must meet the following additional requirements: (in certain cases some of these requirements may be waived):

- (a) A reasonable mastery of the fundamentals of the major fields of chemistry, tested by a written comprehensive examination to be completed within one year after the student is admitted to the graduate program.
- (b) A reasonably mastery of the field of specialization chosen, tested by a Doctoral written examination given normally at the end of the second year of graduate study.
- (c) The passing of a final oral examination in defense of the thesis. An examiner from outside the institution chosen by the candidate's major advisor, may be present at the thesis defence at the discretion of the Department Head.

### *III. Details of Subjects:*

Not all of the courses listed will necessarily be offered in any one year. Special topics courses can be taken several times provided the course content is different.

#### I. Analytical Chemistry

532. **Advanced Analytical Chemistry:** The analysis of alloys, minerals and ores employing titrimetric, gravimetric and instrumental methods. (Prerequisite: Chemistry 332).

2 lectures, 3 laboratory hours a week.

542a. **Instrumental Analysis:** Ultraviolet, visible and infrared spectroscopy; polarography, colorimetry, conductometric titrations, coulometric titrations, electroanalytical methods. (Prerequisite: Chemistry 332).

2 lectures, 3 laboratory hours a week, one semester.

552b. **Special Topics in Analytical Chemistry:** Frontiers in the field of analytical chemistry. (Prerequisite: Chemistry 332).

2 lectures a week; one semester.

## Chemistry — Graduate Studies

562. **Radiochemistry:** Properties and safe handling of radioactive substances. Experiments dealing with the identification and use of various radioactive isotopes and the application of tracer techniques to various fields of chemistry. (Prerequisite: Consent of the instructor).  
2 lectures a week, both semesters. 3 laboratory hours a week, one semester.

### II. Biochemistry

536. **General Biochemistry:** An introductory course in Biochemistry. (Prerequisite: Chemistry 333).  
3 lectures, 3 laboratory hours a week.

536x. Same as Chemistry 536 but without laboratory.

546a. **Intermediate Biochemistry:** A study of enzymes. Literature and/or term paper required. (Prerequisite: Chemistry 536 or equivalent).  
3 lectures a week, one semester.

546b. **Intermediate Biochemistry:** A study of hormones. Literature and/or term paper required. (Prerequisite: Chemistry 536 or equivalent).  
3 lectures a week, one semester.

556a. **Special Topics in Biochemistry.** (Prerequisite: Chemistry 536 or 536x or equivalent).  
3 lectures a week, first semester.

556b. **Special Topics in Biochemistry.** (Prerequisite: Chemistry 536 or 536x or equivalent).  
3 lectures a week, second semester.

566a. **Biochemical Research Methodology:** A study of the current methods used in Biochemistry with emphasis on analytical methods.  
1 lecture, 3 laboratory hours a week, one semester.

566b. **Biochemical Research Methodology:** A study of the current methods used in Biochemistry with emphasis on analytical methods.  
1 lecture, 3 laboratory hours a week, one semester.

### III. Inorganic Chemistry

535a. **Chemistry of the More Familiar Elements:** Descriptive chemistry of the more familiar elements and their compounds, with emphasis on the less familiar chemistry thereof, including a discussion of the economic aspects of inorganic chemistry. (Prerequisite: Chemistry 335).  
2 lectures a week; one semester.

535b. **Chemistry of the Less Familiar Elements:** Descriptive chemistry of the less familiar elements and their compounds, with emphasis on coordination chemistry. (Prerequisite: Chemistry 335).  
2 lectures a week; one semester.

545. **Theoretical Inorganic Chemistry:** Theoretical considerations of the periodic relationships and reactivities of the elements and their compounds, particularly in the light of recent structural, thermodynamic and kinetic data relating to aqueous and non-aqueous solutions, dry state reactions and high temperature chemistry. (Prerequisite: Chemistry 335).  
2 lectures a week.

555. **Selected Topics in Inorganic Chemistry:** Topics to be arranged by the instructor based primarily upon new developments in the field as gathered from a study of the current research literature. (Prerequisite: Chemistry 535a and 535b).  
2 lectures a week.

#### IV. Organic Chemistry

533. **Physical Organic Chemistry:** Applications of thermodynamics and kinetics to organic reaction mechanisms. Mass law, ionic strength and salt effects as well as polar and steric effects are discussed from the physicochemical standpoint. (Prerequisite: Chemistry 333, 444 and 464).  
2 lectures a week.

543. **Synthetic Organic Chemistry:** A detailed study of organic reactions with particular reference to multistage syntheses. Stereospecific synthesis. (Prerequisite: Chemistry 333).  
2 lectures a week.

553a. **Organic Chemistry of High Polymers:** Condensation and addition polymers. Stereospecific polymerization. (Prerequisite: Chemistry 333, 444 and 464).  
2 lectures a week; one semester.

553b. **Heterocyclic Compounds:** The chemistry of heterocyclic organic compounds. (Prerequisite: Chemistry 333).  
2 lectures a week; one semester.

563. **Natural Products:** The organic chemistry of the steroids, terpenes, vitamins and drugs. (Prerequisite: Chemistry 543).  
2 lectures a week.

573a. **Special Topics in Organic Chemistry:** Selected topics of recent interest in the field. (Prerequisite: consent of instructor).  
2 lectures a week; one semester.

## V. Physical Chemistry

544. **Physical Chemistry of High Polymers:** Kinetics of condensation and addition polymerization. Physical and thermodynamic properties. Degradation of high polymers. (Prerequisite: Chemistry 444 and 464).

2 lectures a week.

554. **Theoretical Chemistry:** Statistical and quantum mechanics. Atomic and molecular spectra. (Prerequisite: Chemistry 444, 454 and 464).

2 lectures a week.

564. **Gas Kinetics:** Theoretical and experimental aspects of gas phase reactions. (Prerequisite: Chemistry 444).

2 lectures a week.

574. **Special Topics in Physical Chemistry:** Selected topics of current interest. (Prerequisite: consent of instructor).

2 lectures a week.

## VI. Master's Thesis

## VII. 550. Seminar

## VIII. Doctoral Thesis

## DEPARTMENT OF MATHEMATICS

Associate Professor: Rev. D. T. Faught, C.S.B., M.A.,  
Head of Department.

L. L. Campbell, M.S., Ph.D.

H. A. Eliopoulos, M.Sc., Ph.D.

A. C. Smith, M.Sc., Ph.D.

E. Zakon, Dr.jur.

Assistant Professors: J. Abramowich, M.A., Ph.D.

Lucio Artiaga, M.Sc.

S. Verma, M.Sc., Ph.D.

Sessional Instructors: D. J. Foulis, Ph.D.

F. K. Schnitzer, Ph.D.

### *The Master of Science Degree*

The course of study shall be either at least four graduate courses, or at least three graduate courses and a major paper upon which there shall be an oral examination.

## I. Pure Mathematics

- 501—Advanced Modern Algebra.
- 502—Topics in Topology.
- 503—Group Representations and Spinor Calculus.
- 504—Mathematical Logic.
- 505—Advanced Geometry.
- 506—Introduction to the Differential Geometry in the Large.
- 507—Functions of a Real Variable.
- 508—Theory of Integration.
- 509—Integral Transforms.
- 510—Partial Differential Equations.
- 511—Fourier Analysis.

## II. Applied Mathematics

- 550—Advanced Quantum Mechanics and Quantum Field Theory.
- 551—Group Theory and Quantum Mechanics.
- 552—Topics in Relativity and Field Theory.
- 553—Relativistic Celestial Mechanics and Cosmology.
- 554—Random Noise Theory.
- 555—Information Theory.
- 556—Advanced Electromagnetic Theory.
- 557—Hydro- and Aerodynamics.
- 558—Mathematical Theory of Elasticity.
- 559—Equations of Mathematical Physics.
- 560—Functional Analysis with Applications to Theoretical Physics.
- 561—Numerical Analysis.
- 562—Selected Topics in Applied Mathematics for Engineers.

## DEPARTMENT OF PHYSICS

Associate Professor: L. Krause, B.Sc., M.A., Ph.D., A.Inst.P.  
Head of the Department

Assistant Professors: E. E. Habib, B.Sc., Ph.D.  
N. E. Hedgecock, M.A., Ph.D.  
F. Holuj, M.Sc., Ph.D.  
John Huschilt, M.A., Ph.D.  
R. A. Moore, M.Sc., Ph.D.  
T. D. Nainan, M.Sc., Ph.D.  
A. van Wijngaarden, B.Sc., Ph.D.

The Department provides facilities for students wishing to proceed to the degrees of Master of Science and Doctor of Philosophy. The attention of candidates is drawn to the regulations on page 26 governing admission requirements and the requirements for the Master's degree. The candidates must also satisfy the following additional conditions.

### Admission Requirements.

The basic qualification for admission consists of a Bachelor's degree with adequate specialization in Physics, obtained with first or second class honours. Students with deficiencies may be permitted to make up these deficiencies by registering initially in a program of undergraduate courses.

#### *I. The Degree of Master of Science*

##### Particular requirements:

The course of study for the degree of Master of Science will consist of at least two and not more than three graduate courses and a thesis. One of the courses may be selected from among undergraduate or graduate courses in a cognate field.

Students proceeding to a degree in theoretical physics may be required to pursue a program consisting of five lecture courses, two of which may be taken in the department of mathematics. In this case no thesis will be expected.

#### *II. The Degree of Doctor of Philosophy*

##### 1. Period of Study.

A minimum of three years in full-time graduate studies is required. Credit for one of the three years may be given for a Master's degree obtained in this department or for graduate work carried out at another institution. Not more than seven years should elapse between registration and completion of the requirements for the degree; an extension of this period may be granted only on recommendation from the department.

##### 2. Course Work.

Candidates will complete a minimum of five graduate courses, of which Physics 550, 631 and 650 are obligatory. Certain courses in mathematics or another science may be accepted for graduate credit if approved by the department. All candidates are expected to participate in departmental seminars.

##### 3. Doctoral Committee.

Within one month after registration each candidate will be assigned to an advisory committee consisting of his research advisor and two other staff members in the Department. The committee will, from time to time, review the candidate's progress and will be present at the final oral examination (defence of the thesis). The committee may co-opt an additional member from outside of the University who, as expert in the field of physics in which the candidate's research is carried out, will appraise his thesis and may also be present at the final oral examination.

#### 4. Language Requirements.

A reading knowledge of two modern languages is expected. Written language examinations are set annually in conjunction with the Department of Modern Languages of the University and must be passed at least one year before the date of expected graduation.

#### 5. Thesis.

In order to qualify for the degree, each candidate must present a thesis embodying the results of an original investigation in a branch of physics. Graduate courses form an important but subsidiary part of the program.

The candidate, when requested, shall submit to his chief advisor from time to time portions of his thesis and a complete draft on a date specified by his advisor and place four typewritten copies of the completed thesis in the hands of his advisor at least six weeks before convocation. The members of the candidate's committee must sign the thesis, when approved, on a page immediately following the title page. The candidate shall submit with his thesis four copies of an abstract of no more than 500 words and four copies of a vita. The abstract will be bound with the thesis immediately following the certificate of approval and the vita at the end of the thesis. An additional abstract is required for national bibliographical purposes. The candidate should consult the University Librarian as to the format of the thesis. Rules governing binding, quality of paper, etc., of the thesis can be found on page 28.

#### 6. Examinations.

In addition to the language examinations and examinations in the courses, all candidates must pass qualifying examinations covering the general field of physics at the level of the honours course given in this department. Two three-hour papers are written, usually one year after the commencement of graduate studies. The examinations take place in April and September and must be passed at least one year before the date of expected graduation. Other examinations (written or oral) may be set at the discretion of the department.

Each candidate will, on recommendation of his advisory committee, present himself for a final oral examination in defence of his thesis. This examination will be conducted by a committee which, in addition to the members of the candidate's advisory committee and the external examiner, may include faculty members from other departments. The chairman and extradepartmental members are appointed by the Dean of Graduate Studies in consultation with the Chairman of the Department.



*III. Details of Subjects*

Not all of the courses listed below will necessarily be offered in any one year.

500. **Seminar.** Selected topics in theoretical physics.
526. **Molecular Physics and Spectroscopy:** Infrared and Raman spectra of diatomic molecules and of simple polyatomic molecules.
534. **Advanced Electronics:** Transmission line theory, microwaves, pulse and digital circuits. Network analysis with Fourier and Laplace transforms.
550. **Quantum Mechanics:** Linear vector space, action principle, formulation of the scattering problem. Born approximation, perturbation theory; partial wave analysis; Pauli spin theory; Dirac equation and spin; radiation theory; dispersion relations.
552. **Atomic Physics and Resonance Phenomena:** Interactions between magnetic fields and atomic energy levels with special reference to electron-spin resonance and optical pumping phenomena.
566. **Solid State Physics:** The study of point groups, Bravais lattices and space groups. Inverse lattices with applications to scattering phenomena. Electric, magnetic and thermal properties of solids; superconductivity and superfluidity. The effects of imperfections and impurities in crystals.
567. **Nuclear Physics:** Nuclear forces, scattering phenomena, nuclear models, electromagnetic interactions of nuclei, beta-decay theory.
631. **Statistical Mechanics:** Basic principles of statistical physics, Gibbs distribution, the perfect gas. Fermi-Dirac and Bose-Einstein distributions. Applications to condensed states, the real gas, phase equilibria, solutions, chemical reactions. Theory of fluctuations; second order phase transitions. (Prerequisite: Physics 550).
650. **Advanced Quantum Mechanics:** Relativistic quantum mechanics; systems with many particles with spin; Lagrangian quantization; introduction to quantum theory of fields; free electromagnetic, meson and spinor fields; photon-electron and pion-nucleon interactions, nuclear potential. Other topics of current interest. (Prerequisite: Physics 550).

**Areas of Research.**

Candidates proceeding to the degrees of M.Sc. and Ph.D. may carry out research in the following fields:

Problems in atomic collisions and optical pumping (L. Krause), Beta- and gamma-ray spectroscopy (E. E. Habib and T. D. Nainan), Electron-spin resonance in solids (F. Holuj and N. Hedgecock), Interaction of low energy ions with matter (A. van Wijngaarden).

## SCHOOL OF BUSINESS ADMINISTRATION

- Professor: G. R. Horne, B.A., M.A., Ph.D. (Director).
- Associate Professors: C. M. Birch, B.A., M.A., Ph.D.  
Michael Zin, B.Comm., M.B.A., Ph.D.
- Assistant Professors: J. M. Brownlie, B.A., M.B.A.  
J. B. Gertz, B.S., M.B.A.  
Wilfred Hanson, B.Comm., M.B.A.

### *I. The Master of Business Administration Degree*

The purpose of the Master of Business Administration program is to provide broad post-graduate studies in the general field of business administration. The graduate student is afforded the opportunity to expand his knowledge of the principal phases of business administration, and thereby be prepared for responsible performance in private business and public service careers.

The general principles of management are emphasized throughout the program; this approach is supplemented by the use of the case method of instruction to bring reality to the studies.

Particular admission requirements:

1. In addition to the admission requirements listed above in (1), p. 26 an applicant for admission to the M.B.A. course who has not completed a formal course in the principles of economics must make up the deficiency.

2. For applicants possessing the Bachelor of Commerce General Degree, or equivalent, a make-up year will be required in which the student will take courses as approved by the Director of the School of Business Administration.

3. Graduates with the Bachelor of Commerce Honours (4 years from Grade XIII) from this or other universities, with second class standing, who have done satisfactory work in all the subjects included in the first year of the Master's program as indicated below, are eligible to complete the degree in one year.

4. Graduates who have done work elsewhere comparable to that included in the first year of the Master's program here will be eligible to enter the second year.

5. A student with a university degree, who has completed the six courses leading to the Certificate in Business Administration at this University may receive credit for up to four of the five courses required for the first year of the M.B.A. program.

Students are admitted to the second year if they have secured an average of second class honours in the required subjects of the

first year, or have completed the Diploma Course in Management with second class honours.

**Evening Students.** Provision is made for candidates in full-time employment to spread the work for the degree over a number of years. There is no time limit for the work of the first year but the work of the second year must be covered in not more than four consecutive years. Only two subjects may be taken concurrently by part-time students.

#### First Year

- Bus. Ad. 481ab—Statistical Methods in Business
- Bus. Ad. 483ab—Marketing
- Bus. Ad. 485ab—Personnel Management, Industrial Relations
- Bus. Ad. 489 —Accounting
- Bus. Ad. 493 —Corporation Finance

#### Second Year

- Bus. Ad. 500ab—Business Policy
  - Bus. Ad. 504ab—Administrative Accounting
- Three full courses chosen from the following:

- Bus. Ad. 502ab—Administrative Problems
- Bus. Ad. 506c —Contemporary Business Problems
- Bus. Ad. 507c —Production
- Bus. Ad. 508ab—Marketing Management and Strategy
- Bus. Ad. 510c —International Marketing and Finance
- Bus. Ad. 511ab—Investment Analysis and Management
- Bus. Ad. 513c —Human Relations in the Industrial Community
- Bus. Ad. 514ab—Public Administration
- Bus. Ad. 516ab—Statistical Analysis
- Bus. Ad. 518c —Accounting Theory—Assets
- Bus. Ad. 519c —Accounting Theory—Equities
- Bus. Ad. 520c —Financial Management
- Bus. Ad. 521c —Capital Budgeting

One subject (for which the student must have the undergraduate qualifications) from other graduate courses, if approved by the Director of the School of Business Administration and the Department concerned.

In addition to the subjects listed, the student is required to prepare a paper on some research subject.

The prerequisite for a second term course is its corresponding first term course.

## *II. Diploma Course In Management*

Upon completion of the first year of the M.B.A. program with at least a "C" average, a student becomes eligible for the Diploma in Management. A "B" average is required for admission to the second year of the M.B.A. program.

## *III. Details of Subjects*

481a. **Statistical Methods In Business I:** The distinction between descriptive statistics and statistical inference, theoretical frequency distributions, measures of location and variation, probability, mathematical expectation, and sampling distributions.

3 hours a week, one semester.

481b. **Statistical Methods In Business II:** Problems of estimations, tests of hypotheses, sampling problems, small samples, regression, correlation, index numbers and time series.

3 hours a week, one semester.

483a. **Marketing Principles And Policies I:** Marketing policy formation and application to problems of consumers, merchandising and channels of distribution.

3 hours a week, one semester.

483b. **Marketing Principles And Policies II:** The management of personal selling and sales promotion, pricing, marketing research and integrated marketing programs.

3 hours a week, one semester.

485a. **Personnel Management:** The practical application of personnel principles and techniques to specific situations by use of the case-study method.

3 hours a week, one semester.

485b. **Industrial Relations:** A case course stressing worker-management relations under unionized conditions.

3 hours a week, one semester.

489. **Accounting:** Accounting concepts and techniques as tools for the administration of the economic activity of the business enterprise.

6 hours a week, one semester.

493. **Corporation Finance:** A basic course in business finance. Taught with emphasis on analysis rather than description with the object of demonstrating principles.

6 hours a week, one semester.

## APPLIED SCIENCE

Professors: F. A. DeMarco, Ph.D., Dean of Faculty of Applied Science  
M. Adelman, Ph.D., Head of Chemical Engineering  
H. P. Herbich, D.Sc., Head of Civil Engineering

### Associate

Professors: R. G. Billinghamurst, M.A.Sc., Head of Engineering Science  
W. G. Colborne, M.Sc., Head of Mechanical Engineering  
G. T. Csanady, Ph.D., Mechanical Engineering  
A. W. Gnyp, Ph.D., Chemical Engineering  
P. A. V. Thomas, Ph.D., Electrical Engineering  
T. S. Wu, Ph.D., Civil Engineering

### Associate Research

Professor: S. N. Kalra, M.S., Ph.D., Electrical Engineering

### Assistant

Professors: H. R. Fletcher, M.A.Sc., Head of Electrical Engineering  
H. A. Apostolopoulos, M.S.C.E., Civil Engineering  
G. Babiy, M.Sc., M.E., Mechanical Engineering  
D. D. Duquette, M.S., Civil Engineering  
J. P. Hartt, M.S.C.E., Civil Engineering  
Rev. A. R. Howell, C.S.B., M.A.Sc., Mechanical Engineering  
H. P. Hsu, Ph.D., Electrical Engineering  
H. H. Hwang, Ph.D., Electrical Engineering  
I. Koszman, Ph.D., Chemical Engineering  
C. Tien, Ph.D., Chemical Engineering  
H. J. Tucker, B.Eng., Mechanical Engineering

### *I. The Master of Applied Science Degree*

For General Regulations, see page 26 ff.

#### Particular Regulations:

##### 1. Admission Requirements

A candidate for the degree of Master of Applied Science shall hold the degree of Bachelor of Applied Science of this University or an equivalent degree in Applied Science or Engineering. (In addition, he must have an average of B standing or its equivalent in his major subjects).

An applicant having a Bachelor's degree in Science or Applied Mathematics may be admitted as a candidate on the recommendation of the Department concerned and subject to the approval of the Faculty of Graduate Studies.

Candidates are urged to apply as early as possible to enable the Committee to evaluate qualifications and work out a program.

## 2. Period of Study

The duration of the course will be adjusted individually for each candidate. A minimum of one year in residence, or equivalent, will be required. If more than six hours a week are spent in teaching or other departmental duties, additional time will be required. No candidate may be registered for the M.A.Sc. degree for more than eight years.

## 3. Course of Study

Candidates will be required to complete a minimum of six courses of which one to three may be replaced by a thesis. The thesis may be replaced by an equivalent amount of course work at the discretion of the Department involved, in which case a major paper and/or a comprehensive examination will be required. A "course" shall constitute not less than 50 hours of lectures or the equivalent.

## 4. Language Requirements

It is not obligatory to take a foreign language for credit but a candidate may be asked to demonstrate a reading knowledge of a foreign language at the discretion of the Department concerned.

## 5. Particular Examination Requirements

A candidate who does not obtain 66% in any course may repeat the course once only, and he may not repeat more than one course.

The Master's degree with Honours may be granted to a candidate on the recommendation of the committee in charge of the candidate's research and with the approval of the Faculty Council of Graduate Studies. It will be granted on the basis of an average of 80% or more in his graduate work.

## II. *The Doctor of Philosophy In Chemical Engineering Degree*

### 1. Admission Requirements.

A candidate for the degree of Doctor of Philosophy in Chemical Engineering must be a graduate of a recognized College or University with at least a Bachelor's degree or equivalent in the field of chemical engineering. He must present official evidence of satisfactory academic standing to the Admissions Committee of the Faculty of Graduate Studies and the Department Head before he can be accepted by the University.

**2. Period of Study.**

Normally a minimum of three years' full-time study is required from Bachelor's degree or equivalent, with at least one year spent in residence, and a minimum of two calendar years from the Master's degree, also with at least one year in residence. No more than seven years from commencement of the post-graduate work should elapse before completion of the Ph.D. course.

**3. Course Work**

Candidates for the Ph.D. degree must successfully complete (B average) the following minimum course work:

- (a) four full graduate courses in Chemical Engineering.
- (b) two full courses in a cognate field or fields.
- (c) Seminar, to be taken each year the candidate is registered.

Any candidate who fails to maintain satisfactory standing in all courses and thesis work may be asked to withdraw.

**4. Doctoral Committee.**

Within one month after a candidate's registration, the Head of the Department will, in consultation with the Dean of the Council of the Faculty of Graduate Studies, assign his doctoral committee. This committee will consist of six members, three of whom are to be chosen from the Chemical Engineering Department (including the chief advisor), and three from outside the Department (two of whom should be from a cognate field), being appointed by the Dean of the Faculty of Graduate Studies. One of the latter three committee members will be appointed by the chairman to act as moderator of the thesis oral examination and of any meeting called by the Department Head to review a candidate's progress.

**5. Language Requirements.**

A candidate will be expected to demonstrate by written examination a reading knowledge of German or Russian. The language examinations will be offered annually in conjunction with the Language Department and must be successfully passed before admittance to the Doctoral Examination.

**6. Thesis.**

A thesis embodying the results of an original investigation in the field of the major subject is required of candidates for the Ph.D. degree.

The candidate, when requested, shall submit to his chief advisor from time to time portions of his thesis and a complete draft on a date specified by his advisor or committee, and place four typewritten copies of the completed thesis in the hands of his advisor at least six weeks before convocation. The members of the candidate's committee must sign the thesis, when approved, on a page immediately following the title page. The candidate shall submit with his thesis four copies of an abstract of no more than 500 words and four copies of a vita. The abstract will be bound with the thesis immediately following the certificate of approval and the vita at the end of the thesis. An additional abstract is required for national bibliographical purposes. The candidate should consult the University Librarian as to the format of the thesis. Rules governing binding, quality of paper, etc., of thesis can be found on page 28. The thesis may be submitted to a person expert in the field but at another university, if outside criticism is found to be desirable.

## 7. Examinations.

In addition to a language examination and course work, all candidates must meet the following additional requirements:

- (a) A reasonable mastery of the fundamentals of the major fields of chemical engineering, tested by a written comprehensive examination to be completed within one year after the student is admitted to the graduate program.
- (b) A reasonable mastery of the field of specialization chosen, tested by a Doctoral Examination given normally at the end of the second year of graduate study.
- (c) The passing of a final oral examination in defence of the thesis. An examiner from outside the institution chosen by the candidate's major advisor may be present at the thesis defence at the discretion of the Department Head.

All the following courses will not necessarily be given the same year.

### Engineering Sciences

E.S. 501. **Experimental Stress Analysis:** Strain gages and transducers, brittle lacquers and photoelastic methods of stress analysis. Static and dynamic and transient measurements.

2 hours a week. 3 laboratory hours alternate weeks.

### Chemical Engineering

Ch.E. 500. **Seminar.**

Ch.E. 501a. **Chemical Engineering Thermodynamics I:** An advanced study of the application of classical thermodynamic principles to chemical engineering practice. Open systems, thermo-



dynamics of flowing systems, phase rule, electrolytic cells, chemical equilibria, and prediction of thermodynamic properties.

3 hours a week, one semester.

**Ch.E. 501b. Chemical Engineering Thermodynamics II:** Thermodynamics of irreversible processes. Formulation of fundamental equations of chemical engineering. A detailed analysis of thermal diffusion. Introduction to the concepts of statistical thermodynamics.

3 hours a week, one semester.

**Ch.E. 502a. Chemical Engineering Kinetics I:** An advanced study of the application of kinetic principles to chemical engineering practice including basic kinetic principles, complex rate equations, approximate solution of complex reactions, heat transfer in batch reactors, continuous flow stirred-tank reactors.

3 hours a week, one semester.

**Ch.E. 502b. Chemical Engineering Kinetics II:** A continuation of Ch.E. 502a, dealing with homogeneous tubular reactors, fluid phase reactions catalyzed by solids, catalytic reactor design, uncatalyzed heterogeneous reactions.

3 hours a week, one semester.

**Ch.E. 503a. Mass Transfer:** Definition of concentration, velocity and flux in mass transport processes. Formulation of the equation of change in multicomponent systems. Concentration distribution in laminar and turbulent flow. Interphase mass transfer and definition of mass transfer coefficients.

3 hours a week, one semester.

**Ch.E. 504a. Heat Transfer I:** Derivative of the heat conduction equation. Analytical solution of the conduction equation by the classical method. Numerical and graphical solutions. Discussion of problems involving a change of phase.

3 hours a week, one semester.

**Ch.E. 504b. Heat Transfer II:** Derivative of the energy equation. Laminar heat transfer over a flat plate. The Graetz-Nusselt problem and its solution. Turbulent heat transfer and various analogies between heat and momentum transfer. Free convective heat transfer and condensation heat transfer.

3 hours a week, one semester.

**Ch.E. 505a. Electrochemical Engineering:** Origin of the electrical potential difference. Electrolytic conduction, Debye-Huckel theory, double layer, static electrification, passage of current through electrolytic cell.

2 hours a week, one semester.

Ch.E. 506b. **Corrosion:** Clean surfaces, surface damage to metals, effect of imperfections on dissolution, electrode solution interfaces, electrolytic etching of metals, electrochemistry of dissolution, dissolution of metals, oxidation of metals.

3 hours a week, one semester.

Ch.E. 507a. **Non-Newtonian Fluid Technology:** Formulation of stress and strain tensors. Constitutive equation and its derivation. Rheological classification of industrially important non-Newtonian fluids. The viscometry of non-Newtonian fluids, non-Newtonian fluid boundary layer equation, heat transfer, pipe line design, and mixing of non-Newtonian fluids.

3 hours a week, one semester.

### Civil Engineering

C.E. 500. **Advanced Mechanics of Materials:** Mechanical properties of materials; limitations of the ordinary formulae of mechanics of materials; introduction to the theory of elasticity; theory of plates and membrane stresses in shells.

2 hours a week.

C.E. 501. **Advanced Problems in Statically Indeterminate Structures:** Continuous trusses and bents; arches, rings and frames with curved members; flexible members; frames with semi-rigid connections, shear-wall structures; torsion at non-circular sections; framing systems subject to combined bending and torsion.

2 hours a week.

C.E. 502. **Advanced Structural Analysis:** Numerical methods applied to structural analysis, numerical integration, finite difference approximation, relaxation procedures; matrix analysis of complex structures, stiffness and flexibility matrices, emphasis to the application of digital computer.

2 hours a week.

C.E. 503. **Advanced Structural Mechanics I:** Beam-columns; instability of struts, frames and trusses; inelastic buckling; bending; bending of plates; buckling of plates; analysis and design of folded plate structures.

2 hours a week.

C.E. 504. **Advanced Structural Mechanics II:** Stresses in cylindrical shell roofs; membrane stresses in domes and shells of double curvatures; flexural action near boundaries: approximate methods of analysis; design considerations.

2 hours a week.

C.E. 505. **Structural Analysis for Dynamic Loads:** Behaviour of structural materials under dynamic loading; response of structures to dynamic loads; general theory for distributed mass systems; simplified analysis; energy method and numerical procedure; blast loads; design considerations.

2 hours a week.

C.E. 506. **Plastic Analysis and Design of Steel Structures:** Stress-strain relationship; moment-rotation characteristics; plastic analysis of beams and frames; estimates of deflections; minimum weight design; general loading; factors affecting the fully plastic moment; design considerations.

2 hours a week.

C.E. 507. **Prestressed Reinforced Concrete:** Principles of prestressing; prestress losses; materials; prestressing systems; analysis and design of statically determinate and indeterminate concrete structures.

2 hours a week.

C.E. 508. **Water Power:** Stream flow and water power estimates; storage problems; analysis, design and selection of water power structures and equipment; types and purposes of dams and weirs; turbine analysis; transmission lines; cost and value of water power; typical problems will be studied.

2 hours a week.

C.E. 509. **Advanced Hydromechanics:** Theory of uniform and varied flow in open channels; theory of the use of models in design; conditions for similarity in the case of hydraulic structures; elastic structures, aircraft and waves.

2 hours a week.

C.E. 510. **Advanced Water and Sewage Treatment:** Characteristics of water and sewage both chemical and biological, and their influence on the design of treatment facilities. Theory of sedimentation and flocculation, with applications to the design of clarifiers, suspended solids contact units, and grit chambers. Theory of flow through beds of solids, and its application to design of filter beds. The treatment and disposal of sludge. Miscellaneous water and sewage treatment methods and problems.

2 hours a week.

C.E. 511. **Advanced Hydrology:** Analysis and synthesis of the hydrograph by unit hydrograph. Stream-flow routing. The hydrograph as a function of drainage characteristics; estimation of runoff from Meteorological data. Infiltration theory. Sea water intrusion in coastal Aquifers. Application of hydrologic techniques.

2 hours a week.

**C.E. 512. Advanced Soil Mechanics and Applications:** Properties of soils, stresses, consolidation, settlements, bearing capacity, stability of slopes, flownets and seepage, stabilization of soils, special problems on buildings, highway and airport foundations, tunnels, underground conduits. Course includes laboratory testing.

2 hours a week.

**C.E. 513. Advanced Highway Design:** Special problems on stabilization, bases, subgrades, pavements, drainage, frost action. Emphasis on modern approach to geometric design of rural and urban highways traffic engineering. Course includes complete highway project design and occasional laboratory.

2 hours a week.

**C.E. 514a. Advanced Problems in Foundations:** Combined footings. Mat and Raft foundations, group piling, retaining walls, abutments, vibrations in foundations.

2 hours a week.

**C.E. 514b. Modern Airport Design:** Selection of site, runways, modern rigid pavements, stabilization of subgrades, frost action, drainage; course includes airport design problems and projects.

2 hours a week.

**C.E. 515. The Engineer in Public Health;** economic value of adequate water supply and proper sewage treatment; epidemiology of communicable diseases; biostatistics; food sanitation; environmental health; air pollution; collection and disposal of municipal refuse; industrial hygiene; and sanitary engineering in time of disaster.

2 hours a week.

### Electrical Engineering

**E.E. 500c. Graduate Seminar:** All graduate students will attend the seminar.

**E.E. 521c. Network Analysis:** Network topology and fundamental theorems. Matrix formulation. Representation of network functions. Transform techniques and transient analysis. Two-port networks. Filter theory. Signal-flow graphs.

3 hours a week, one semester.

**E.E. 522c. Network Synthesis:** Energy functions and the positive-real function criterion. Synthesis of driving point impedance of two- and three-element (R, L, C) networks and applications. Topics in four terminal network synthesis and applications. The approximation techniques.

3 hours a week, one semester.

E.E. 531c. **Theory of Electromagnetic Fields:** Laplace's and Poisson's equations and conformal mapping. Maxwell's equations, scalar and vector potentials. Circuit concepts from field equations. Electromagnetic waves. Mode theory of cylindrical guides and resonators. Radiation and antennas.

3 hours a week, one semester.

E.E. 532c. **Advanced Electromagnetic Field Theory:** Electromagnetic potentials. Green's function. Boundary value problems. Field equivalence concepts. Spherical and cylindrical wave functions, vector wave functions. Diffraction. (Prerequisite: 531 or equivalent).

3 hours a week, one semester.

E.E. 541c. **Feedback and Control Systems:** Linear feedback control systems. Transfer function analysis. Stability, compensation. Optimization. Components of control systems.

3 hours a week, one semester.

E.E. 542c. **Advanced Control Systems:** Nonlinear systems. Sampled-data systems. Adaptive systems. (Prerequisite: 541 or equivalent).

3 hours a week, one semester.

E.E. 551. **Principles and Applications of Computers:** Logical structure of computers. Computer components and limitations. Flow diagrams, problem preparation. Principles of coding.

2 hours a week, two semesters.

E.E. 561. **Advanced Theory of Machines:** General principles of rotating machines. General equations of induced voltage, armature reaction, and torque. Steady-state and transient performance of machinery. Machine network analysis.

2 hours a week, two semesters.

E.E. 562c. **Advanced Power System Analysis:** Fundamental concepts. Torque angle characteristics. Multi-machine problems. Stability limits. Economic dispatch, impulse levels, exciter and voltage regulator response, system design.

3 hours a week, one semester.

E.E. 563c. **Power System Transients:** Travelling waves, free and forced oscillations, reflections, transition points, multi-conductor systems, multi-velocity waves, attenuation and distortion, lightning surges, switching surges, arcing grounds, protective devices, surges in transformer and machine windings.

3 hours a week, one semester.

E.E. 564c. **Tensor Analysis of Electric Circuits and Machines:** The application of dyadics, matrices and tensors to the theory of electric circuits and machines.

3 hours a week, one semester.

**E.E. 565c. Two Dimensional Fields in Electrical Engineering:** Calculation and construction of electric and magnetic fields for conductors, plates, vacuum tubes, machine slots, teeth, etc., analogous problems in fluid flow by analytic methods as well as free hand mapping.

3 hours a week, one semester.

**E.E. 571c. Solid-State Physical Electronics:** Introduction to quantum and statistical mechanics. Band structure. Conductivity, mobility and lifetime of carriers. Magnetic properties of solids. Magnetic resonance.

3 hours a week, one semester.

**E.E. 572c. Solid-State Applied Electronics:** Semiconductor physics. Transistor construction and characteristics. Transistor applications. Ferrites. Tunnel diodes.

3 hours a week, one semester.

**E.E. 581c. Communication Principles:** Transmission of information. Transmission through electrical networks. Modulation. Noise. Random signal theory. Basic information theory. Reliability of transmission.

3 hours a week, one semester.

**E.E. 591c. Principles and Techniques of Microwave:** Microwave principles. Power generation and measurement. Impedance concepts. Representation of microwave circuits. Resonant-cavity, attenuation. Spectrum analysis, microwave measurements.

3 hours a week, one semester.

**E.E. 592c. Microwave Electronics:** Transit time effects. Interaction of electromagnetic fields and electron streams. Space-charge wave. Velocity modulation tubes, crossed field tubes. Harmonic generation. Amplification.

3 hours a week, one semester.

**EE. 600c. Special Topics:** Selected advanced topics especially directed in the fields of research in the department. Consent of the instructor required.

Mechanical Engineering

M.E. 501. **Heat Transfer:** A heat transfer course covering advanced topics in conduction, convection and radiation.

2 lectures a week, first semester; 3 lectures a week, second semester; 3 laboratory hours alternate weeks, all year.

M.E. 502. **Thermodynamics of Fluid Flow:** Concepts applying to incompressible and compressible fluids, isentropic flow, Fanno flow, choked conditions, isothermal flow, varying area adiabatic flow, normal and oblique shocks, Rayleigh flow, generalized one-dimensional flow.

2 hours a week.

M.E. 503. **Theory of Viscous Fluids:** (a) Laminar Flow, Navier Stokes equations with exact and approximate solutions, approximate solution of the boundary layer by momentum theorem. (b) Turbulent Flow, general theories, wall turbulence, free turbulence.

2 hours a week.

M.E. 504. **Turbulent Flow:** Navier-Stokes equations, stability of flow, origin of turbulence. Stochastic averages, methods of measurement of fluctuating quantities. Homogeneous turbulence models, velocity correlations and spectra, energy dissipation and transport phenomena in turbulent flow, Kolmogoroff's Theory of local isotropy. The structure of turbulence in shear flow, intermittency. "Absolute" and "relative" diffusion by turbulence effects of scale, application to atmospheric turbulence. The generation of aerodynamic noise in shear layers and boundary layers.

2 hours per week.

## SUMMARY OF REGISTRATION, 1962-63

Regular Winter Session	Men	Women	Total
Arts .....	560	260	820
Commerce .....	109	0	109
Science .....	269	39	308
Engineering .....	197	1	198
Nursing .....	1	51	52
Graduate Studies .....	71	11	82
Theology .....	18	0	18
	<hr/>	<hr/>	<hr/>
Total Full Time Day .....	1225	362	1587
Part Time Day .....	65	38	103
	<hr/>	<hr/>	<hr/>
	1290	400	1690
<b>Extension Courses</b>			
Summer School .....	387	248	635
Evening and Saturday Classes .....	734	330	1064
Non-credit .....	218	14	232
	<hr/>	<hr/>	<hr/>
	1339	592	1931
	<hr/>	<hr/>	<hr/>
Gross Totals .....	2629	992	3621
Duplicates .....	—243	—121	—364
	<hr/>	<hr/>	<hr/>
Net Totals .....	2386	871	3257



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