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Investigating Microcosms and Macrocosms: The history of the department of Chemistry and Physics 1853-2003 at Arcadia University (formerly Beaver College)

Arthur Breyer
Arcadia University

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**Investigating Microcosms
And Macrocosms**

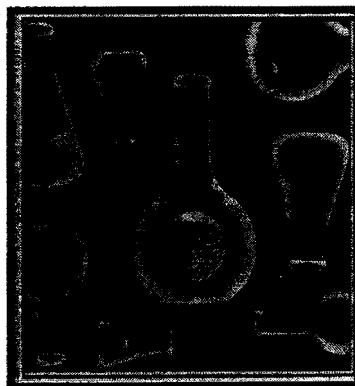
**The History of the Department of
Chemistry and Physics**

1853 to 2003

at

**Arcadia University
(Formerly Beaver College)**

**Dr. Arthur Breyer
Professor of Chemistry Emeritus**



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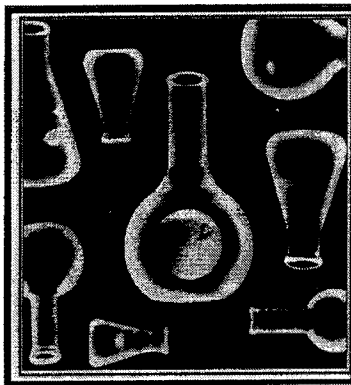
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Dr. Samuel Cameron (Psychology Department Arcadia University) suggested this endeavor as an out growth of his involvement in the writing of A 150-Year History of Beaver College and Arcadia University. I would like to thank Anita Washington, Faculty Secretary, for the creative and skilled typing of this monograph from hundreds of pages of handwritten notes. Dr. Chester Mikulski, Dr. H. Stephen Huber, Dr. Peter Campbell, Dr. Linda Mascavage and Dr. Emanuele Curotto, the current faculty members of the department of Chemistry and Physics provided extensive material based on their personal résumés. Jeanne Smith, Secretary of the Department of Chemistry and Physics provided faculty pictures and assisted with the final draft. Joann Provasnik, Ann Ranieri and Ellen Lefebvre provided generous access to the library archives. Erik Nelson and Joshua Blustein generated computer prints of illustrations and pictures. Dr. Michael Berger, Provost and Vice-President for Academic Affairs provided encouragement and strong support. My wife, Louise Breyer, has been very patient during the roughly 300 hours I have spent on this interesting historical project. This monograph is dedicated to her and my three children, Richard, Carol and Adrienne.

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Chronology

The College

The Beaver Female Seminary was founded in 1853 under the charter, which stated it was to be "a seminary of learning for young women in the arts, sciences, and useful literature." In 1865, a music department was added and the name was changed to Beaver Seminary and Musical Institute. Major changes in 1872 led to a new charter that renamed the institution Beaver College and Musical Institute. At that time male students were added to the student body. In 1901 a four-year college program was begun. Requirements for admission, made to conform to the standard courses for admission to the best colleges, were made in 1903. On March 5, 1907, the charter was amended to make the college again exclusively for women and the name was changed to Beaver College. The Beechwood School was founded in 1911 based upon a solid foundation of "The Liberal Arts and Scientific Courses." In 1925, Beaver College moved to Jenkintown, Pennsylvania and joined academic forces with the Beechwood School—"a school of proven soundness with a unique policy and a record of phenomenal success." The rapid growth of the College over the next three years led to the purchase of the famous "Grey Towers" estate in 1928. The College became co-educational in 1972. Rapid growth in the Graduate Program begun in 1973, along with parallel developments in the undergraduate program, coupled with the reputation of the world-renowned College for Education Abroad led to University status in 2002. The name change to Arcadia University became official on July 16, 2001.

Historical Development of the Physical Sciences at Beaver

In 1869 there was both Beaver Seminary and Musical Institute for "ladies" and a "male school." Tuition was: \$12.50 for the first year, \$13.50 for the second year, \$14.50 for the third year, and \$16.50 for the senior year. There were three semesters every year. Board for the year was \$187. Fuel was 50¢ per week. While daily French and German lessons were \$8.50, Latin and Greek lessons were free. One-semester courses in Geology and Astronomy, along with a two-semester course in chemistry were required in the senior year. No significant changes in the coursework in the physical sciences occurred until 1895-96. That year there were three semesters of physics in the sophomore year, three semesters of chemistry in the junior year and one semester each of astronomy, meteorology, and geology in the senior year.

The goal of the science program was stated in the 1895-96 catalog:

"All the Scientific work is under the direction of a Specialist, and it will be carried out entirely upon laboratory methods, supplemented by textbooks and lectures. The educational and practical value of this department is well known, and is now very generally appreciated by all well-informed people. The Scientific instruction is arranged with a two-fold view.

1. To impart a general view of the vastness and importance of science to those who will never enter upon the University Course.
2. To afford adequate preparation for prospective university work."

In 1898, the four-year program required three semesters each: astronomy, chemistry, geology, mineralogy and physics.

The 1898 catalog of Beaver College and Musical Institute gave details of the content of the science courses:

Natural Science

"The College has three laboratories—chemical, physical, and biological—all large, well lighted and supplied with the latest improved apparatus. The work will be conducted largely by the laboratory method, supplemented by textbooks, and lectures.

Chemistry

An introduction to the principles of chemistry. Williams' Elements of Chemistry is used as a textbook. Recitations and laboratory work in which each student will perform a number of experiments with the more common elements.

Physics

An elementary discussion of dynamics, hydrostatics, heat, light, sound, electricity, and magnetism. The student will be expected to become familiar with the apparatus by personal experiments.

Zoology and Botany

The fall term will be devoted to zoology. Special attention is given to laboratory work in which types of the more common forms of animals are noted. In connection with this, the classification of the animal kingdom is studied. The winter and spring terms are devoted to Botany—Gray's Botany being used as a textbook. This course includes the study of plant and vegetable life, the last part of the year being devoted to the analysis of flowers and preparation of a herbarium.

Geology

This course includes a discussion of dynamical and structural geology. In the classroom the more common rocks and minerals are studied. A number of excursions are taken on Saturdays.

Astronomy

Todd's New Astronomy. One feature of this book is the use of the laboratory method by means of simple and inexpensive apparatus, and where practicable this plan will be followed in the course."

The 1901-02 academic year added three semesters of qualitative analysis but reduced mineralogy to a one-semester course and astronomy to two semesters. With the move to a level of admissions requirements standard for the "best colleges," the curriculum in chemistry changed to three semesters each of elementary chemistry, qualitative analysis, and quantitative analysis along with a term of theoretical chemistry added in the 1902-03 academic year. Three semesters of physics, two in geology and one in mineralogy rounded out the physical science requirements. In 1903-04 the College moved to a two-semester yearly program with courses comparable to 1902-03. With the change of Beaver back to a college exclusively for women in the academic year 1908-09, the coursework in the physical sciences was reduced to one course in general physics, two semesters of chemistry and single courses in geology and astronomy.

It seems of interest to delineate the coursework and texts used in the 1909-10 academic year.

Natural Science

"No Elementary training in biology will be required as a preliminary to Biology I. For Chemistry I, the student should have a thorough knowledge of the elements of physics. For Physics II, a fair understanding of algebra, geometry, and trigonometry is required. One of the first three courses described below is required in the sophomore year; and one in the junior year.

Chemistry

- I. General Descriptive Chemistry. Recitation, lectures, lecture-demonstration, and laboratory work. Based on Remsen's General Chemistry, Advanced Course. Three hours.
- II. Qualitative analysis. Lectures and laboratory work, dealing with seventy-five simple and compound unknown substances. Based on Jones' Junior Course in Practical Chemistry.

Geology

- I. Physiography and General Geology. Recitation, illustrated lectures, laboratory and field work. Descriptive, structural, dynamic, and economic geology, with special reference to the relation of the physical features of the earth to the life of man. Based on Norton's Elements of Geology and Merrill's Rocks, Rock-Weathering, and Soils.

Astronomy

- I. General Astronomy. Astronomy. Recitations, lectures, and practical studies, based on Young's General Astronomy. A study of the form and movements of the earth, and of its relation to other bodies in space. Prerequisite: Mathematics I.

Physics

- I. Theoretical and Practical Course in General Physics. Based on Hastings & Beach's University Physics, and Sabine's Laboratory Manual. Two recitations or lectures a week, and two laboratory exercises of at least two hours each a week. In this course, special attention is given to the subject of sound in order to adapt the work to the requirements of the School of Music."

During the 1915-16 academic year, the program in the physical sciences was expanded to include six physics courses:

"Elementary (3 semesters), and advanced (one semester) courses in mechanics solids and liquids, sound and light, and magnetism and electricity. A one-year course in general chemistry and a semester course in both qualitative and quantitative analyses were also required."

During the 1919-22 period, the six physics courses remained the same, but added to the three chemistry courses were courses entitled: Chemistry of Foods, Food Analysis, and Sanitary Chemistry. The latter course involved methods for determining the quality and possible adulterants in food along with water analysis and purification. Astronomy and two semesters of geology were also required. Of special note during this period, Mary Packard Fiske taught all these science courses! The program of coursework remained the same from 1923 to 1926 except for the substitution of semesters of Organic and Household Chemistry for the Chemistry of Foods and Food Analysis.

All the sciences were incorporated into one department in 1927-28. The chemistry offerings were reduced to General, Physiological and Household chemistry, while the physics offerings dropped to four: General, Electricity & Magnetism, Light, and Household Physics. Laboratories for all of the sciences on the Grey Towers Campus in Glenside were constructed for the 1929-30 academic year in Murphy Memorial Hall.

With the introduction of a Bachelor of Science degree, the course offerings in chemistry and physics were again expanded. General, Analytical, Organic, Physiological Chemistry, Applied Chemistry of the Household and Commerce, Laboratory Techniques, and Chemical Preparations and Field Research comprised the

new program. The seven-course physics concentration involved Elementary, General, Mechanics of Solids And Fluids, Sound and Light, Heat And Magnetism, Electricity And Household Physics. Up to this point and time, length of service of science faculty members was very short.

For the 1930-31 academic year Dr. William Sturgeon assumed the chairmanship of the Chemistry Department along with the introduction of strong professional offerings in chemistry. Two semesters of General Inorganic Chemistry were followed by Qualitative Analysis, Quantitative Analysis, two terms of Organic Chemistry, Physiological Chemistry, Applied Chemistry of the Household and Community, Physical Chemistry, Advanced organic Chemistry, Organic Preparations and the Teaching of Elementary Chemistry. Oddly, the physics chair reduced the offerings to Elementary, Heat, Sound and Light, Electricity and Household Physics.

By the year 1936-37, the chemistry offerings included a two-semester course in Advanced Physiological Chemistry with the five semesters of physics remaining the same. The advanced Physiological Chemistry course was renamed Biochemistry in 1938. The new chair of the Physics Department, Helen Gilroy, Ph.D., significantly revised the physics coursework. The new program began with a year of Elementary Physics followed by courses in Photography, Optics, and Atomic and Molecular Physics. For non-science majors, a two-semester survey of Physical Science and Physics for Home Economic students was offered.

In 1940-41, the Chemistry Department added two courses: Chemistry of Textiles and Related Substances and Special Individual Work for Advanced Students. With the plans to offer a physics major within a few years, the coursework in physics was changed to a professional program. Along with a year of Elementary Physics, courses in Mechanics and Heat, Photography, Optics, Atomic and Molecular Physics, Electricity and Magnetism, Spectroscopy and Theory and Practice in Equipment Testing were added. Also included were the Physical Basis of Music, and Physics for Home Economic Students. For different majors, three different courses in general inorganic chemistry were given in 1943-44.

The Chemistry and Physics Departments were combined in 1947-48 with changes again in the Physics program. Courses were reduced to General Physics, Physics of Home Economics, Photography, Physics of Physical Education and Electricity and Magnetism. For 1950-51, a one-semester course for Home Economic students in organic chemistry was added. With the addition of a medical technology program in 1947, course enrollments in chemistry and physics increased. A curriculum revision in 1956-57 was designed to familiarize students with the fundamental principles underlying chemical and physical phenomena. "Emphasis is placed on the development of analytical problem-solving methods, possessing the ability to see what others have seen and think—what no one else has taught." The coursework sequence: General Chemistry and Qualitative Analysis, Quantitative Analysis, Organic Chemistry, Technical Writing, Biochemistry, Physical Chemistry, and Individual Work for Advanced Students. All were two-semester courses except Qualitative Analysis. The Physics

program was weak with only general physics and physical science being offered for non-majors.

With the appointment of Arthur C. Breyer as Chair of the Department of Chemistry and Physics, the first step toward gaining accreditation by the American Chemical Society was made in 1964-65. The chemistry and physics programs were totally redesigned by the departmental staff and with the guidance of the Dean of the College and the Educational Policies Committee.

The courses offered were Modern Chemical Concepts I & II (General Chemistry); Modern Chemical Concepts II, IV (Organic); Chemical Concepts V (Quantitative Analysis); Theoretical Chemistry I & II, and elective Special Topics courses in Biochemistry, Analytical Chemistry, Physical and Inorganic chemistry, and Organic Chemistry. Students were also encouraged to take a capstone course, Independent Study and Seminar. The only physics course was Fundamental Concepts of Physics I & II. Increased emphasis on advanced mathematics and biology were also prescribed.

By 1974-75, chemistry students could elect any one of three programs, depending on their career goals, which included a common core program.

Program I

This program will prepare students for graduate work in chemistry and chemical allied sciences and for teaching at the high school, and following graduate study, at the college or junior college level.

Program II

Students interested in medical, dental, osteopathic, and veterinarian graduate programs, and the paramedical professionals should consider this program or Program I.

Program III

This program is designed for students who expect to qualify for a position in chemistry, chemical allied professions such as information retrieval, scientific librarian, scientific illustration, marketing advertising and sales, or general science teaching at the elementary or secondary school level.

During this same year, a new course in Nuclear Physics was added to the physics course offerings.

In a move toward accreditation, a Bachelor of Science degree program was initiated in 1982 with specific coursework listed for minors in chemistry and physics. Program II and III above would still lead to a Bachelor of Arts degree.

The Bachelor of Science degree program prepares students for graduate school in chemistry and chemical allied sciences, for professional-level employment in the

chemical industry and for secondary, two-year college and post-graduate college teaching positions, and is often the program of choice for premedical students.

All Bachelor of Science recipients who complete this program are certified by the American Chemical Society as having met the Society's high standards for an undergraduate degree in chemistry.

A common feature of all the departmental programs was flexibility. "Substitutions in keeping with the student's intended career may be made with the approval of the departmental chairman."

The titles of many of the chemistry courses were changed in 1986.

CH 203	Quantitative Analysis became Equilibrium and Analysis
CH 201-2	Organic Chemistry: Structure, Reactions and Mechanisms
CH 301-2	Theoretical Chemistry became Physical Chemistry

The Special Topics advanced courses became:

CH 304	Instrumental Methods of Clinical Analysis
CH 305	Inorganic Chemistry
CH 306	Qualitative Organic Analysis
CH 307	Polymers and Biopolymers

Still later, the Organic Analysis course was changed to Advanced Organic Chemistry, CH306.

A course entitled "Career Internship In Chemistry", CH370 was added in _____.

Two different introductory courses in physics were offered during this period. Fundamental Concepts in Physics I & II for general students and Conceptual Physics I & II for science majors.

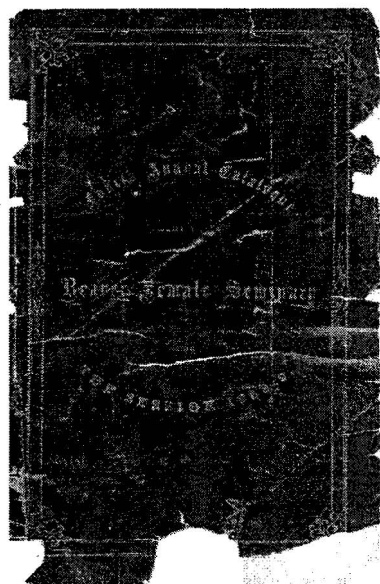
Beginning in the 1974-75 academic year, a progression of new courses in physics was added.

PH324	Atomic Physics	PH325-6	Mathematical Physics I & II
PH332	Engineering Thermodynamics	PH333	Statistical Thermodynamics
PH331	Engineering Mechanics	PH351	Quantum Chem. & Chem Physics
PH341-42	Electronic Circuit Analysis I & II	PH345	Topics in Twentieth Century Physics
PH324	Frontiers in Astronomy	PH389	Physics Research

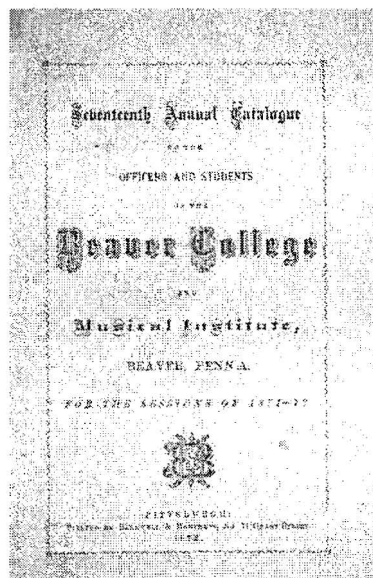
These courses were developed to meet the career goals of pre-engineering and Bachelor of Science professional majors.

The scope of science offerings by the department was expanded by the addition of PH223 Essentials of Physical Geology in 1998. Chemistry majors have been regular participants in the Cooperative Education and Center for Education Abroad programs since 1977.

Evolution of A University



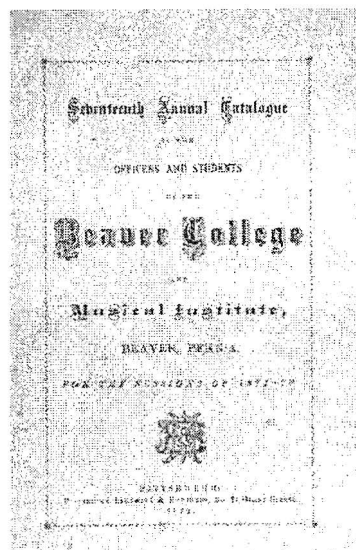
1858-1859
Beaver Female Seminary and
Musical Institute
Beaver, PA



1869-1870
Beaver Seminary and Musical
Institute
Beaver, PA



1873-1874
Beaver College and Musical
Institute
Beaver, PA



1897-1898
Beaver College and Musical
Institute
Beaver, PA

Evolution of A University



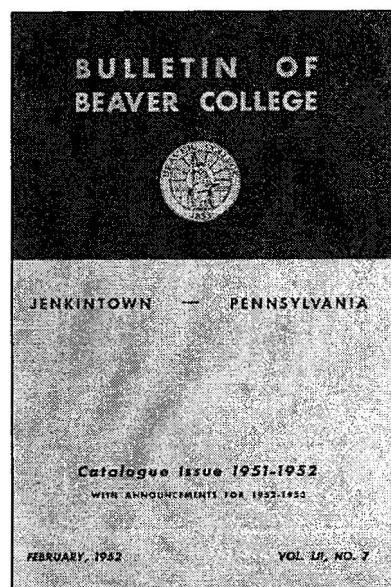
1901-1902
Beaver College and Musical
Institute
Beaver, PA



1909-1910
Beaver College
Beaver, PA



1923-1924
Beaver College for Women
Beaver, PA

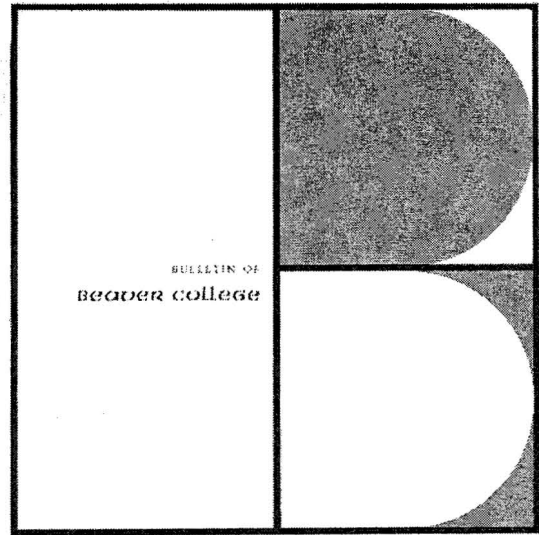


1951-1952
Beaver College
Jenkintown, PA

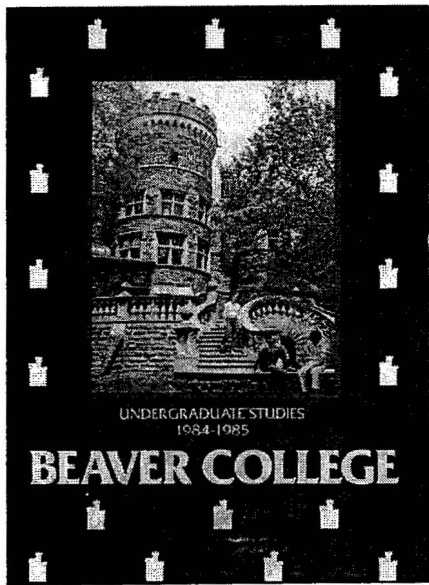
Evolution of A University



1951-1952
Beaver College
Jenkintown, PA



1968-1969
Beaver College
Glenside, PA



1984-1985
Beaver College
Glenside, PA



2002-2004
Arcadia University
Glenside, PA

Homes of the Chemistry/Physics Department
Beaver, Pennsylvania



COLLEGE HALL.

Homes of the Chemistry/Physics Department
Jenkintown, Pennsylvania



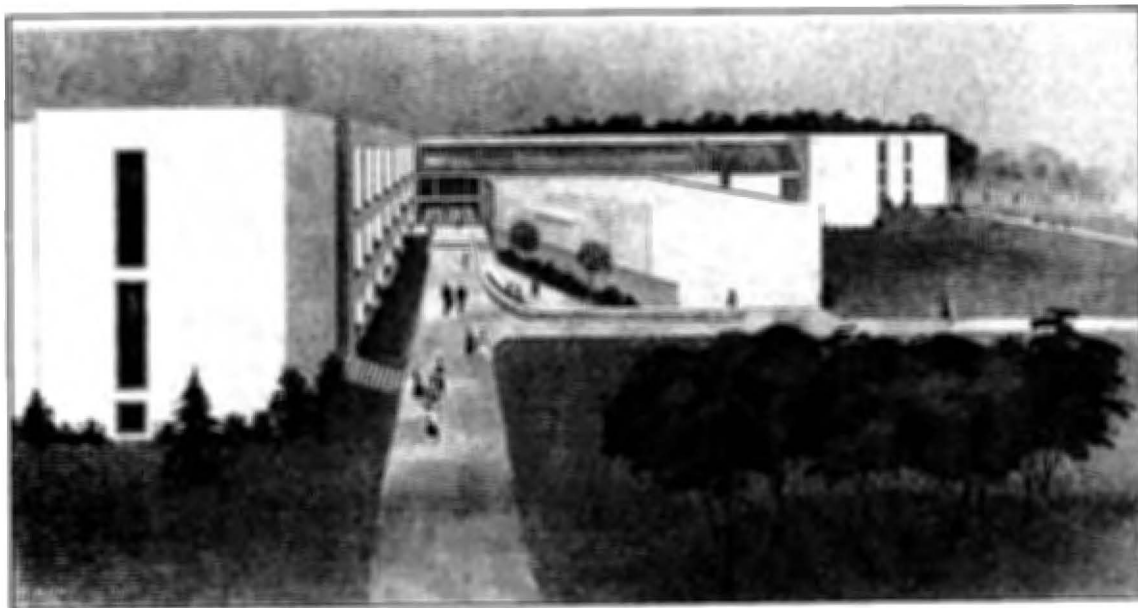
Photographed at Beaver College

Beaver Hall is the center of school life. It is the original building used by the college after its transfer from Beaver, Pennsylvania.

Murphy Hall
Glenside, Pennsylvania



Boyer Hall of Science, Glenside,
Pennsylvania



Dedication of the Marian Angell Boyer Hall
of Science

DEDICATION
OF THE
MARIAN ANGELL BOYER
HALL OF SCIENCE

SUNDAY, MAY SECOND
NINETEEN HUNDRED AND SEVENTY-ONE

BEAVER COLLEGE

GLENSIDE, PENNSYLVANIA

Dedication of the Marian Angell Boyer Hall of Science

Program

GREETINGS

Edward D. Gates, President of the College

INVOCATION

James R. Gailey, General Secretary of the Board of Christian Education,
The United Presbyterian Church in the U.S.A.

ADDRESS

Robert L. Geddes, Senior Partner, Geddes Brecher Qualls Cunningham,
Architects for the Building, and Dean of the School of Architecture and
Urban Planning, Princeton University

DEDICATION OF THE HALL OF SCIENCE

John R. Bunting, Chairman of the Board of Trustees

DEDICATORY PRAYER

William F. Wefer, Member of the Board of Trustees

REMARKS

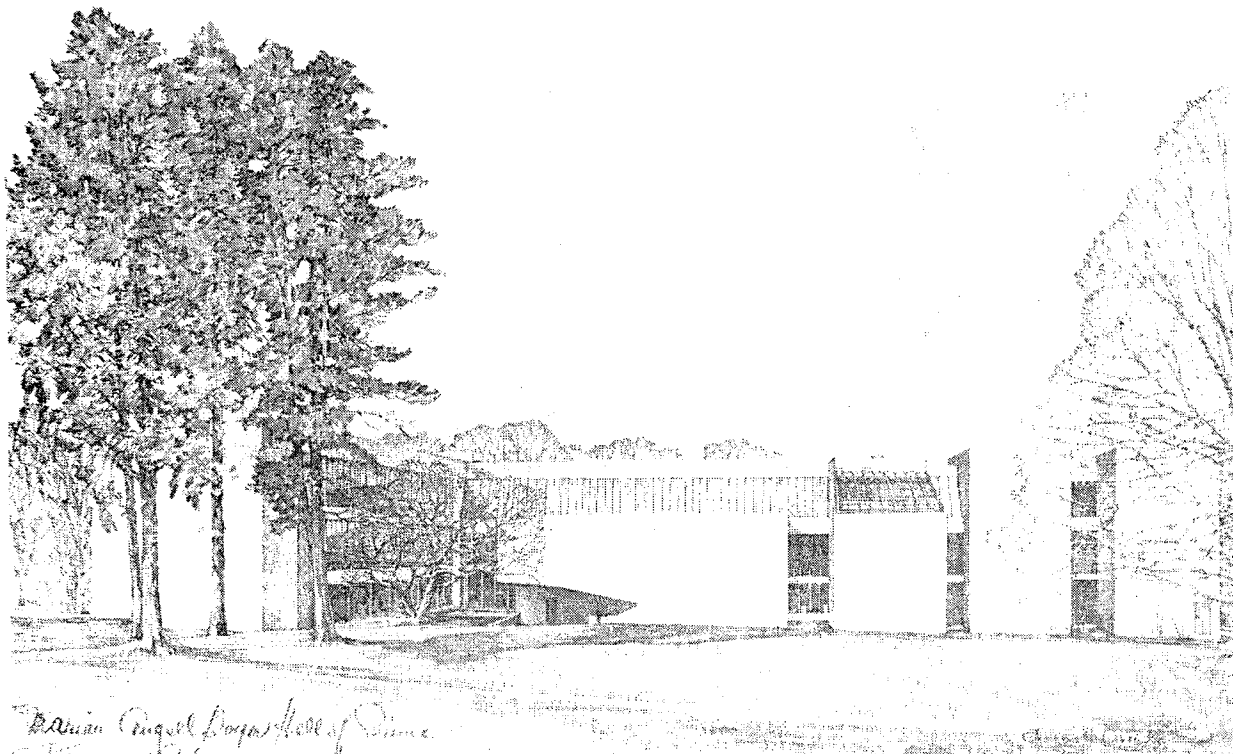
Margaret F. LeClair, Dean of Beaver College
Susan C. Saxer, '71, President of Math Club
Virginia Fulmer Haist, President of the Alumnae Association
Harry G. Kuch, Member of the Board of Trustees and
Chairman of the Dedication Committee

TOURS OF THE MARIAN ANGELL BOYER HALL OF SCIENCE

RECEPTION

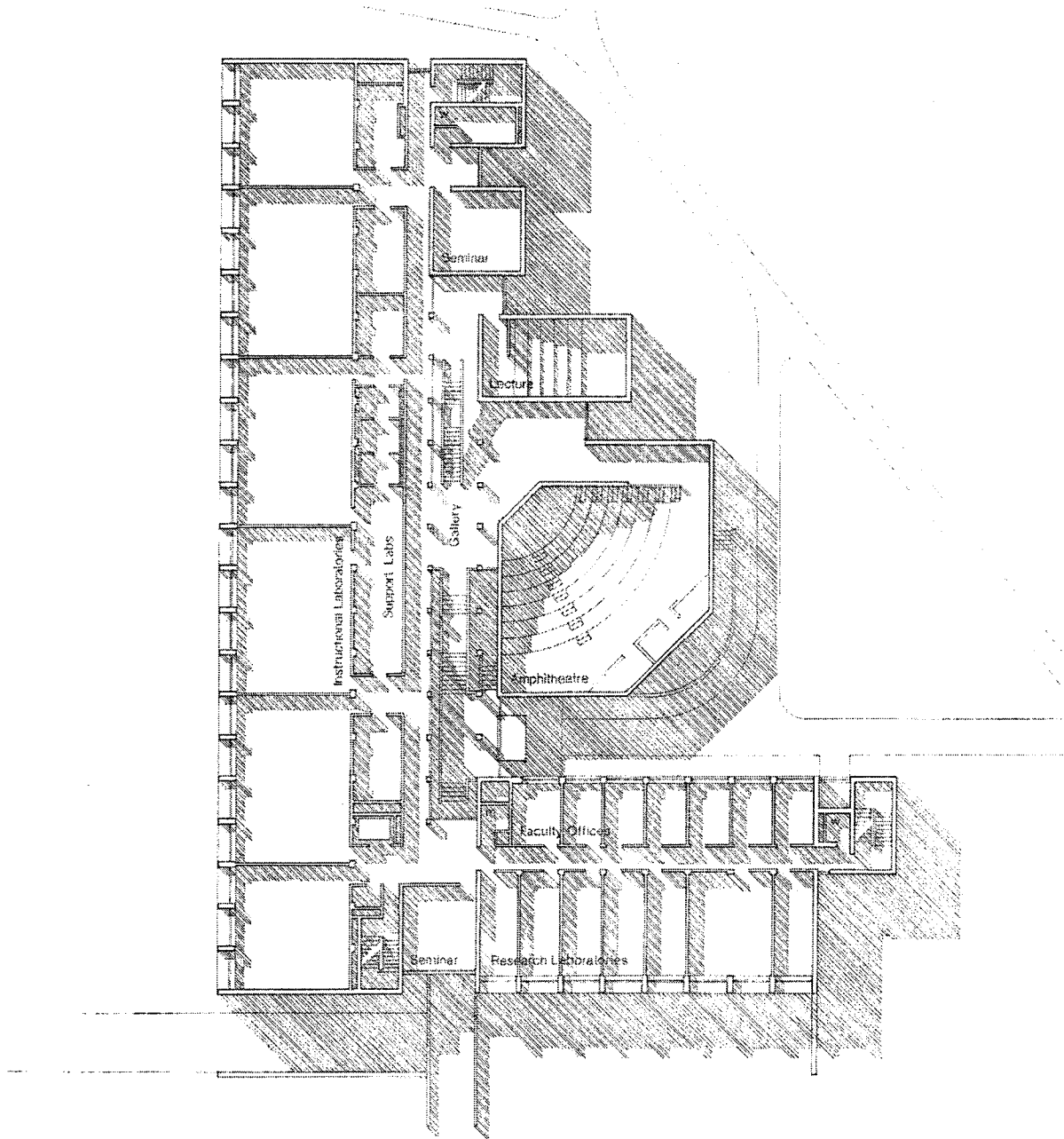
Grey Towers Castle

The Marian Angell Boyer Hall of Science



Dedication of the Marian Angell Boyer Hall
of Science

Marian Angell Boyer Hall of Science



Marian Angell Boyer Hall of Science

Geddes Brecher Qualls Cunningham Architects

Marian Angell Boyer Hall of Science



Program Development

Program Development

Over the 39-year period between 1964 and 2003, the Department of Chemistry and Physics faculty members have been creatively involved in the development of many major new programs at Arcadia University (Beaver College).

Medical Technology

The medical technology program was initiated in 1949. Professor Kathryn Darby served as advisor from 1949 to 1987 after which time the program was terminated. The coursework included extensive coursework in biology and chemistry as well as introductory physics. Students could elect either of two plans: 1) an integrated four year program leading to a Bachelor of Science in Medical Technology with an accredited hospital; or 2) four years at Beaver earning a Bachelor of Arts degree followed by a year at a clinical placement. The latter plan allowed the student to apply to any approved clinical placement for further study and if a second degree in medical technology is directed, the student could arrange to have the courses taken at the placement transferred to the College.

Premedical Programs

The pre-medical program was begun in the 1940s and has continued to be a program of major interest for many students.

Arcadia University offers many programs that satisfy the course requirements for admission to schools of medicine, dentistry, osteopathy, optometry, podiatry and other health-related fields. While pre-medical students usually major in biology or chemistry, medical schools will except students with excellent records regardless of major, provided they have a solid foundation in the basic sciences and mathematics. The pre-medical advisors assist students with the application process and choice of schools.

In view of the extensive coursework recommended in biology, chemistry and physics, the program's co-advisors are Dr. John Hoffman, Chair of the Biology Department and Dr. Chester Mikulski, Chair of the Department of Chemistry and Physics.

Chemistry for Nurses

Over the years we have had a number of different formats for preparing students for the field of nursing. Most recently we had a cooperative program with Abington Memorial Hospital in which students could transfer there after their sophomore year. They also had the option of transferring to an institution offering a B.S. degree in nursing. As part of the program, the Chemistry and Physics Department offered CH105, Chemistry for the Health Sciences. At other times, pre-nursing students took Chemistry 101-102, Modern Chemical Concepts I-II. In earlier years we affiliated with Presbyterian Hospital and the University of Pennsylvania School of Nursing.

Chemistry Seminar CH390

The senior chemistry seminar course began in 1966. Over the years it has undergone several formats. Initially topics such as polymer chemistry, descriptive inorganic chemistry, reaction kinetics, nuclear chemistry and medicinal chemistry were chosen. Seniors and chemistry faculty members each gave two seminars over the course of the year. During several years, the chemistry faculty led seminars on spectroscopic methods, biochemistry and other topics. Students completed workbook assignments and submitted written reports. Currently the two-semester capstone course requires students to complete a library or laboratory research project, deliver a seminar and prepare both a written report and poster presentation. The major objective was to enable the students to develop the poise, techniques, and content organization necessary for the presentation of a technical paper.

Science in Civilization

The Science in Civilization course was designed by Dr. Frank Sturgis, Dr. Raymond Rose, Dr. Roland Eddy, Dr. Robert Matthews and Dr. Arthur Breyer under a 1969-71 National Science Foundation College Science Improvement Program (NSF-COSIP) grant. For many years the course was team-taught by four professors (Breyer, Eddy, Matthews, and Rose) to non-science majors. It covered topics such as atomic physics, energy, electricity, heat, mechanics, rates of reaction, equilibrium, plant life, ecosystems, air, water, and noise pollution, environmental issues, genetics, circulatory systems, conception, energy production and utilization, population, human health, food production, radioactivity, and a host of other topics. Of special note were the sections on music, art and color, and the role of science in society. In the music section there were classes in which a very large number of musical instruments were demonstrated and explained by guest musicians. The Amado String quartet played music in several classes with comments. There was a laboratory demonstration on piano tuning. In the art and color section visits were made to the Art Department for lectures and "labs" on lithography, etching, etc. Lectures were given on dyes and color as well as how colors arise in plants from a chemical viewpoint. Trips were made to the Abington Water Treatment and Sewage Treatment Plants. Tours were arranged to the McNeil Pharmaceutical Laboratories. Guest lecturers spoke on Urbanism and Utopia, Role of Science and Technology in Society, Science, the Law and Society, and Art History. Many new laboratory experiments of interest to non-science majors were designed. An extensive series of films on such topics as sense perception, equilibrium, nuclear science, and biochemistry were shown.

Currently the course is overviewed as follows: ID130-131

"Science in Civilization is a two-semester course in which students learn and apply basic concepts of physics, chemistry, astronomy, geology and biology. The interrelationship among the fields of science is stressed and concepts are reinforced throughout the year. Basic problem-solving skills are emphasized in

both lecture and laboratory. The goal of the course is to produce scientifically literate students who are able to make informed decisions in our increasingly technologically oriented world. The course is primarily for non-science majors, including those preparing for the teaching profession. There are three class hours and three laboratory hours weekly."

For the evening undergraduate program the course was modified in 1988 by Dr. Ronald Rowe and entitled Science and Technology Today and described as follows:

"Two-semester course for non-science majors. Includes a descriptive survey of the role of science and technology in modern American life. Emphasizes the effect of scientific knowledge and its technological applications on lifestyles. Examines basic concepts of the physical, life, and earth sciences applied to current societal crises, such as population, pollution, and energy production and consumption. A major change in the evening course was the discontinuing of the laboratory program. With the loss of financial support for a team-taught course the teaching of the course was assumed by Dr. Ronald Rowe in 1983-84, who fortunately had training in biology, chemistry, geology, and general science."

Freshman Laboratory Research Program

From 1969 to 1971, during the last seven weeks of the freshman laboratory program each student worked on a laboratory project selected from a list of topics suggested by the chemistry-physics faculty members or by the students themselves. Projects included thin-layer chromatographic studies on dyes and surfactants, the analysis of bleaching agents, radioisotope experiments, extraction and identification of natural products from lichens and fungi, the adoption of college science demonstrations to the elementary school level, electrochemical experiments, the synthesis, structure and properties of inorganic complexes, and computer programming problems.

Students were required to submit a written report of their work. The program was very highly rated by the students who were used to formal one-session experiments carried out by all students. Unfortunately, the program required an enormous amount of overload time by the faculty members and because of that program was terminated in 1972.

Engineering-Combined Program

In the early 1970s, Dr. Edward Gates and Dr. Arthur Breyer made a number of trips to the Polychrome Cooperation in Yonkers, New York and met with Dr. Gregory Halpern, President of the corporation and several members of his leadership staff. The Dean of Engineering at Columbia University was a consultant to the company. On a visit to the Beaver College campus in 1975 by Dr. Halpern and the Dean, Dr. Breyer was asked to tour the Dean around the campus. During the course of the tour the Dean asked Dr. Breyer if Beaver College would be interested in a Cooperative Engineering Program with Columbia University. This led to lengthy discussions with Dr. Gates,

Dean Margaret Le Clair, Dr. Charles Moulton, the chemistry-physics staff and Columbia University. A formal agreement establishing both a 3-2 program and 4-2 programs was signed on October 6, 1976. Dr. Moulton, Chair of the Mathematics Department and Dr. Breyer were appointed co-advisors.

Advisors:

1976-1978	Dr. Moulton; Dr. Breyer
1979-1980	Dr. Moulton
1980-1981	Dr. Moulton; Dr. Wolff
1981-2003	Dr. Huber; Dr. Mikulski

The program in engineering is a combined five-year plan in cooperation with Columbia University. Designed for students with strength in science and mathematics, the program provides strong liberal arts foundation coupled with intensive engineering study as a sciences. The program qualifies students to take the examination for professional engineers.

Typically, students complete the first three years at Arcadia University in programs in mathematics, computer science, chemistry, or an individualized major in applied physics. Upon recommendation of the program adviser, students then transfer to Columbia University to complete two additional years of engineering study. Upon completion of the five-year program, students are awarded the Bachelor of Arts degree for Arcadia University and the Bachelor of Science degree in engineering or applied science from Columbia University.

Under the combined plan a student may elect to pursue any one of the following programs at Columbia University: Applied Mathematics, Applied Physics, Biomedical engineering, Chemical Engineering, Civil Engineering and Engineering Mechanics, Computer Engineering, Computer Science, Earth and Environmental Engineering, Materials Science and Engineering.

It is also possible for students to complete a four-year bachelor's degree program at Arcadia University and then take two additional years at Columbia University for a Master's Degree in engineering.

Among other options, Dr. Huber expanded the engineering combined program to Drexel University and Widener University

Dr. H. Stephen Huber has served as principal advisor and liaison officer for the Combined-Plan Engineering Program since 1981. He has also designed and implemented a significant number of courses for the program including engineering mechanics, statistical thermodynamics and atomic physics.

Interdisciplinary Science

The interdisciplinary science program was developed in 1975 by Dr. Raymond Rose and Dr. Arthur Breyer to provide more flexibility for students who had strong interests in several sciences.

The program in interdisciplinary science provides an opportunity to build a four-year program on a solid core of courses in biology, chemistry, mathematics, and physics. The program is particularly valuable for 1) students interested in professional employment or graduate study in biochemistry, pharmacology physiology, nutritional science, immunology, clinical chemistry, or pharmaceutical science; 2) students interested in preparing for professional careers in dentistry, medicine, osteopathy, optometry, veterinary medicine, or related medically-allied fields; and 3) community college or junior college transfer students who would like to complete a science major geared toward a variety of careers within two years.

Participants in the program receive a B.A. in Interdisciplinary Science. Dr Arthur Breyer served as advisor until 1992 when Dr. Chester Mikulski assumed the responsibilities.

Cooperative Education

A proposal was submitted to the National Science Foundation in 1976 for retraining women in chemistry who had left the workforce to raise a family. When the grant was denied, it was recast in a new proposal to Health, Education & Welfare Department which resulted in receiving an HEW Title IV D Cooperative Education Grant in 1977 for \$29,000 with Dr. Arthur Breyer as Director. Mr. Charles Lower was hired as Program Director. He submitted a second successful proposal in 1978 and assumed leadership of the program. Subsequent proposals were denied.

Cooperative education provides an opportunity to combine on-campus academic study with periods of off-campus, education-oriented employment in areas related to students' academic and career interests. Through this program, students experience immediate application of their academic training while contributing to the financing of their education. They may be exposed to varied cultural backgrounds and geographic locations through their work experiences. They learn to adapt gradually to the work environment and can explore interests and emerging careers on an organized basis.

Co-op students are paid at prevailing rates by their employers. Work assignments are normally full-time for a six-month period. Students taking additional co-ops may take part-time work assignments (20 or more hours a week) for six months combined with part-time study (a maximum of 11 credits), or full-time assignments during the summer (a minimum of 250 hours). An academic adviser establishes learning objectives for each work assignment. Upon the successful completion of each work assignment and its learning contract, academic credit is awarded.

Students may elect this program in the sophomore through the senior years (Cooperative Education I, II, III, or IV). Students must maintain a log of all activities and must submit a detailed written report to their employer, the Career Services Director, and the Department.

Post-Baccalaureate Certificate in Health Professions or in the Sciences

The program, begun in 1984-85, was developed by the faculty of the Biology and Chemistry—Physics Departments. This post-baccalaureate program is designed for persons who have completed a bachelor's degree and wish to pursue a career in the health professions or sciences. The program prepares students for admission to schools of dentistry, medicine, osteopathy, optometry, audiology, podiatry, veterinary medicine, physician assistant studies and other health-related fields; for graduate study in biology, chemistry and physics or for entry into full-time employment in the basic sciences. Requirements for the Post-Baccalaureate Certificate in the Sciences are different from the requirements for the Post-Baccalaureate Certificate in the Health Professions. In addition, they are dependent upon the coursework taken in each student's undergraduate program.

Optometry—Combined Program

As part of the American Chemical Society Student Affiliates Program, the chapter advisor arranged annual field trips to the Pennsylvania College of Optometry (PCO) for students interested in considering optometry as a profession. As a consequence, many graduating seniors went on to PCO for graduate work. Dr. Arthur Breyer met with the Dean of the College (PCO) and the Director of Admissions (PCO) to consider a cooperative degree program with PCO. Dr. Bette Landman joined in the dialogue and detailed negotiations which led to a final agreement in 1986.

The program in optometry is an accelerated seven-year plan in association with the Pennsylvania College of Optometry (PCO). Students complete the first three years at Arcadia University and the remaining four years at PCO. Upon completion of the first professional year at PCO, the Bachelor of Arts degree in interdisciplinary science is granted from Arcadia University; upon successful completion of the full program at PCO, the Doctor of Optometry degree is awarded from PCO.

The curriculum is designed so that core requirements and all but one course required for the major in interdisciplinary science can be completed in three years. (The final course will be completed during the first year at PCO).

Students apply for admission to the program during their junior or senior year and are selected by a joint PCO/Arcadia University committee. Four places in each professional year's class at PCO are reserved for qualified Arcadia University students.

Astronomy Program

Through several grants Dr. Stephen Huber was able to purchase and build an observatory that housed a 14" Cassegrain Telescope on the roof of Boyer Hall. Not only was the telescope made available to students enrolled in the astronomy course but also groups from all over the Delaware Valley were invited to pay a visit, to the observatory

Master of Arts Concentration in Chemistry Program

Retraining In-Service Teachers for Chemical Education, a Title II Program, funded by the Education for Economic Security Act P.O. 98-377, was designed for experienced teachers who currently were not certified to teach chemistry. The objectives of the program were (1) to enable teachers to gain certification in chemistry and/or physical science; (2) to provide an opportunity for teachers, to complete a Masters of Arts in Education with a concentration in chemistry; and (3) to prepare a group of master chemistry teachers through a nine-course sequence of chemistry courses specifically designed for teachers, coupled with a wide variety of pedagogically oriented workshops, colloquia, symposia and in-course activities.

In addition to the large initial grant, the 1987-1989 retraining program received nine grants from the Philadelphia School District and small grants, from two corporations and the Philadelphia Section of the American Chemical Society. The program was directed by Dr. Arthur Breyer who also developed the nine courses specifically designed for high school teachers and approved by the Educational Politics Committee and the Faculty.

These courses were:

CH435 Modern Chemical Concepts and the Teaching of High School Chemistry I
CH436 Modern Chemical Concepts and the Teaching of High School Chemistry II
CH437 Audio-Visual Chemistry Workshops
(Involved 15 different workshops totaling 56 hours of class)

CH439 Organic and Biochemical Structures, Reactions, and Mechanisms I
CH440 Organic and Biochemical Structures, Reactions and Mechanisms II
CH441 Descriptive Inorganic Chemistry
CH442 Analytical Chemistry
CH443 Basic Physical Chemistry and Chemical Physics I
CH444 Basic Physical Chemistry and Chemical Physics II
CH445 Biochemistry

Chemistry and Business

A number of colleges initiated programs combining chemistry with various business programs. The American Chemical Society Committee on Professional training (ACS-CPT) in our preparation for accreditation expressed strong support for our Chemistry and Business major that was developed by Dr. Chester Mikulski and Dr. William Biggs in 1986-7.

The program in chemistry and business is designed for students who have an interest in chemistry but do not wish to pursue a career in research. With a dual major in business and chemistry, graduates of the program are prepared for entry-level position in management, marketing, advertising, sales, or other business activities in chemical or pharmaceutical companies. A highlight of the program is the senior-level internship, which involves placement in a chemical and/or pharmaceutical firm.

In addition to having immediate job applicability, the degree is designed to meet the M.B.A. requisite courses for many leading graduate institutions. The department has articulation agreements with many of the Philadelphia area colleges and universities that permit our student to waive first year requirements and in some instances to take graduate level courses during the senior year. Students who complete the program receive a B.S. in Chemistry and Business.

Peace Studies

Although not a program under the administration of the Department of Chemistry and Physics, the Center for Peace Studies at Beaver College/Arcadia University was initiated by Dr. H. Stephen Huber under a Faculty Development Grant "Program Development Initiatives by the Beaver College Center for Peace Studies" Dr. Huber and six collaborators developed the program in 1992-1993.

Biochemistry Concentration

From 1990 to 1994, Dr. Peter Campbell made significant changes in the biochemistry course in the areas of enzyme mechanisms NMR spectroscopy, transcriptional control, biotechnology and the laboratory program along with improved coordination with the cell biology course. The American Chemical Society Committee on Professional Training (ACS-CPT) had strongly endorsed our plans to design a B.S. program in biochemistry in 1991. The Department of Chemistry and Physics submitted a proposal for this new major and it was approved for initiation in 2001-2002.

Pre-Veterinary Program

In 1972 the first overture to place an extremely well-prepared student in veterinary school was unsuccessful. At that time there was an obvious discrimination against accepting female students into veterinary school. However, for five successive years beginning in 1978, we were able to place one applicant each year in veterinary

school all under the premedical program for which Dr. Arthur Breyer was the adviser. The current advisor is Dr. John Hoffman.

Arcadia University offers several routes for completion of the requirements for admission to schools of veterinary medicine. Majors in biology, chemistry and psychobiology are most commonly taken by students interested in Veterinary medicine, but schools will accept students with excellent records in other majors, provided they have adequate preparation in the basic sciences and mathematics. The pre-professional adviser assists students in the choice of school and with the application process.

Language of Science

A new introductory course, Chemistry 100, Language of Science was developed by Dr. Emanuele Curotto in 2001 and was offered for the first time in the fall of 2002. The course is designed for incoming students to learn or relearn the studying, analytical and algorithm development skills that make up the functional prerequisites for further studies in chemistry and physics. Other related materials will provide interest and an opportunity to apply these prerequisites.

Master of Science Degree in Forensic Science

Beginning in the Fall 2003, the first class in the Master of Science Degree in Forensic Science (MSFS) was admitted. This exciting program was developed by a cooperative effort by the National Medical Services (NMS), The Frederic Rieders Family Renaissance Foundation (FRFRF) and Arcadia University. The collaborators were Drs. Chester Mikulski, John Hoffman, and Mark Curchack of Arcadia University and Drs. Frederick Rieders, John DiGregorio and Larry Presley of NMS. Mr. Presley serves as Director of the Forensic Science Program. The two-year program was designed for those who hold BA or BS degrees in chemistry or biology, forensic laboratory analysts and for law enforcement personnel. The program includes coursework in criminalistics, forensic toxicology, and forensic biology along with technical investigations in forensic science. Coursework and research will be carried out at both Arcadia University and NMS. Lectures and laboratory work will be taught by staff from Arcadia University, FRFRF, and NMS. Students may elect to specialize in forensic biology (particularly DNA typing) or forensic toxicology. The detailed programs for chemistry and biology majors are delineated in the outline which follows:

FIRST YEAR	M.S.F.S CURRICULUM		Credits
FIRST SEMESTER			
FS 500: Introduction to Forensic Science I (Foundations and Physical Aspects of Forensic Science)			3
FS 502: Law, Evidence, and Procedure			3
Forensic Science Symposium			1
BI 425: Cellular Biology	CH 404: Instrumental Analysis I		3
BI 404: Genetics	CH 407: Polymers and Biopolymers		3
OR FS 585: Independent Research in Forensic Science			
SECOND SEMESTER			
FS 501: Introduction to Forensic Science II (Foundations and Biological Aspects of Forensic Science)			3
FS 503: General Principles of Toxicology/FS 504 General Principles of Pharmacology			6
FS 561a: Forensic Science Symposium			1
BI 433: Molecular Biology	CH 405: Instrumental Analysis II		3
BI 421: Human Genetics and Development	CH 403: Biochemistry		3
OR FS 585: Independent Research in Forensic Science			
SECOND YEAR	FIRST SEMESTER		
	FS 525: Forensic Toxicology I		3
	FS 530: Forensic Biology I		3
	FS 562a: Seminar Series: Special Topics in Forensic Science I		2
	FS: 583 Graduate Internship in Forensic Science OR FS 596: Thesis Research in Forensic Science		3
SECOND SEMESTER			
FS 526: Forensic Toxicology II OR FS 531 Forensic Biology II			3
FS 540: Statistical Analysis and Biostatistics			3
FS 562b: Seminar Series: Special Topics in Forensic Science II			2
FS 584: Graduate Internship in Forensic Science OR FS 597: Thesis Research in Forensic Science			3
Total			51

The Importance of a Quality Program in Chemistry and Physics

The mission of an active, modern program of physical and chemical education at the undergraduate level transcends the training of professional chemists and physicists. Chemistry and physics are important in other disciplines and in the intellectual lives of many students seeking a liberal education. The structure and scope of any particular undergraduate program in chemistry and physics is governed by the overall educational objectives and resources of the institution in relation to the needs of the students and the other constituencies whom it seeks to serve. For there to be a sound, comprehensive program that prepares its students for professional work in the physical sciences, there must be a strong institutional commitment of resources to achieve this objective.

The comprehensive programs should be administered by the Department of Chemistry and Physics organized as an independent unit with control of an adequate budget. The Department should be involved in and exercise reasonable control over matters pertaining to faculty selection and promotion, course development, assignment of teaching responsibilities, grading standards, and similar intradepartmental activities.

Furthermore, the Department should promote improvements in educational and employment opportunities in professional areas for women and minority groups.

An adequate level of financial support, with continuity and stability, is essential to a strong and modern program of education in chemistry and physics. The institution must establish its ability and willingness to make such a financial commitment, and the level should be consistent and reasonable in relation to the overall resources of the institution and its educational goals.

Financial support by the institution is necessary for the following:

1. A permanent chemistry faculty of sufficient size and scientific breadth to offer the variety and level of chemistry courses specified in the American Chemical Society criteria.
2. Sufficient nonacademic personnel for secretarial services, stockroom administration, and instrument and equipment maintenance.
3. Expendable supplies and capital equipment acquisitions and replacements as required for high quality laboratory instruction.
4. Equipment maintenance and repair.
5. A suitable amount and variety of library and learning resources including scientific periodicals, other references materials, and computer facilities.
6. Support for student and faculty research.
7. Staff travel to professional meetings.
8. Sabbatical leaves for tenured faculty.

The Department of Chemistry and Physics should offer courses basic to most science careers within the context of small classes and laboratory sections numbering 15-20 or less students with the exception of freshmen classes. A basic foundation in the sciences and mathematics should provide students with broad and flexible backgrounds needed to commence graduate school, handle a wide-variety of industrial positions, enter the teaching profession and even prepare them for vocational opportunities that were not in existence when the student was attending college. Science majors should be well prepared in the social sciences and the humanities. They also should have developed writing skills and be able to make well-organized and clear verbal reports. All students should be aware of the importance of innovation and experimentation in scientific progress and success in scientific careers.

American Chemical Society Accreditation

During the 1964 Spring American Chemical Society (ACS) meeting in Philadelphia, Dr. Arthur C. Breyer was invited to present a major research paper, "Salting-Out Chromatography" at an all day symposium. Dr. Celia Marshak, acting chair of the Beaver College of Chemistry and Physics while in attendance at the meeting met Dr. Breyer at the Employment Clearing House and invited him to visit the College and explore an opportunity to become Chairman of the Department. The year after accepting the position, the Department restructured the chemistry curriculum to conform to the requirements for a program which would lead to ACS accreditation. This was the beginning of what has been a growing relationship between the Department and the American Chemical Society. The American Chemical Society is recognized as a world leader for fostering scientific education and research as well as promoting public understanding of science. The Society was founded in 1876 as a nonprofit organization and is the world's largest scientific society, citing a membership of more than 150,000 chemists and chemical engineers.

Over the years all faculty of the Department have been members of both the National ACS and the local Philadelphia section. Active involvement of our Department in the Philadelphia section led to an invitation for one of our outstanding senior chemistry majors to be considered for the Philadelphia Section American Chemical Society Student Achievement Award in chemistry.

This award has been presented at the annual Honors Convocation each year since 1968. Meetings of the Philadelphia section were held on our campus at least once a year throughout the 1970s, with social hours in Grey Towers, dinners in the Dining Hall and meetings in Calhoun Auditorium. Groups of our students served as hosts and hostesses and in the process made productive contacts with professional chemists and their corporations. In 1968, we explored the possibility of applying for ACS accreditation but were informed that the minimum number of tenured chemistry faculty members was four. Our lack of a fourth tenured faculty member stopped the process dead in its track.

Dr. Fran Bonner visited Beaver College May 17-18, 1976, to evaluate our entire program under the ACS Cooperative Chemistry Consultant Service sponsorship. As you might expect, he had good things to say and strong suggestions for change.

In January 1983 a renewed effort to achieve ACS accreditation was begun based upon a detailed four-page outline geared toward meeting with the ACS Committee on Professional Training (CPT) at the August 1983 National American Chemical Society meeting. For a variety of reasons, the effort could not be completed in time. We began again to strive for a meeting in 1987. Our fourth faculty member, Dr. June Taylor, a biochemist was granted a leave of absence for the fall 1987 semester. Just as the accreditation process was moving into high gear, Dr. Taylor resigned effective January 1, 1987—another disappointment!

In 1988, Dean Jean Dowdell appointed Dr. Breyer to serve as coordinator for preparing a new application for ACS accreditation. Each member of the Department was asked to submit their resume, course syllabi, reorganize their laboratories and overview the library resources in their specific areas in preparation for a preliminary on-site evaluation by Dr. Helen Burke, Chestnut Hill College, Dr. Donald Jones, Maryland State College, and Dr. Robert Orr, Delaware Valley College, three area chemistry chairs of ACS accredited departments, on October 27, 1988. They prepared a six-page written report containing fourteen recommendations which we received in early January 1989. On the basis of this report and our self-evaluation we delineated a detailed list of the areas needed to be addressed in order to proceed.

1. Library Resources

Through the collective efforts of the chemistry faculty out-of-date books were weeded out, books were contributed, and lists of new books, treatise series and periodicals were recommended for future purchase to meet the standards of the ACS Committee on Professional Training.

Letters were obtained from the USDA Eastern Regional Agricultural Research Service and the Spring House Rohm and Haas Laboratory certifying that our students and faculty members would have access to their book and periodical collection and selected auxiliary services.

We began to investigate the addition of high-discount, on-line computer search options for use by students and faculty along with further computer-assisted instruction.

2. Additional Staff

With the approval of Dean Dowdell and the Educational Policies Committee (EPC), we began a search for a full-time biochemist. We were also given permission to hire a full-time secretary whose services would be shared by Beacon Research. The College would fund 50 percent and Beacon Research would fund 50 percent of the cost.

3. Safety

With the assistance of the chemistry faculty and the student assistants, the third floor, basement, and outside solvent shed chemical storage facilities were reorganized over several years and unneeded chemical reagents were removed by outside disposal companies. Reorganization followed OSHA-NIOSH recommendations. Over the period 1987 to 1990 this effort, coordinated by Dr. Chester Mikulski, involved over 300 man-hours of work by the entire chemistry-physics faculty and all our student assistants. Especially critical was the safe disposal, through outside professionals, of a great number of hazardous chemical reagents. Beacon Research, under Dr. Ellington Beavers, was very helpful in this effort. A major component of this endeavor was reorganizing all of our chemicals in area categories required by OSHA and NIOSH.

All students and faculty research laboratories were brought up-to-date with safety features which maximized protection of all personnel.

4. Staff Input:

Each chemistry faculty member submitted a resume, course syllabi, and representative quizzes, examinations, handouts, term reports, and details of their laboratory programs. Preparations were made to reestablish the ACS Student Affiliates Chapter to be in place by September 1989.

5. Alumni Data

A lengthy newsletter was prepared and sent to all known alumni who had majored in chemistry, requesting them to bring us up-to-date on advanced degrees, professional employment, and honors and awards. They were also encouraged to help us build up our library resources.

Letters were sent to Dr. J. Arthur Campbell, a former chair of the ACS Committee on Professional Training (ACS-CPT) and Dr. Donald Jones, who served as a member of ACS-CPT, to ask for their recommendations on the minimum number of faculty members required for accreditation, the specific courses and the sequence suggested, library resources, and essential major large instruments needed for accreditation. On the basis of their responses we made plans to acquire the instruments we needed. They indicated the essential need of laboratory computers for acquiring and manipulating data. Also suggested was obtaining Chemical Abstracts through STN International for which small colleges receive a 90 percent cost reduction for off-hour use. They indicated that the chances for ACS accreditation without a minimum of four tenured faculty in the specialties of inorganic, organic, physical, and biochemistry was very dim.

Over the next two years all the needed data were gathered for formal submission of an application for accreditation. The requisite set of materials requested by ACS-CPT at the next stage in the process included:

- Two copies of the college catalog.
- Faculty Personal History Record Cards for each faculty member.
- The completion of a 22-page evaluation questionnaire.
- Copies of final examinations for all courses.
- Representative student research reports.
- Miscellaneous supporting evidence.

The 22-page questionnaire required information on degrees offered, course enrollments, senior majors, coursework for pre-health profession programs and other science related programs, variety of self and outside evaluators, goals of the Department, department budget, grants in detail, salary schedule, appointments and promotions, faculty development, service to the community and profession, sabbatical

policies, scholarly activities, student assistant policies, departmental support staff, faculty summary details, current teaching courses and loads for each teacher, admissions policies, career counseling and placement, senior major student outcomes for the past five years, faculty perception of students, students' perception of undergraduate training, classroom and laboratory space, list of all instrumental equipment owned, library resources (books, periodicals, film readers), off-campus library resources, list of all subscribed periodicals, auxiliary facilities, service facilities, college-wide computer facilities, departmental computer facilities, safety considerations. It is common knowledge that the ACS accreditation is the most difficult of all others to obtain.

Dr. Breyer attended a lecture discussion on October 20, 1988 at the University of Pennsylvania led by Dr. Alice Cunningham, Chair of Agnes Scott College's Department of Chemistry and current chairperson of the ACS Committee on Professional Training. Dr. Cunningham reviewed the present status of the Chemistry In The United States and the Current Guidelines for ACS Accreditation of Departments of Chemistry.

The submission of our application to ACS-CPT was made in February 14, 1991. Dr. Mikulski and Dr. Breyer were requested to attend a meeting of CPT on Saturday, April 13, 1991, in Atlanta, Georgia. We were given a searching interrogation by the Committee of nine members lasting about an hour and were told we would hear from them in about a month. We received a written summary of the major conclusions of the nine-member CPT Committee. They spelled out the remaining concerns for us to address and indicated that they would carry out an on-site visit to the college in the fall of 1991.

1. Size of the Chemistry Faculty

The chemistry faculty must always comprise of a minimum of four full-time chemistry faculty members with specialization in at least four of the major sub disciplines: inorganic, organic, analytical, physical and biochemistry. Accreditation reviews are made every five years and each accredited department of chemistry must file an annual report.

2. Teaching Loads

The maximum total teaching load (on and off campus) is 12 credit hours and 15 contact hours. CPT was very concerned about the spring 1991, 18-hour contact load of Craig Culbert. They also strongly pressed us to insure them that his replacement upon retirement would be a full-time specialist in organic chemistry.

3. Special Programs:

The CPT was very interested in our future plans for a biochemistry major and had high praise for our Chemistry and Business major which they indicated that they might wish to consider as a model program.

Advanced Courses

The members of CPT appeared to be satisfied with our advanced course offerings, but commented that they only minimally seemed to meet ACS expectations. The minimum required courses are:

Chemistry 301-302, 304, and 305 and Chemical Research, Chemistry 389 done either on-or off-campus with a research report (could also be done under ID360, 362, or 364 Cooperative Education).

Library Resources and Use

Our library collection also seemed to be a matter of great concern to the CPT. Dr. Mikulski, reported on the acquisition of a computer unit which is co-dedicated (shared with Astrophysical Data Analysis) to conducting on-line literature searches—an extremely valuable instructional component that our programs never had in-house before (the ACS-CPT expects that such capabilities exist within the department, as opposed to in library or off-campus locations). The numbers indicated that this capability together with the ongoing arrangements with the ERRC and Rohm & Haas libraries might meet ACS expectations, provided that these facilities are easily accessible and utilized by students and faculty on a routine basis.

Our courses should require the use of the library resources including periodicals, specialized books and on-line searching. Our periodical collection was deficient in terms of number of periodicals. In lieu of such a deficiency, we must document that our students are making use of the ERRC and Rohm and Haas libraries, as well as on-line searching. Faculty must weed out obsolete books and add, if possible, replacements from their collections.

During the 1990-91 academic year, the Chemistry Department was able to recommend and have purchased \$10,000 worth of new library treatise series and monographs coupled with additional up-to-date advanced texts provided by the Chemistry-Physics staff.

Dr. Helen Burke, Chair, Chestnut Hill College and Dr. Robert Orr, Chair, Delaware Valley College were invited to our campus on February 22, 1991. Their chemistry departments are ACS accredited and they were among the three consultants who visited us in 1988 for an initial evaluation. We toured all our facilities again and then reviewed their previous report which listed 14 recommendations.

They were extremely pleased with the progress we have made, indicating that we had addressed all 14 recommendations. They also reviewed our self-evaluation questionnaire sent to the ACS on February 14, 1991, and indicated that it was a very fine presentation. They suspect that the Committee will still find points which need additional effort since the composition of the ACS-CPT which changes does affect the focus. The new committee did suggest several items that need attention.

- Storage and disposal of selected chemicals.
- Continue to review and act on safety procedures in our laboratories.
- Need for minimum of four full-time tenured chemists at all times.
- Progress in continually upgrading instrumentation, and academic programs.

Dr. Hans Veening, Professor of Chemistry at Bucknell University, was assigned by ACS-CPT to carryout the on-site visit to evaluate the Beaver College Department of Chemistry October 30-31, 1991. Based upon his findings, he was required to prepare a summary report which he submitted to the CPT on February 1, 1992. The CPT reviewed his report and considered our application for accreditation at the National ACS Meeting held in San Francisco in April 1992. On April 27, the CPT informed us that they concluded that they should defer approval of our chemistry program until we have had an opportunity to address Committee concerns about two items, namely: 1) the Beaver College chemistry department's compliance (or lack thereof) with ACS guidelines statement on libraries and the list of recommended journals and 2) the status of faculty hiring as a result of the two pending retirements in the chemistry department. We were told that if we could report back to CPT by July 15, then the CPT would again consider our application at the fall 1992 meeting to be held the last week of August in Washington, D.C.

In May 1992 the department received a letter from ACS-CPT which deemed an onsite visit by a CPT associate to be appropriate. This required an invitation for the visit from the President of the College. Dr. Bette E. Landman formally invited the ACS Committee On Professional Training to consider the Department For Accreditation.

Beginning with FY 1992-1993, the Chemistry and Physics Department replaced their subscription to the annual review entitled, "Chemistry of Functional Groups" with eight new subscriptions to periodicals on the CPT's Journal List for Undergraduate Programs. This enabled the department to meet the minimum library requirements for approval, i.e., subscriptions to 20 or more referred journals in the chemical sciences together with a range of other reference materials and an established mechanism for faculty and students to gain access to the wider literature. The Development Office agreed to seek a donor for Chemistry of Functional Groups.

Their greatest concern was the occurrence of workloads in excess of 15 contact hours: (Craig Culbert had an 18 contact-hour load in the spring 1991, semester). While they seemed to be satisfied with our explanation about one faculty member about to retire, the fact that two of our departmental faculty members planned to engage in off-campus employment in the fall semester could very well have proven lethal to all our efforts. The CPT also wanted assurance that the College was committed to maintaining a minimum of four full-time chemists who would represent four different areas of specialization.

The ACS Committee on Professional Training reviewed our application for accreditation at the National ACS National Meeting held in August 1992. On September 28, the CPT

informed us that because we had a 50 percent turnover in our chemistry faculty, they would like our department to submit a reevaluation form which would give the CPT a current picture of our department, including teaching loads and allocation of advanced courses among faculty members. The CPT Also requested that Faculty Personal History Forms be completed by our two new faculty members, Drs. Mascavage and Steyert. The CPT asked to see evidence that the new faculty members were in on-going positions that allowed our department to offer a full range of chemistry courses on a regular basis.

In compliance with these requests, a communication was dispatched to the ACS-CPT on January 29, 1993 which included: an update for our department; a completed reevaluation form; Faculty Personal History Records and vitae for Drs. Mascavage and Steyert; copies of the most recent final examinations for all upper level courses that do not have physical chemistry prerequisites; an updated departmental equipment list; a list of current periodicals; and two copies of the most recent college catalog. The Committee indicated that it would review our application at the ACS National Meeting in April, 1993 and communicate its decision to us in due course. However due to the election of new members to CPT and a relocation of the ACS-CPT offices, the secretary of the CPT indicated that there would be a delay in responses to applicant institutions. We would hear from CPT after the August 1993 National ACS Meeting.

With the retirement of Dr. Breyer (physical chemistry) and Mr. Craig Culbert (organic chemistry), the College decided to hire full-time tenureable organic and physical chemists to assure their teaching responsibilities. Dr. Linda Mascavage (organic chemistry) and Dr. David Steyert (physical chemistry) had been hired to fill the two required tenure positions moving us closer to meeting the requirements for ACS accreditation. Accreditation would markedly increase our ability to bring top students to major in chemistry for a multitude of diverse career outcomes. At this juncture Dr. Chester Mikulski assumed the position as coordinator of the accreditation process. Dr. Steyert decided to move to a major university effective September 1, 1994, which again put our application on hold. The committee was also concerned about the sequencing and offering frequency of our 300 level chemistry courses and our performance in maintaining no more than 15 contact hours of classes for each faculty member.

With respect to contact hours, Dr. Mikulski was able to point out that the actual contact hours were less than the number of lecture and/or laboratory hours for all courses. This correction brought all faculty members to no more than the maximum 15 contact hours of instruction. At the same time, he was able to demonstrate that by alternation for some advanced courses, every chemistry major would be guaranteed to be able to fulfill all advanced course requirements by ACS-CPT. Along with these items syllabi, examinations, and other materials on our two new advanced courses Statistical Thermodynamics (CH333) and Quantum Chemistry and Chemical Physics (CH351) were submitted for review by ACS-CPT.

Fortunately the College was able to hire Dr. Thomas Dougherty for the physical chemistry tenuarable position for the fall semester of 1994. The Department was able

to demonstrate to ACS-CPT that all teaching loads in the Department of Chemistry met the maximum of 15 contract hours. We were also able to document the facts to show that all chemistry majors over their four-years at Beaver College were able in every case to complete all the courses required for accreditation by ACS-CPT. It was also pointed out that the advanced courses could be taken on a tutorial basis. Deficiencies in our library resources were addressed over the entire course of the accreditation process.

In 1995 the College received the very-long awaited news that the Department of Chemistry had received the accreditation from the American Chemical Society. On June 4, 2002, the Department was requested to submit a five-year report to ACS-CPT for the period 1995-2000 on the total academic performance of the Department. This ten-page document to ACS-CPT identified our undergraduate chemistry program for the first time as of Arcadia University and also an ACS approved professional chemistry program. It noted the addition of Dr. Emanuele Curotto as our current physical chemist.

Faculty

Chronology 1858 to 2004

It seemed of interest to catalog from available resources a list of faculty members in the physical sciences from the earliest period of the institution to the present. In the formative years of Beaver, one faculty member taught all courses while also serving as chairperson of the department. Until 1910 the college catalogs did not list the academic degrees of the faculty. The highest degrees and where indicated the institution that granted that degree are listed. Information on many faculty members who taught science between 1853 and 1926 could not be found.

Years Worked	Professor	Highest Degree	Institution	Courses Taught
1858-	Rev. R. T Wright			Natural Sciences
1869-70	R. Amanda Campbell			Natural Sciences
1871	Sadie J. Woodruffe			Natural Sciences
1873-4	Olivia Smith			Natural Sciences
1874-77	M. M. Johnson			Natural Sciences Chemistry
1877-80	William Todd			Chemistry, Astronomy Geology
1895-6	William Ross Laughlin	BS		Chemistry, Physics, Meteorology, Geology, Astronomy
1898	Gilbert Haven Trafton	BS		Chemistry, Physics, Meteorology, Geology, Astronomy
1901-2	E.L. Sherwood	M.A.		Chemistry, Physics, Meteorology, Geology, Astronomy
1902-9	Frederick M. McGaw			Chemistry, Physics, Meteorology, Geology, Astronomy Mathematics
1907-10	Amon B Plowman	Ph.D.		Chemistry, Physics, Astronomy
1911-29	C. Mace Thomas	Ph.D.	Harvard	Physics
1915-17	Edith James	A.B.	Vassar	Chemistry

Years Worked	Professor	Highest Degree	Institution	Courses Taught
1918-24	Mary Packard Fisk	A.B.		Chemistry, Physics, Astronomy, Geology
1927-29	Catherine Buhrmester Iva Irene DeWitt Virginia Walton	A.B. A.M. B.A.	Illinois Bucknell Harvard	Natural Sciences Natural Sciences Natural Sciences
1929	Walter F. Clayton Gladys Pemberton Clayton	Ph.D. A.M.		Physics Chemistry
1930	William F. Sturgeon Howard M. Fields J. Stockton Roddy	Ph.D. M.S. Ph.D.	Chicago Pennsylvania	Chemistry Chemistry Physics
1933	Ralph Donaldson	M.D.	Hahnemann	Physics
1936	Lillian Stringfellow	B.A.	Beaver College	Chemistry, Physics
1936-7	J. Cecil Rhodes	M.S.	Pennsylvania	Chemistry
1938-41	Helen Gilroy	Ph.D.	Cornell	Physics
1940-41	Adell Schmidt	M.S.	Cornell	Chemistry
1941-3	A. Gardner Foulke	Ph.D.	Rutgers	Chemistry
1943-50	Lillian Bassett	M.Ed.	Penn State	Chemistry
1944-7	Margery Milne	Ph.D.	Radcliffe	Physics
1947-58	Alfred Vandling	M.A.	NYU	Physics
1947-58	Marjorie Stevenson	A.B.	Hunter	Chemistry
1948-9	Elizabeth Roulston	M.A.	Bryn Mawr	Chemistry
1949	Cathryn Gudmundsen	M.A.	Columbia	Chemistry
1950-52	Oregon B. Helfrich	Ph.D.	John Hopkins	Chemistry
1952-63	William W. Hassler	Ph.D.	Pennsylvania	Chemistry
1952-63	Louisa G. Plummer	M.S.	Minnesota	Chemistry
1952-4	Helen W. Nutting	Ph.D.	California	Chemistry
1957-60	Nellie R. Harris	Ph.D.	Pennsylvania	Physical science Physics
1960-64	Celia Marshak	Ph.D.	Columbia	Chemistry
1962	Eleanor Wilson	M.A.	Temple U	Physics
1963	Kathryn Adamson	M.A.	North Carolina	Chemistry
1963	Craig Culbert	M.S.	Temple	Chemistry-Physics
1963-77	Roland Eddy	Ph.D.	Brown	Chemistry-Physics
1964-92	Arthur C. Breyer	Ph.D.	Rutgers	Chemistry-Physics
1966	Alvin Byer	M.S.	Drexel U.	Physics
1966-69	Myrna L. Bair	Ph.D.	Wisconsin	Chemistry
1970-71	Harvey Paige	Ph.D.		Chemistry
1972-3	Gordon Davy	Ph.D.	California	Chemistry
1970-3	Donald Tibbetts	Ph.D.	Illinois	Chemistry
1976-present	Chester M. Mikulski	Ph.D.	Drexel U.	Chemistry/Geology
1977-present	H. Stephen Huber	Ph.D.	Drexel U.	Physics
1978-79	William Ratchford	Ph.D.		Chemistry
1980-81	Larry Gould	Ph.D.	Pennsylvania	Physics
1980-81	Bleeker Springs	Ph.D.	Westleyan	Chemistry

Years Worked	Professor	Highest Degree	Institution	Courses Taught
1982-3	Esther Crow	Ph.D.	Pennsylvania	Physics
1989-90	Leslie Kilgren	Ph.D.	Pennsylvania	Physics
1990-91	Cherye Schulman	M.S.	North Texas	Chemistry
1982-7	June Taylor	Ph.D.	Pennsylvania	Chemistry
1988	David J. Miller	M.A.	U. of Penn.	Physics
1989	Frank Costello	Ph.D.	Temple U.	Chemistry
1989-present	Peter Campbell	Ph.D.	Columbia	Chemistry
1992-present	Linda Mascavage	Ph.D.	Seton Hall	Chemistry
1992	David Steyert	Ph.D.	CA, Berkeley	Chemistry
1994-97	Thomas Dougherty	Ph.D.	M.I.T.	Chemistry
1996-present	Eric Yanez	M.S.	Drexel U.	Chemistry
1996-present	Emanuele Curotto	Ph.D.	Yale U.	Chemistry

Dr. Stephen Huber



Dr. C.M. Mikulski



Mr. Craig Culbert



Dr. Roland Eddy



Mr. Alvin Byer



Dr. Myra Bair



Dr. Donald Tibbetts



Dr. Thomas Dougherty



Dr. Harvey Paige



Department of Chemistry and Physics Major Equipment Inventory

Over the past forty years the Department of Chemistry and Physics, primarily through research proposals and equipment grants coupled with funds from the Beacon Research Foundation and departmental budgets, has assembled an impressive inventory of instruments which more than meets the goals of the American Chemical Society Committee on Professional Training (ACS-CPT). As a consequence, the quality of course laboratory work and faculty-student research has grown significantly. As of 2003, our equipment inventory includes the following items:

1	Hitachi R-1200 NMR with Workstation
1	Nicolet Avatar 360 FTIR Spectrometer and Workstation
1	Johnson-Matthey Magnetic Susceptibility Balance
2	Serfass Conductivity Bridge
1	Buchler Fractomette 200 Automatic Fraction Collector
1	Gilford Multiple Sampling Spectrophotometer
1	Corning MegaPure Distillation System
1	QUV Accelerated Weathering Tester
1	LKB Ultraspec II with Computer Interface
1	Beckman DB Spectrophotometer with Reflectance Accessory
1	Beckman Atomic Absorption DBG Grating Spectrophotometer
1	Dohrman Microcoulometer with Components
2	Sargent-Welsh Electrolytic Analyzer
1	Hoover Capillary Melting Point Apparatus
1	Thomas System 700 Spectroanalytical System
1	Rudolph Automatic Polarimeter
1	Baird Flame Photometer
20	PH Meters
1	Hewlett Packard 5890 GC – 5965 FTIR with Workstation—5971 Mass Spectrometer
1	Parr Adiabatic Calorimeter
2	Bausch and Lomb Refractometers
6	Electrophoresis Unites (2 vertical, 4 horizontal)
10	Bausch and Lomb Spectronic 20's
1	Sargent-Welsh Titration Accessory-pH Recorder
1	PE 137 Sodium Chloride Spectrophotometer
1	Sorvall Super Speed RC2-B Automatic Refrigerated Centrifuge
1	PerkinElmer Analyst 300 with Workstation
2	HR200 Electronic Balances
1	Waters High Performance Liquid Chromatograph
12	Analytical Balances (5 Sauter, 2 Mettler, 3 Oertling, 2 Sartorius)
8	Mettler PJ 360 Delta Range Balances
1	Silicon Graphics Workstation
5	Pentium PCs (1 in each faculty office)
1	Macintosh Computer
6	Student PC Workstations
2	Student Linux Workstations

Faculty

Faculty Members in the Department of Chemistry
and Physics
1964-2003

Dr. Chester Mikulski, Chair

Born in Philadelphia, PA, Dr. Mikulski was awarded a B.S. Degree in Chemistry in 1969 and a Ph.D. Degree in Inorganic chemistry in 1972 from Drexel University. His primary area of interest was the investigation of polynuclear transition metal complexes with neutral phosphoryl and thiophosphoryl esters. He would spend the next four years as a senior postdoctoral fellow with the Department of Chemistry at the University of Pennsylvania. The highlight of his appointment was the synthesis of the first analytically pure conducting polymer: sulfur nitride. This seminal advance led his collaborators, Drs. Alan G. MacDiarmid and Alan J. Heeger into an intensified effort to discover other materials with similar properties. For their achievements, Dr. MacDiarmid and Dr. Heeger were named co-recipients of the Nobel Prize in Chemistry in 2000. Descriptions of Dr. Mikulski's monumental isolation of polymeric sulfur nitride and its unusual optical and electrical properties have continued to appear in both national and international inorganic and polymer chemistry textbooks since 1976. Beginning with his appointment to the Beaver/Arcadia faculty in January 1976, Dr. Mikulski's research career has undergone increased diversification. His expertise in the field of amine N-oxide coordination chemistry has been extended to investigations of the binding tendencies of important bioinorganic species. Working shoulder-to-shoulder with over eighty student co-investigators, he has successfully isolated and characterized several hundred metal complexes with nitrogenous bases, nucleosides, antibiotics, etc. Researchers at the National Cancer Institute have confirmed anti-neoplastic activity of one of these substances.



He has published over one-hundred-and-sixty articles in leading scientific journals, of which over half have student co-authors. He has been a National Institutes of Health extramural Associate and has served as panelist or Chairman of the Metallobiochemistry Study Section at NIH since 1988. Dr. Mikulski has been the Chair of the Department of Chemistry and Physics at Arcadia since 1985. He has also served on many of the University's committees and has chaired a number of these. Locally, Dr. Mikulski has been extremely active in several athletic organizations dedicated to serving the youth of the community. For the past twenty-five years, he has been involved as a member of the board, commissioner, and coach for several neighborhood baseball, basketball, and soccer organizations.

Included among his many awards from township schools and organizations is the Cheltenham Jayvees' Rob Krigel Distinguished Service Award presented to Dr. Mikulski in 1998. When he can find time, Dr. Mikulski is an avid golfer.

Dr. H. Stephen Huber, Associate Professor

H. Stephen Huber was born in Philadelphia, Pennsylvania. For his B.A. from Earlham College, he majored in both physics and music. He received his M.S. from Drexel University and then entered their doctoral program. His thesis for his PhD. in theoretical physics was entitled "Efimov States and Bound State Properties in Selected Nuclear and Molecular Three-body Systems." He has taught at Beaver College/Arcadia University since 1977. He has taught as an adjunct professor at Drexel University and Penn State. He has also been a visiting scholar in Astronomy and Astrophysics at the University of Pennsylvania. Among the many facilities he has developed are the Beaver/Arcadia Observatory, the Holographic Laboratory and the Astrophysical Data Analysis Center. During his twenty-five plus years at Beaver College/Arcadia University Dr. Huber has served on almost all of the committees of the institution. In addition to his expertise in physics, Dr. Huber has performed as a ballet dancer and concert pianist at the professional level. His publications include theoretical physics, quantum optics, biomechanics, astrophysics, as well as a lengthy series of review articles and biographies for McGill's encyclopedia. In addition he founded and was president of the Artisans at Huber Instruments, makers of stringed musical instruments including harps, hammered dulcimers, harpsichords, lutes, and zithers.



Dr. Peter Campbell, Associate Professor

Peter Campbell was born in Fairmont, Minnesota and received his undergraduate degree at Carleton College. He earned his Ph.D. at Columbia University. His doctoral dissertation was done under the mentorship of Dr. Ronald Breslow, one of the most renowned organic chemists in the U.S.A. His two-year post-doctorate was carried out with Dr. G. T. Kaiser at the University of Chicago on enzyme chemistry. Prior to coming to Arcadia University he taught at New York University and Philadelphia College of Pharmacy and Science. Seventeen of his research projects have been published in leading chemical and biochemical periodicals. His areas of teaching expertise are biochemistry and organic chemistry. Throughout his career he has served on a very wide array of college committees. Dr. Campbell is a professional musician singing bass in the Pennsylvania Pro Musica, Philadelphia Festival Chorus and the Choral Arts Society of Philadelphia.

Dr. Linda Mascavage, Associate Professor

Linda Mascavage was born in Atlantic City, New Jersey. She was awarded a B.S. cum Laude from Georgian Court College with majors in chemistry and education in 1972 along with N.J. State Certification in Physical Science. From 1972 to 1983 she taught chemistry, physics, physical science and honors courses at two different high schools. She was awarded a M.S. in Organic/Analytical chemistry from Seton Hall University in 1984 followed by a Ph.D. in Organic chemistry in 1987. Her dissertation, mentored by Dr. Daniel Weeks, involved a physical organic chemistry problem dealing with reaction kinetics and mechanisms. Her college teaching career began in 1987 at Temple University. She has been an Adjunct Research Associate there since 1988 with interests in kinetics, mechanisms, synthesis, and molecular modeling. She has co-authored sixteen publications in leading chemical periodicals and the Encyclopedia of Reagents for Organic Synthesis. Linda does consulting work for local companies and serves as a manuscript referee for two American Chemical Society journals. From 1994 to 1997 she served as treasurer of the Philadelphia Organic Chemists' Club and since 1996 has been a member of the Board of Directors of the Delaware Valley Science Council.

Dr. Emanuele Curotto, Assistant Professor

Emanuele Curotto was born in Chiaveri, Geneva, Italy. He earned his B.S. degree summa cum laude from the University of Massachusetts-Lowell in 1992. At Yale University, he completed a Ph.D. in Chemical Physics under the mentorship of Dr. R. J. Cross in 1996. In recognition of his outstanding work as a graduate teaching fellow, he received the Thomas Cooke Teaching Award in 1995. He continued research in chemical physics for two years on a postgraduate fellowship at the University of Rhode Island under the leadership of Dr. D. L. Freeman. He joined the faculty of Arcadia University in 1998 as an assistant professor where he has developed a very active program of faculty-student research.

Mr. Eric Yanez, Facilities Manager

A part-time adjunct instructor and lab manager, Eric Yanez was born in Bogotá, Columbia. He grew up and was educated in the United States. Eric received his Bachelor of Science degree in Chemistry and Biology from then Beaver College in 1982. In 1987 he received a Master's degree in biomedical engineering from Drexel University, and in 2002 he received a Master in Education from Arcadia University. Eric teaches chemistry and physics at St. Maria Goretti High School for Girls on a full-time basis, and works for Arcadia on a part-time basis. Eric has been working for the Chemistry and Physics Department since September 1996. In addition to preparing for laboratory experiments, Eric has been a laboratory instructor for chemistry, physics, and astronomy courses.

Dr. Arthur Breyer, Professor Emeritus

Arthur Breyer was born in Brooklyn, New York. After graduating from high school, he served two and a half years in the U.S. Army. An infantryman in the 28th Infantry Division, he participated in three major battles and was captured in the Battle of the Bulge in Hosingen Luxemburg. After six months in prison, working in Czechoslovakia and Germany, the Russian army liberated him. After his discharge he completed a B.A. with majors in chemistry and mathematics at New York University. Graduate work led to an M.A. in physical chemistry from Columbia University. His doctorate in chemistry, mentored by Dr. William Rieman, included a dissertation on physical chemistry of "Salting-out Chromatography of Aldehydes and Ketones." He taught (10 years) at Upsala College, Ohio Wesleyan University (5 years) and Harvey Mudd College of Science and Engineering (1 year) before becoming chairman of the Department of Chemistry and Physics at Beaver College in 1964. His postdoctoral studies were carried out at M.I.T., American University and the University of Pennsylvania. He has served as a visiting professor at the University of North Dakota, the University of Wisconsin, Madison, and Princeton University where he directed the Woodrow Wilson National Foundation-Dreyfus Foundation Institute. In 1966 he served as the USA-National Science Foundation Aid to International Development (AID) representative to the Central American Chemistry Teachers Association Conference. He has served on a large number of college committees. Active in the Philadelphia Section of the American Chemical Society since 1964, he chaired the section in 1980-81. He served five three-year terms on the National American Chemical Society as Councilor along with four terms on both the Nomenclature Committee and the Inorganic Nomenclature Committee. He authored over 30 publications including eight in refereed journals.



Avocationally, Arthur Breyer has been a tenor soloist at Beaver College and several churches for the past 40 years. Stamp collecting and gardening are other major interests.

Mr. Craig Culbert, Assistant Professor

Craig Culbert was born in Brooklyn, New York. His B.S. in Chemistry was awarded by Haverford College. Following achieving an M.A. in chemistry from Temple University, he matriculated for a doctorate at Bryn Mawr College carrying out his research project under Dr. Ernst Berliner, Chairman of the Department and a distinguished organic chemist. He finished his coursework with honors, but never completed the dissertation. Prior to coming to Beaver College he taught at Temple University.



Dr. Thomas Dougherty (deceased)

Thomas Dougherty was awarded a B.A. in chemistry from Williams College with highest honors. His coursework and research on "Time Resolved Light Scattering Studies of Crystals Near Structural Phase Transitions led to a Ph.D. degree from Massachusetts Institute of Technology. Subsequently he continued his research at M.I.T. as a postdoctoral fellow. His highly regarded teaching and student-faculty research was moving into high gear when a brain tumor terminated his life. He had been honored by the dedication of the 1998 Beaver College yearbook to him. Upon his death, his wife established the Dr. Thomas Dougherty Endowed Faculty-Student Research Fund in 1998.

Dr. David Steyert

David Steyert was awarded a B.A. with highest honors in chemistry from Williams College. He attended Stevens Institute of Technology for one year before entering a doctoral program at the University of California, Berkeley. He achieved the Ph.D. degree in 1991 having written his dissertation on "Turntable Far-Infrared Laser Spectroscopy on the Prepare-Water Complex." For three years he had worked at the ATT Bell Laboratories as a Senior Technical Assistant with two research professors. Before coming to Beaver he taught at Colgate University. David enjoys fly-fishing and has great interest in current events. His ten publications have been published almost exclusively in the Journal of Chemical Physics.

Awards

Arcadia University Faculty Awards

Members of the Department of Chemistry and Physics have received the following awards.

Lindback Award for Distinguished Teaching

1966	Dr. Arthur Breyer
1967	Dr. C. Roland Eddy
1977	Mr. Craig Culbert
1985	Dr. H. Stephen Huber

Ellington Beavers Award for Intellectual Inquiry

1990-91	Dr. Chester Mikulski
1991-92	Dr. Peter Campbell
1992-93	Dr. H. Stephen Huber
1993-94	Dr. Linda Mascavage
1999-00	Dr. Emanuele Curotto

Professor of the Year

1991-92	Dr. Arthur Breyer
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The Stacy Ann Vetta '82 Professorship

2000-01	Dr. Emanuele Curotto
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Sigma XI National Honorary Chemistry Society

Dr. Chester Mikulski
Mr. Craig Culbert
Dr. Arthur Breyer

Thomas P. Dougherty Endowed Faculty-Student Research Award

2001	Dr. Linda Mascavage
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REGIONAL AND NATIONAL AWARDS - DR. ARTHUR C. BREYER

REGIONAL:

1. American Institute of Chemists (AIC) Honor Scroll Award for 1973: 'For his outstanding ability to inspire and promote enthusiasm for the sciences in serving humanitarian needs. For his devoted leadership teaching students and guiding educators. For his many contributions to scientific knowledge and for fostering student-faculty research.' May 9, 1973.
2. Middle Atlantic Region, American Chemical Society 1974, E. Emmett Reid Award: 'For Excellence in Teaching Chemical Sciences,' ACS Priestley Bicentennial meeting, April 25, 1974 (First recipient of this award).
3. American Chemical Society, Philadelphia Section Service Award, "in grateful appreciation of long and faithful service to the section." Dec. 13, 1979
4. Spectroscopy Society of Pittsburgh, 1989 Teaching Award
5. Ulliyot Award for Meritorious Service, Philadelphia American Chemical Society Section, January 19, 1993

NATIONAL:

1. American Chemical Society National Tour Speaker Awards 1972; 1974; 1976; 1982; 1984; 1985.
2. Manufacturing Chemists Association (MCA) 1977 National Award in Chemical Education "for excellence in teaching chemistry and in recognition of service to the scientific community instructing and inspiring students," April 12, 1977.
3. Western Connecticut Section of the American Chemical Society National Visiting Scientist Award, May 22, 1984. 'For excellence in chemical education and teaching.'
4. HEW Title II Chemistry Retraining Program Certificate of Appreciation, "for his boundless energy, enthusiasm, and understanding during the past two and one half years while teaching us the intricacies of the chemical world. The knowledge, the skills and the tools you have given us are without measure and will be invaluable in our teaching of tomorrow's children." July 14, 1988
5. James Flack Norris Award for Outstanding Achievement in the Teaching of Chemistry, November 1993. (One award recipient chosen from nominations from anywhere in the world.) November 11, 1993
6. National American Chemical Society Award for 15 years of service as a National Councilor representing the Philadelphia Section. (1997)
7. National American Chemical Society Award for 50 years of service. (1977)

The Northeastern Section
of the American Chemical Society

Confers the Forty-second

JAMES FLACK NORRIS AWARD

for Outstanding Achievement in the
Teaching of Chemistry

on

ARTHUR CHARLES BREYER

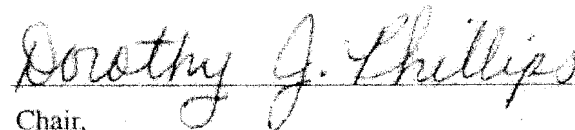
Beaver College, Glenside, Pennsylvania

November 11, 1993

You are given this award in recognition of the many contributions you have made to the teaching of chemistry, both at graduate and undergraduate levels, and for your contributions to programs that have broadened the intellectual horizons of teaching professionals. Your development of the National Science Foundation sponsored Chemical Education Materials Study-Chemical Bond Approach Institutes, your involvement in the Chemical Education Conferences, and your participation in the Woodrow Wilson Foundation - Dreyfus Master Chemistry Institutes have significantly influenced many chemistry teachers and their students over the last generation. More recently your involvement in leading a group drafting Source Book Modules for the ChemSource Project is an indicator of your continuing concern for improvement in the teaching of chemistry. This award is a measure of the high esteem in which you are held among chemists and chemical educators.



Chair,
Norris Award Committee




Chair,
Northeastern Section

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Chair,
Norris Award Committee


Chair,
Northeastern Section

Faculty Research Grants

The Department of Chemistry and Physics has received a very large number of grants for a wide variety of programs since 1964 totaling many million dollars. The expertise, inventiveness, persistence, creativity and long hours of effort by our entire faculty has greatly enhanced the total instructional and operational budgets of the Department.

Grant Recipients:

Dr. Linda M. Mascavage

1. "Innovation and Change in the Chemistry Curriculum: Computer-Assisted Molecular Modeling and Computational Chemistry"; SEPCHE's Institute for Mathematics and Science," Arcadia University; Spring 2002; \$10,620.
2. "The Dihydropyridine Route to Novel 2-Azabicyclo [2.1.1] hexanes"; ACS/PRF type SRF, American Chemical Society (Co-PI); Summer 2002; \$8,000.
3. "Glycosidase Inhibitors: The Synthesis of Indolizidine and Pyrrolizidine Bases"; Thomas P. Dougherty Endowed Faculty-student Research award, Arcadia University, Spring 2001; \$2,000.
4. "The Enantioselective Synthesis of Aza Sugars from Amino acids. The 3 Hydroxy-2-hydroxymethylpyrrolidines"; Faculty Development Award, Arcadia University; Spring 2001; \$1,200.
5. "Gas Phase Hydrochlorination of Dideuteroacetylene: Kinetics and Stereochemistry"; Faculty Development Award, Beaver College; spring 1997; \$1,200.
6. "Molecular Modeling for Undergraduate Faculty" Workshop/Course; National Science Foundation; Georgia Institute of Technology; Spring 1996; \$2,000.
7. "The Preparation and Proton NMR Properties of some Novel Trichlormethylthiazolidinones"; Faculty Development Award, Arcadia University; 1994-1996; \$900.
8. "Relative Reactivities of C-C double vs. Triple Bonds: Gas Phase Reactions of 2 Butyne, (E)-Butene and Vinylacetylene"; Ellington Beavers' Award for Intellectual Inquiry, Arcadia University; 1993-1994; \$900.
9. "Gas Phase Hydrochlorination Reactions of 2-Butyne"; Faculty Development Award, Arcadia University; 1993-1994; \$900

Dr. Emanuele Curotto:

1. Quantum Stochastic Computations on Noble Gas-Hydrogen Halide Clusters: Determination of the Finite Temperature Frequency Shift. The Petroleum Research Fund; October 2000; \$26,000.
2. The Structural, Spectroscopic, and Thermodynamic properties of HX (X = F, Cl) Solvated by Noble Gas Clusters. U.S. Department of Defense. MHPCC account Application; October 1998.
3. Stereographic Projection Path Integral Simulations of Diatomic Clusters, The Petroleum Research Fund; April 2004, \$50,000.

Dr. Peter Campbell

1. Peter Campbell and Myra Jacobsohn—NSF Instrumentation and Laboratory Improvement Grant; Biotechnology and Molecular Biology; Curricular Integration, 1990 (\$17,429 matching by Beaver College) a total of \$34,858.
2. "DNA Supercoiling Studies" Ellington Beavers' Award for Intellectual Inquiry, Arcadia University; 1993-1994; \$2,000.
3. Peter Campbell and Chester Mikulski—NSF Instrumentation and Laboratory Improvement Grant; "NMR Spectroscopy in the Undergraduate Chemistry Curriculum, Early and Often", 1993 (\$30,006 matching by Beaver College). A total of \$60,012.

Dr. Chester Mikulski

1. Pew Memorial Trust, Laboratory Equipment Grant (our portion of \$250,000 grant); 1987-90; \$131,000.
2. National Institutes of Health (NIH) Extramural Associate; 1988; \$40,000.
3. 1990 Ellington Beavers Fund for Intellectual Inquiry Faculty Award. Project title: The Synthesis and Characterization of Novel Metallodrugs with Potential for Treatment of Hypertension and Central Nervous System Disorders.
4. American Chemical Society Project SEED (Summer Educational Experience for the Disadvantaged) Award, 1990; \$1,000.
5. PEW Science Facilities Modernization Grant to purchase Hewlett-Packard 5890 MS-GC-5965 FTIR with Workstation, LKB UltraSpec UV-VIS, and Johnson Matthey Magnetic Susceptibility Balance; 1992; \$65,000.

6. American Chemical Society Project SEED grant; 1991; \$1,000.
7. Chester Mikulski and Peter Campbell—NSF Instrumentation and Laboratory Improvement Grant; NMR Spectroscopy in the Undergraduate Chemistry curriculum, Early and Often," 1993 (\$30,006 matching by Beaver College) A total of \$60,012.
8. Friends of the Library—Mrs. Annabel Lindy; Additions to the Advanced Book Collection, 1992-1993; \$5,000.
9. SEPCHE Math-Science Institute Grant for a New Atomic Absorption Instrument; 1997; \$25,000.
10. Bacon Research Award—Varian Workstation purchase; 1996; \$7,250.
11. 1998 Beacon Research Award—ThermoNicolet Avatar 300 FTIR spectrometer purchase (\$27,283.10); \$1998; \$27,283
12. 2002 SEPCHE Math-Science Institute Grant to purchase Perkin-Elmer Analyst 300 Atomic Absorption Instrument; 2002; \$24,297.
13. PEW Faculty Development Grant; \$4,000; 1989

Dr. H. Stephen Huber

1. "In Vivo Magnetic Measurement of Occupational Lung Dust Clearance of Bituminous Coal Miners." Funded by the American Lung Association of Pennsylvania. \$3,968, 1982-83.
2. "Faculty/Student Research and Training in Optics and Optoelectronics," Ben Franklin Partnership, \$50,000 with matching industry support 1987-88.
3. Newport Research Corporation, Grants to Young Researchers, \$5,260; \$8,146, 1988
4. "Development of High Efficiency Fiber Optic Switches," Ben Franklin Partnership, \$32,620 with matching support from industry, 1988-89.
5. "Development of Laboratory Facilities to Support the Cooperative Engineering Program at Beaver College," \$25,000. Funded by Universal HIGH Technologies, 1986.
6. "Computer Hardware for Engineering Program." DEC PDP 1105 and 1135 computer systems and peripherals provided by Atronics, inc. (subsidiary of Magnavox).

7. Electronics Laboratory Supply Grant, \$1,700, Funded by a private donor.
8. "Grant-in-Aid Program for Research on Energy, program proposal funded by the Energy Education Advisory Council of the Philadelphia Electric Company, \$10,000; 1987-90.
9. Pew Memorial Trust, Laboratory Equipment grant, physics portion \$53,140. Total grant (several authors) \$250,000; 1987-88.
10. Donation of Cromemco System III, multiuser/multi-tasking computer system with peripherals to support electro-optics laboratory, Righttime Econometrics, 1988.
11. Pennsylvania Council on the Arts, Specific Support Grant. Written for the Dance Theater of Pennsylvania to support production of "Hansel and Gretel," \$3,000; 1986.
12. Pennsylvania Council on the Arts, Specific Support Grant. Written for the Dance Theater of Pennsylvania to support an original work, \$3,000, 1986-87.
13. Pennsylvania Council on the Arts, Specific Support Grant. Written for the Dance Theater of Pennsylvania to support production of "Coppelia," \$3,000, 1987-88.
14. "Preliminary Study of Pain in the First Ray," Pointe dance study at Philadelphia College of Podiatric Medicine. Funded in cooperation with Pennsylvania College of Podiatric Medicine and the Langer Foundation (Steven Kravitz, D.P.M., Principal Investigator; Stephen Huber, Co-investigator).
15. "Detection of Neutrino Bursts from Supernovae," Cottrell College Science Research Grant, 1991; \$12,000.
16. "Particle Astrophysics and Cosmology," Faculty Development Award; 1992; \$750
17. "Development of a Collaborative Research Program with the Astrophysical Research Consortium at the Apache Point Observatory," Ellington Beavers Fund for Intellectual Inquiry; 1992-3; \$3,100.
18. "Development of Astronomical Research Opportunities for Students at Beaver College," Stephen Huber and David Miller, P.I., Faculty Development Award; 1992-3; \$1,200.
19. "Development of Computer Imaging Capabilities at Beaver College to Support Student Research Projects in Astronomy, Chemistry, and Engineering," Faculty Development Award; 1994; \$900.
20. "Support of Student Senior Thesis Research Projects in Astrophysics," Faculty Development Award; 1994-5; \$900

21. OPTIONS Grant, to establish a community outreach at Beaver College on peace and international security issues, 1991-92; \$1,000.
22. Electro-Optic Laboratory Supply Grant, BT & D Corporation, \$10,000 in electro-optic equipment and supplies; 1992.
23. "Program Development Initiatives by the Beaver College Center for Peace Studies," Faculty Development Fund (6 collaborating authors) 1992-3; \$1,000.
24. SEPCHE Grant for purchase of six large aperture Cassegrain telescopes with GPS and computer controls, video camera attachments, 2002; \$22,000.
25. "A Study of the Emissivity Properties of Commercial Paints and Their Effects on Infrared Thermal Analysis," Grant-in-Aid Program for Research on Energy, funded by Philadelphia Electric Company, Cynthia Chilli, junior undergraduate, P.I.; 1988, \$500.
26. "Development of a Computer Code for a Directional Analysis of Neutrino Bursts from Supernovae," Ellington Beavers Fund for Intellectual Inquiry. Calvin Uzelmeier, junior undergraduate, P.I., 1990-91; \$500.
27. "An Analysis of Maxwell's Electrodynamics with the Incorporation of Magnetic Monopoles," Ellington Beavers Fund for Intellectual Inquiry, Mario Pineiros, junior undergraduate, P.I.; 1991-2; \$350.
28. "Statistical Determination of a Supernova Neutrino Pulse Intensity Profile," Ellington Beavers Fund for Intellectual Inquiry, Miguel Pineiros, Junior undergraduate; P.I.; 1991-2; \$350.
29. "Observation of Selected Deep Sky Objects Using the 40 foot Radio Telescope at the National Radio Astronomy Observatory, Green Bank, WV," Ellington Beavers Fund for Intellectual Inquiry, Paul Mayer, senior undergraduate, P.I.; 1992-3; \$500
30. Atlantic County Support for the Arts, Written for the Atlantic Contemporary Ballet Theater, 2003; \$2,800.

Craig Culbert

1. "Development of the Microscale Organic Chemistry Laboratory Program," PEW Faculty Development Grant; 1987-1988; \$4,000.
2. Microscale Organic Chemistry Laboratory Equipment Grant; 1988-89; \$20,000.

3. NSF-COSIP Grant for Student-Faculty Research, "A Kinetic Study of the Persulfate Oxidation of some Substituted Phenols in Acid Solution," Lily Nwaka; Luziviminda Peredo, summer 1971; \$1,150.

Dr. Arthur C. Breyer

1. National Science Foundation Summer Institute Grants for Senior High School Chemistry Teachers, 1962-1975; 14 grants, \$829,080. The eight-week programs attracted 71 teachers from 37 countries, 637 teachers from all 50 states and 50 Beaver college undergraduates who served as student assistants. All received 10 academic credits for the three-course program.
2. National Science Foundation Undergraduate Equipment Grants, 1965, 1967, 1969; \$53,600 for purchase of analytical instruments and chemistry and physics films.
3. National Science Foundation Undergraduate Research Participation Grants 1962-65; \$57,315 supported research for 26 students under two research supervisors.
4. Sigma X's grants in aid 1961-62; \$1,200 for support of student research.
5. National Science Foundation College Science Improvement Program (COSIP) 1969-1971, \$128,900 with Dr. Bernard Mausner and Dr. Frank Sturgis. Chemistry-Physics department portion supported student-faculty summer research, an invited lecturer program and the development of the Science in Civilization, ID101-102 course.
6. NSF-COSIP Grants for Student Faculty Research
 - a. "Reverse-Phase Thin-Layer Chromatography of Sodium Alkyl-Sulfoalkanoate Surfactants from Animal Fats"
 - Jane Seltzer, Summer 1969; \$1,150
 - Marsha Fischl, Summer 1970; \$750
 - (1) "Thin-Layer Chromatography of Lichen and Fungal Extracts"
 - (2) "Thin-Layer Chromatography of Selected Surfactants and Surfactant Precursors" Lia Blazakis, Summer 1970; \$750; 1971; \$750.

b. "Thin-Layer Chromatography of Structurally-Related Triphenylmethane Dyes"

Carmen Chiarlanza, Summer 1969; \$750

7. Higher Education Facilities Act Title I Grant \$885,556; Higher Education Facilities Title III matching loan \$1,247,000 (1969). These grants were authored by the biology, chemistry, psychology and mathematics chairman with staff input. Partially funded construction of Boyer Hall of Science.
8. Health, Education and Welfare Title IVD Cooperative Education Grant, 1977, \$29,000. A second grant written by Charles Lower was received in 1978. these grants initiated the Cooperative Education Program at Arcadia University.
9. CEC 78 International Conference on Chemical Education, 1978, \$185,000 First Chem Ed conference held in the USA. Over 400 teachers attended and lived in our residence Halls. Dr. Arthur Breyer served as co-director and program chairman.
10. Model Building Workshop; Chemical Education Projects, Inc., 1983; \$2,410.
11. Lecture-Demonstration Workshop, Chemical Education Projects, Inc., 1983; \$1,300.
12. Chemistry Retraining Programs for Experienced Teachers in fields other than chemistry, Eisenhower Title II Grant; 1986-87; \$89,000.
13. School District of Philadelphia Renaissance in Science and Mathematics (PRISM) grants. Chemistry Retraining of Experienced Teachers Program 1985-89 (a) \$25,300, (b) \$8,000, (c) \$12,000, (d) \$9,000, (e) \$9,170 for a total of \$63,470.
14. Chemistry Retraining of Experienced Teachers, Philadelphia ACS Section; \$1,000, chemical corporations (\$3,000) 1989; total \$4,000.
15. Woodrow Wilson's National Fellowship Foundation—Dreyfus Master Teacher Institute Grant; 1998; \$9,500.
16. PEW Foundation Faculty Development Grant: To co-author the lab manual, Explorations in the Chemistry for the Gillespie's Chemistry text 1989; \$4,000.

17. PEW Faculty Development Grant—"Hands on Methods for Improving the Teaching of Solid State Chemistry," 1991-2; \$4,000.

Dr. Donald Tibbetts

NSF-COSIP Grant for Student-Faculty Research

1. "Construction of a Nuclear Quadrapole Resonance Spectrometer," Summer 1971; \$700.
2. "The Isolation and Structure Determination of the Red Pigment of the Lichen, *Usnea Strigosa*" Kathleen Chance; Summer 1971; \$400.
3. "Dimedon Complexes of Nickel" Monique Miller; Summer 1971; \$400.

Dr. Roland Eddy

NSF-COSIP Grants for Student Faculty Research

1. "A Computer Program for Identification of Unknown Lichen Compounds" Carmen Dorsey; Summer 1971; \$1,150.
2. A New Modification of a Computer Program for the Spatial Locations of Atoms of a Chain Molecule Undergoing Intramolecular Rotations," Carmen Dorsey, Summer 1971; \$1150.

Dr. Myrna Bair

NSF-COSIP Grants for Student Faculty Research

1. Complexes of Copper (II) and Nickel (II) with Nucleic Acids and their Derivatives," Carol Grossman; Sharon Hurwit, Summer 1969; \$1,150.
2. "The Coordination of Copper (II) Ions as a Function of the Structure of Amino Acid Ligands" Melissa Yanover; Diane Taylor; 1970; \$1,150.

Dr. Thomas Dougherty

PEW Faculty Development Grant. "Study of Chemical Kinetics by Advanced Chemistry Students Through Modification of an Ultraviolet/Visible Spectrophotometer to Vary the Reaction Temperature; 1994; \$4,000.

Regional Laser and Biotechnology Laboratory Grant of University of Pennsylvania. "Development of New Ultra Fast Techniques to Study the Dynamics of Biological Systems;" 1994-95.

Student Section

Arcadia University Chemistry Student Awards

The Philadelphia Section American Chemical Society Scholastic Achievement Award

Given to the senior who has made the most significant advance in the study of chemistry.

Year	Student Awardee	Year	Student Awards
1968	Connie Hopping	1987	Edwin Nungessor
1969	Elizabeth McFadden	1988	Peggy Shunk
1970	Doris Wunsch	1989	Troy Dobson
1971	Kathleen Chance	1990	Richard Caimi
1972	Carolyn Dixon	1991	Renee Luckenbill
1973	E. Jane Seltzer	1992	Calvin Uzelmeier
1974	Cora Chan	1993	Paul Mayer
1975	Dorrit Hale	1994	Robert Lontz
1976	Coralia Bonatsos	1995	Michelle Ripp
1977	Maria De Almeida	1996	Holly Digiosaffatte
1978	Deborah Tuttle	1997	Nicole Willard
1979	Judith Ross	1998	Kelly Zwiesdak
1980	Randolph Deprince	1999	Carrie Miller
1981	Linda Mattucci	2000	Michelle Dietrich
1982	Lynne Weiss	2001	Nathan Bucks
1983	Matthew Kurlan	2002	Jonathan Skone
1984	Kristie Kunkel	2003	Michael Russo, Jr.
1985	Glyn Holton	2004	Craig A. Oppenheimer
1986	Han Trinh		

The American Institute of Chemists Medal
Award
For Outstanding Achievement In Chemistry By A
Senior

Year	Student Awardee	Year	Student Awardee
1969	Elizabeth McFadden	1988	Peggy Shunk
1970	Doris Wunsch	1989	Randy Tammara
1971	Sharna Hurwit	1990	Marybeth Sokach
1972	Camen Dorsey	1991	Ian Binnersley
1973	Melissa Yanover	1992	Yvonne Nujoma
1974	Wendy Dolcetti	1993	Wendy Walsh
1975	Bath Lindsey	1994	Sharon Pine
1976	Zita Starka	1995	Daniella Gorbacheva
1977	Barbara Rosenberg	1996	Heather Perry
1978	Barbara Marks	1997	Elizabeth Pezzold
1979	Joseph Unruh	1998	Nicole Martin
1980	Joann Balazs	1999	Alisa Aguado
1981	Edna Chism	2000	Juliann Mogish
1982	Richard Rabin	2001	Amanda Schorle
1983	Chung Ja Lee	2002	Yakaterina Koshkareva
1984	Matthew Shore	2003	No Awardee
1985	Teresa Soto	2004	No Awardee
1986	Donna Staley		
1987	Edwin Nungessor		

The Gates-Alyea-Breyer Award

To an outstanding chemistry student at the junior level or below who shows unusual potential for future graduate studies, with preference given to a student who is seriously considering teaching as a career.

Established by Dr. Arthur C. Breyer, former Professor of Chemistry and Physics, to honor Dr. Edward D. Gates, former President of Arcadia University, and Dr. Hubert Newcombe Alyea, Professor of Chemistry, Princeton New Jersey.

Year	Student Awardee	Year	Student Awardee
1990	Karen Milillo	1998	Michelle Dietrich
1991	Cheryl Kelley	1999	Nathan Bucks
1992	Paul Mayer	2000	Stephanie Kozo
1993	Michelle Ripp	2001	Yakaterina Koshkareva
1994	Daniela Gorbacheva	2002	Michael Russo, Jr.
1995	Nicole Willard	2003	Rosemary Stoertz
1996	Donna Grim	2004	Christina Lane S. Tan
1997	Kelly Zwiesdak	2005	Kathryn E. Lomberk



1976: Coralia Bonatsos receives the Freshman Achievement Award from Dr. Arthur Breyer



1974: Cora Chan receives the
Freshman Achievement Award from Dr. Arthur Breyer



1968: Connie Hopping receives the Philadelphia Section
American Chemical Society Scholastic Achievement Award
From Dr. Roland Eddy

**THE ELLINGTON BEAVERS AWARD FOR INTELLECTUAL
INQUIRY**

For a student research project that best exemplifies the substantial intellectual inquiry inherent in good research. This award was established in 1989 by the Arcadia University Board of Trustees honoring the leadership of Ellington Beavers, former Chair of the Board of Trustees, for his distinguished service.

Year	Student Awardee
1991	Miguel Pineiros Vallejo

National American Chemical Society Student Affiliate Awards

Outstanding Chapter:	1968	Dr. Myrna Bair; Faculty Advisor
Outstanding Chapter	1970-81	Dr. Arthur Breyer; Faculty Advisor
Commendable Chapter	1991	Dr. Chester Mikulski, Faculty Advisor
Honorable Mention	2000	Dr. Chester Mikulski; Faculty Advisor
Honorable Mention	2001	Dr. Linda Mascavage; Faculty Advisor
Commendable Chapter	2002	Dr. Chester Mikulski and Dr. Linda Mascavage, Co-advisors
Honorable Mention	2003	Dr. Linda Mascavage, Faculty Advisor

SENIOR CHEMISTRY MAJOR GRADUATES			
Year	Number Graduates	B.A.	B.S.
1951	6	6	0
1952	3	2	1
1953	2	1	1
1954	0	0	0
1955	2	2	0
1956	0	0	0
1957	0	0	0
1958	0	0	0
1959	1	1	0
1960	4	1	3
1961	5	5	0
1962	2	2	0
1963	0	0	0
1964	4	4	0
1965	3	3	0
1966	5	3	2
1967	4	2	2
1968	4	4	0
1969	7	7	0
1970	2	2	0
1971	4	4	0
1972	4	4	0
1973	4	4	0
1974	5	5	0
1975	3	3	0
1976	5	5	0
1977	3	3	0
1978	6	6	0
1979	12	12	0
1980	9	9	0
1981	11	11	0
1982	16	7	9
1983	12	7	5
1984	3	2	1
1985	6	2	4
1986	6	1	5
1987	5	3	2
1988	5	1	4
1989	7	3	4
1990	5	1	4

Year	Number Graduates	B.A.	B.S.
1991	4	1	3
1992	11	3	8
1993	6	4	2
1994	6	6	0
1995	7	1	6
1996	11	8	3
1997	10	5	5
1998	9	5	4
1999	9	6	3
2000	8	3	5
2001	3	3	0
2002	7	4	3
2003	3	1	2
Total	279	188	91

Representative Outcomes of Senior Chemistry Graduates	
1940	Ruth (Thompson) Hill Control Chemist, Thomas Edison Co. Battery Division, West Orange, New Jersey
1942	Ruth (Bell) Wolfram Chemist, National Drug Co.
1942	Virginia Van Dyke M.D. Hahneman Medical School Medical Director, Somerset Valley Nursing Home and private practice in Bound Brook, New Jersey
1942	Marjorie (Aldrich) Bowers University of Maryland, M.A. Elementary Education Analytical Chemist—Thomas Edison Lab Crystallographer Bell Laboratories Elementary School Teacher (30 years)
1943	Marion (Bready) Mullen School of Portrait and Commercial Photography—Certificate Chemist—WAC (military service) Commercial Photographer
1946	Carolyn (Doernbach) Barney Research—University of Pennsylvania Research—Long Beach Veteran's Hospital
1946	Ruth (Smartley) Maxson Chemist—Exide Battery Corporation
1948	Carol (Roland) Ranger Research Technician, University Hospital Harvard University Laboratory Instructor—Arcadia University

Representative Outcomes of Senior Chemistry Graduates

1949	<p>Helen E. Ahart M.A. 1956 Columbia University Dietitian-Nutritional Specialist V.A. Hospital—Dietitian to Chief of Nutritional Therapy, Education and Research</p>
1950	<p>Mary Jane Patch Research Biochemist VA Hospitals Published 23 Research papers, 1953-1984</p>
1951	<p>Janet (Bullock) Perper M.S. Temple University, Occupational Health Research Vice President Carr and Perper, Inc. Glenside, Pennsylvania – Chemical Safety Management</p>
1951	<p>Doris (Parsons) White Princeton University—coursework Senior Research Assistant Biology, Princeton University</p>
1951	<p>JoAnn (Lissfelt) Nassutti M.S. American University at Beirut—Physical Chemistry CPA—California State University Vice President Hemming Morse Certified Public Accountants, San Mateo, CA</p>
1952	<p>Patricia Smith M.D. Howard University M.P.H. Columbia University Medical Director, Medicaid, State of Connecticut</p>
1962	<p>Barbara (Starks) Favazza M.D. University of Virginia Child Psychiatrist—California; Missouri Clinical Associate Professor of Psychiatry, University of Missouri Director, Residency Training Program and Child Psychiatry Outpatient Clinic, University of Missouri Member, Missouri State Mental Health Commission Author: 2 books; 2 publications</p>

Representative Outcomes of Senior Chemistry Graduates

1963	<p>Julia S. (Lee) Erickson Certification in Education, Bowie State College, 1979 M.A. 1986 St. John's College <i>Editor, American Chemical Society</i> Instructor, Connecticut College High School Chemistry Teacher, Maryland Co-author <u>Chemistry</u> D.C. Health 1987</p>
1964	<p>Janet (Spence) Kerr M.S. Rutgers University; Physiology Ph.D. Rutgers University; Physiology Assistant Professor, Rutgers University Camden Post Doctorate University of Pennsylvania Medical School Research Associate University of Pennsylvania Medical School Assistant Professor University Medical and Dental School of New Jersey Dupont Corporation, Senior research pharmacologist</p>
1965	<p>Ruth Markley Analytical Chemist—Dupont Information Science Specialist—Dupont Director Cooperate Labeling</p>
1968	<p>Connie (Hopping) Kane-Maguire M.S. Carleton University (Ottawa) M.B.A. Furman University, summa cum Laude Research Assistant, Carleton University Process Development, Quality Assurance and Production Planning Engineer Celanese Corporation Forensic Chemist, Hendrix Forensic Associates</p>
1968	<p>Marion (Yick) Katzenbach M.B.A. Marketing, Western New England College M.L.S. Information Science, Simmons College Jr. High School Science Teacher Adult Education Science Teacher Information Specialist, MIT President, Katzenbach and Associates, Marketing Communications and Information Retriever MR Corporation—competitive analyst</p>

Representative Outcomes of Senior Chemistry Graduates

1969	<p>Janice Young M.S. Microbiology, Thomas Jefferson University M.T. Stanford School of Medical Technology Microbiology Manager, Differential Diagnostics, Bloomfield, New Jersey Senior Supervisor Medical Technology Montefiore Medical Center, Bronx, New York Supervisor Clinical Microbiology Veterans Administration Medical Center, Washington, DC</p>
1969	<p>Elizabeth (McFadden) Smith M.S. Catholic University of America, Physical Inorganic Chemistry Professor of Chemistry and Chair of the Department Northampton Community College, 1971-present Secretary/Treasurer, Keplers Fuel Co., 1976-present</p>
1969	<p>Barbara Prosser M.S. University of Delaware Research Microbiologist, N.Y. Ocean Science Lab Associate Scientist, Hofmann Laroche, Inc. Scientific coordinator, Hofmann Laroche, Inc. Chemotherapy Department, Hofmann Laroche, Inc.</p>
1970	<p>Maida (Serret) Burka M.S. Villanova University Associate Director, International Regulatory Affairs, Wyeth-Ayers Research Corp. Manager of Health Registration and Drug Regulatory Affairs, Wyeth International, Ltd. Research Assistant, Wyeth Laboratories Research Assistant, McNeil Laboratories</p>
1971	<p>Kathleen (Chance) Chiu M.D. Hahneman Medical School Neonatology Fellowship, University of California at Davis Staff Physician (Neonatology) University of California, Davis Medical Center Pediatrician, Children's Clinic of Chester, Chester, PA</p>

Representative Outcomes of Senior Chemistry Graduates

1972	Deborah Konietzko M.D. Medical College of Pennsylvania Family Practice Physician
1973	Monique Miller M.B.A. Marketing Sales Manager, DSM Chemicals Sales Representative, Allied Chemical Company
1973	Jane (Seltzer) Spencer M.S. Analytical Chemistry, University of Connecticut High School Chemistry Teacher, 1986- present Medical Chemist Technologist, Hospital of St. Raphael, New Haven, Ct.
1974	Heather (Pierce) Stern M.D. Temple University Assistant Professor of Biology, Arcadia University Private Practice, Endocrinology and Internal Medicine
1974	Cora (Chan) Kokosa M.S. Chemistry University of Illinois Associate Chemist, Miles Laboratories Chemist Northern Indiana Public Service Corp. Senior Experimental Chemist, General Motors, Flint, MI
1975	Beverly (Milestone) Maisey Certificate—Tool and Die Design Mechanical Engineer Nemco, Inc. Co-owner of two small corporations with her husband
1975	Joni Rossnick M.S. Drexel University, Biochemistry M.S. Temple University, Embryology M.D. Philadelphia college of Osteopathic Medicine Family Medicine, Public Health

Representative Outcomes of Senior Chemistry Graduates

1975	<p>Dorrit (Hale) Sterner M.D. Temple University Graduated first in her class and awarded five prizes for outstanding performance in overall performance, internal medicine, surgery, psychiatry and pathology. Chief medical resident, Department of Internal Medicine, Pennsylvania Hospital Staff physician in internal medicine</p> <ol style="list-style-type: none"> 1. Indian Health Service Hospital, Arizona 2. Indian Health Service (Navajos) <p>Rough Rock, Arizona, Project director & Clinical Director, Health Department, Philadelphia, PA Clinical Director, Health District Ten, Phublic Health Department, Philadelphia, PA</p>
1976	<p>Jean Olivia (Grant) Dean M.D. Thomas Jefferson Medical College Chief of Obstetrics/Gynecology U.S. Public Health Service Choltan Nation Hospital</p>
1976	<p>Victoria Woods-Anderson M.D. Medical college of Pennsylvania Physician U.S. Army Data Processor—computer programmer McNeil Labs</p>
1976	<p>Sally (Pearson) Miller Northeastern University Analytical chemist—Liberty Mutual Insurance Company Registered Patent Agent—Lan Firm</p>
1976	<p>Sheryl Silverman Crystallographer, The Institute for Cancer Research Molecular Genetics, The Institute for Cancer Research</p>
1978	<p>Jack Goldman University of New Orleans (chemistry) M.B.A. Finance Pace University Portfolio Administrator, Pinnalle Associates, Ltd.</p>

Representative Outcomes of Senior Chemistry Graduates

1979	<p>Maureen (Finn) Tierney Medical College of Pennsylvania Certificate in Medical Technology Medical Technologist 1. Suburban General Hospital, Newtown, PA 2. Fairview General Hospital, Fairview, Ohio</p>
1979	<p>Benjamin Kelch D.O. Philadelphia College of Osteopathic Medicine, 1983 Doctor's Hospital, Columbus, Ohio Internal Medicine, 1984-87 Fellow Department of Neoplastic Diseases, Hahneman University</p>
1980	<p>Peter Taraschi D.O. Philadelphia college of Osteopathic Medicine Family Medicine Private practice (Florida)</p>
1980	<p>Camille Lucci Advanced Study including M.A. Thesis Bryn Mawr College, Molecular Biology B.A. Mathematics, Rosemont College (1989) Instructor, Science Harcum Junior College Actuary-Pension Analyst Pension and Financial Services, Radnor, PA</p>
1980	<p>Joann (Balazs) Sweasy Ph.D. Microbiology—Genetics Rutgers University (1989) Post doctorate, University of Washington Cancer Research—Genetics—Molecular Biology, (1989-91) Associate Professor, Radiology, Yale University</p>

Representative Outcomes of Senior Chemistry Graduates

1981	<p>Linda Mattucci M.S. Pharmacology Hahneman University McNeil Pharmaceutical Laboratories Senior Information Scientist Senior Regulatory Submissions Specialist Regular Regulatory Submissions Specialist Research Associate Spectroscopy Research Assistant</p>
1981	<p>Nancy DeFranco Graduate Work, Temple University Pharmaceutical/Marketing Research Assistant, McNeil Labs</p>
1981	<p>Barbara (Toross) Ruocco B.S. Medical Technology, Arcadia University Graduate Work, 1982 Southern Connecticut State University Technical Instructor, Derkin-Elmer Analytical Chemist, Olin Corporation Medical Technologist Diagnostic Medical Lab</p>
1982	<p>Richard Rabin MSE Computer Science/Artificial Intelligence Technical sales Engineering—East coast Manager—Intelli corp. Kathleen Weeks Smith Kline Beckman Information Scientist Associate Information Scientist Analyst Associate Information Analyst</p>
1982	<p>Fran Braslow University of Pennsylvania, Medical Technology Medical Technologist, E.M. Cohn M.D. Medical Paralegal, Tabas and Rosen Medical Paralegal, E.R. Jacobs & Associates</p>
1982	<p>Lynne Weiss M.D. Private Practice</p>

Representative Outcomes of Senior Chemistry Graduates

1983	Dominick Braccia D.O. Philadelphia college of Osteopathic Medicine, 1987 Family Medicine—Delaware County Memorial Hospital
1983	Ruby Sampson M.D. New Jersey College of Medicine and Dentistry, 1990
1983	Peggy Shunk Senior Analytical Chemist Merck-Sharpe-Dohm Pharmaceutical
1983	Jamie Jacobsohn M.D. University of Pennsylvania
1983	Chang Lee D.O. New Jersey College of Osteopathic Medicine
1984	Valerie (Zipay) Newman D.C. Life Chiropractic College Private Practice: Newman Chiropractic Center
1985	Teresa Soto M.D. Albert Einstein College of Medicine, 1990 Residential Programs counselor for Mentally Handicapped, Bucks County Community Interactions, Inc., 1987 Medical Student Advisor & Programs Assistant, Office of Minority Affairs AECOM, 1986-87
1985	Glen Holton Ph.D. Carnegie-Mellon University
1986	Glen Dragon M.D. Temple University, 1990 Intern General Surgery Residency, 1990
1986	Stephen Einreinhofer D.O. Osteopathic Medicine, 1990

Representative Outcomes of Senior Chemistry Graduates

1986	Randy Barnett D.O. Philadelphia college of Osteopathy
1986	Steven Lichtenstein D.O. Philadelphia College of Osteopathy
1986	Donna Staley Ph.D. University of Delaware, Chemistry
1988	Victoria Cordova M.S. Forensic Science with a concentration in criminalistics University of New Have, 1990 National Medical Sciences Willow Grove, Forensic Science
1988	Richard Ruffin M.D. University of Pittsburgh Research Associate: Wistar Institute
1988	Sharon Zion M.A. in Education with a concentration in Chemistry, 1988 High School Chemistry, General Science Teacher
1989	Adam Denish D.V.M. University of Pennsylvania Veterinary School
1989	Randy Tammara Ph.D. Temple University School of Pharmacy
1990	Jean Gatlin-Hurst M.A. in Education with a concentration in Chemistry, Arcadia University Edison High School, Science Teacher



1978
Nancy Harris carrying our instrumental analysis with
Dr. Chester Mikulski



1966
Beaver College NSF Summer Institute in Chemistry



1968
Crystal Model Building Program
National Science Foundation Institute



1966 Dr. Arthur Breyer, USA Aid to International Development
Central American Chemistry Teachers Conference



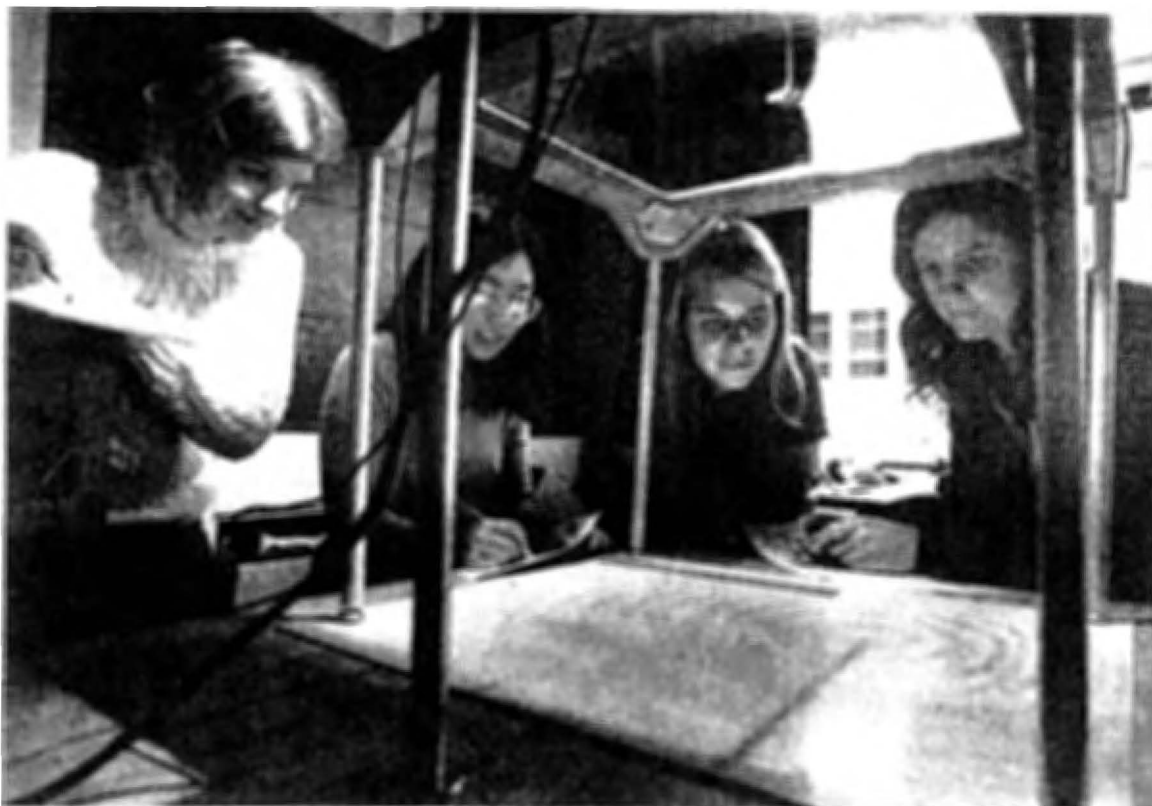
1971 Dr. Harvey Paige class lecture in
Advanced Inorganic Chemistry



Dr. Hubert Alyea, Princeton University worldwide renowned lecturer at the 1972 National Science Foundation Summer Institute



Dr. Chester Mikulski works with students on an Electrochemistry experiment



First year Physics students carrying out a series of
Ripple-tank experiments



National Science Foundation Summer Institute for High School Chemistry Teachers – discussion on Grey Towers Terrace



Dr. Jeryl Walker, scientific American "Circus of Physics" Lectures at the National Science Foundation Summer Institute for High School Teachers

Appendix A

STUDENT SENIOR THESIS

Department of Chemistry and Physics

All senior chemistry majors are required to carry out a library and/or laboratory research project under a faculty sponsor at Beaver College/Arcadia University as part of the graduation requirement. The following listing covers the period 1969 to 2003. In the earlier part of this period a senior thesis was only an option.

1975	Lindsey, Beth	"Electrophoretic and thin-layer chromatographic studies on a series of structurally related azo dyes."	Breyer
1974	Chan, Cora	"Electrophoretic and thin-layer chromatographic studies on a series of structurally related triphenylmethane dyes."	Breyer
1974	Klimis, Dorothy	"Thin-layer chromatography of a series of structurally-related aryl alkyl sulfonates."	Breyer
1972	Dorsey, Carmen	"Thin-layer chromatography of structurally-related triphenylmethane dyes."	Breyer
1972	Seltzer, Jane	"Reverse-phase thin-layer chromatography of surfactants from waste animal fats."	Breyer
1972	Blazakis, Lia	"Reverse-phase thin-layer chromatography of a series of structurally-related alkylester surfactants."	Breyer
1971	Millie, Marsha	"A Systematic Study of the Variables Involved in the Reverse-phase thin-layer Chromatography of Oxyethylated Surfactants."	Breyer
1971	Miller, Monique	"Dimedon Complexes of Nickel."	Tibbetts
1971	Chance, Kathy	"The Isolation and Structure Determination of the Red Pigment of the Lichen, Usnea Strigosa"	Tibbetts
1971	Dorsey, Carmen	"A Computer Program for the identification of unknown lichen compounds."	Eddy
1971	Dorsey, Carmen	"A New Modification of a Computer Program for the Spatial Locations of Atoms of a Chain Molecule Undergoing Intermolecular Rotations".	Eddy
1970	Yanover, Melissa	"The Coordination of Cooper II Ions as a Function of the Structure of Amino Acid Ligands."	Myrna Bair
1970	Taylor, Diane	"The Coordination of Cooper II Ions as a Function of the Structure of Amino Acid Ligands."	Myrna Bair
1969	Grossman, Carol	"Complexes of Copper (II) and Nickel (II) with Nucleic Acids and Their Derivatives."	Myrna Blair
1969	Hurwit, Shanna	"Complexes of Copper (II) and Nickel (II) with Nucleic Acids and Their Derivatives."	Myrna Blair

Arcadia University
(formerly Beaver College)

American Chemical Society Affiliate Chapter

Dr. Arthur Breyer became a member of the Philadelphia Section of the American Chemical Society (ACS) in 1964 and immediately became active on the Education Committee. Through this association, we were approved in 1968 for participation by an outstanding senior chemistry major in the Philadelphia Section ACS Scholastic Achievement Award on an annual basis. The award recognizes academic achievement, leadership and intellectual capacity. An additional outgrowth of Beaver College's relationship with the ACS was the invitation to obtain a charter for an ACS Student Affiliate Chapter in 1967. Members of the chapter elected officers each year who along with their faculty advisor developed a program of on-campus and off-campus activities. For the first year 1967-1968, Dr. Myrna Bair served as faculty advisor. On the basis of activities carried out each year presented in a lengthy annual report chapters were considered for outstanding, commendable and honorable mention awards. The Beaver College chapter received the Outstanding Chapter Award in its very first year! One year went by without an award. After Dr. Bair resigned her position, Dr. Arthur Breyer became faculty advisor and served in this capacity from 1969-70 to 1982-83. The chapter received eleven consecutive outstanding chapter awards from 1970-71 to 1981-82. (The student report for 1982-3 was not sent in by the report deadline.) All officers graduated in June 1983 and for two years no students volunteered to serve as officers. Student interest and leadership simply fell apart between 1984-1986.

Dr. Chester Mikulski became faculty advisor in 1987 and Dr. Linda Mascavage assumed the role of co-advisor beginning in 1994. In addition to receiving Commendable Chapter Awards in 1990-1991, 2001-2002 and Honorable Mention Awards in 1999-2000; 2000-2001, 2002-2003 the club received the Student Government Award for "outstanding contribution to academics and improving the quality of life at Beaver College."

Over the past thirty-five years the ACS Student Affiliates Chapter has carried a wide-variety of activities on-campus and off-campus. Representative activities include:

On Campus :

1. Published a newsletter, "The Condenser," which was circulated to 200 students and 50 local chemical professionals.
2. Tutoring program for freshmen chemistry students staffed by upper level chemistry majors
3. Tutoring program for organic chemistry led by junior-senior chemistry majors.
4. Extensive regular speakers on chemical topics by area professionals' chemists and even one Nobel Prize laureate.
5. Student Affiliates were active in "Department Calling Night," Countdown to Beaver," annual Family Weekend activities, freshmen orientation, Activity Fair, and "Beaver Blitz."
6. Film programs
7. Students served as hosts and hostesses for local ACS and American Institute of Chemists (AIC) meetings held on campus.

8. "Dr. Seuss Reading Night" and juggling, face painting, etc., for children from a local orphanage.
9. "Haunted Castle" in the context of Harry Potter demonstrated all kinds of starting experiments for local students.
10. Senior Chemistry major poster session's oral presentations.
11. Regular social and business meetings and involvement in student government.

Off Campus

1. Organized a career symposium with Tulane University and the Louisiana ACS Section at a natural meeting.
2. Graduate school nights at area colleges.
3. Donated a subscription to Wonder Science to a local elementary school.
4. Participate in S.H.A.D.E.S.—a program designed to involve middle-school girls in science and mathematics.
5. Participation in Big Brothers/Big Sisters Bowl-a-thon.
6. In connection with National Chemistry Week (NCW) carried out science lecture experiments and topical lectures at area elementary and high schools as well as comparative programs in area colleges. Chemistry majors were involved in presenting the experiments.
7. Premedical conferences held annually.
8. Field trips to Pennsylvania College of Optometry.
9. Participation in the ACS Employment Clearing House at regional and national meetings.
10. Student-faculty attendance at local, regional and national ACS meetings.
11. Attendance at Eastern Colleges Science Conference.

12. Regular program of field trips to the laboratories official chemical corporations such as Mende, McNeil, Smith Klein Beecham, National Medical Laboratories and Eastern Regional USDA laboratories.

13. Off-campus courses: For example, 14 students and 2 faculty members attended the Industrial Analytical Chemistry Short course at an Eastern Analytical Chemistry Conference in Somerset, New Jersey.

Student Senior Thesis

Department of Chemistry and Physics

As part of the graduation requirement all Senior chemistry majors are required to carry out a library and/or laboratory research project under a faculty sponsor at Arcadia University. The following listing covers the period 1969 to 2003. In the earlier part of this period a senior thesis was only an option.

Year	Last Name	First Name	Name of Senior Thesis	Mentor	Degree
2003	Russo	Michael F.	Parallel Tempering Simulations of ARN-HCL Clusters N=1-12: Structural, Thermodynamic, and Spectroscopic Properties	Curotto	BS
2003	Kozo	Stephanie	Kinetics of Deuterium Exchange Between D-NaOH and Acetone using Proton NMR	Campbell	BS
2002	Klein	Kelly	Lupron Depot 3.75 mg	Mikulski	BA
2002	Momorella	Karen	Complexes of Copper (II) Perchlorate with 2'-Deoxyribonucleosides	Mikulski	BS
2002	Skone	Jonathan H.	Simulations of Heterogeneous Noble Gas Clusters: Isomers and Normal Modes of Krn-H (n=1-13)	Curotto	BS
2002	Koshkareva	Yekaterina	Biology/Chemistry		BS
2002	Wilson	Mark	Carisoprodol/Meprobamate Method Validation	Mikulski	BS
2001	Bucks	Nathan E.	The Synthesis of Aspartyl Protease Substrates and Inhibitors	Campbell	BA
2001	Porter	Robert	The Chemistry Behind Cleaning Contact Lenses	Mikulski	BA
2001	Schorle	Amanda	A Complex of Copper (II) Perchlorate and 3-Hydroxypyridine-2-carbaldoxime	Mikulski	BA
2000	Baker	Bryan P.	Approaches to the Determination of the pKa of 2,3-diphenyl-1,3-thiazolidin-4-one in aqueous methanolic solutions	Mascavage	BS
2000	Dietrich	Michelle R.	CX-100: A New Free-Radical Inhibitor	Beavers	BS
2000	Hutchings	James B.	An NMR Study of an α -proton Exchange Between acetone-d ₆ and HCl	Campbell	BA
2000	Foley	Maureen T.	same as J. Hutchings (CoInvestigator)	Campbell	BA
2000	Neibauer	David W.	Improving the accuracy of the van der Waals equation by adding a temperature dependency using an azeotropic mixture of 2-Propanol and water	Curotto	BS
2000	Ghayal	Madhavi R.	Geometrical Optimization of Ar12-HF and Ar54-HF Clusters	Curotto	BS
2000	Mogish	Juliann	Preparation and NMR Properties of Substituted 3-benzyl-2-phenyl-1,3-thiazolidin-4-ones	Mascavage	BS
1999	Aguado	Alisa M.	Temperature Dependence of the Vibrational Fundamental of Ar12-HF	Curotto	BS
1999	Anderson	Matthew	An NMR Study of the Rate of Reaction Between Iodomethane and Sodium Thiocyanate in Ethanol	Campbell	BS
1999	Wahl	Timothy	same as M. Anderson (CoInvestigator)	Campbell	BA
1999	Brown	Maisha T.	The Rate of Alpha Bromination of Cyclohexanone	Campbell	BS
1999	Gabriele	Mary	Complementary & Alternative Medicine (CAM): Reasons for Utilization; Patient Characteristics and Satisfaction	Mikulski	ID
1999	Kligerman	Michael F.	The Intercalation of Pyridine into Iron (III) Oxochloride	Mikulski	BA
1999	Leyzerzon	Yuliya	Lasik: A New Approach to Refractive Surgery	Mikulski	BA
1999	Loch	Katie	Visual Prostheses	Mikulski	BA
1999	Miller	Carrie Ann	The Assessment of Bone Marrow Transplantation and Enzyme Replacement Therapies in Dogs with MPS VII	Mikulski	BA
1999	Schulz	Michele L.	Measurement of the Attenuation of the Energy Emission for the Suernova Remnant Cassiopeida A	Huber	BA
1998	Moyer	Stephen	Assessing Frailty By Comparing Metabolic Cost	Mikulski	ID
1998	Karpewicz	Charles T.	Cyclodextrins: A Survey of Bonding Capabilities with Metal Ions	Mikulski	BA
1998	Martin	Nicole A.	Detection of Benzene Exposure By Ion Chromatography with Minor Metabolite Muconic Acid	Mikulski	BS
1998	Patel	Ashish S.	The Binding Activity of Adenosine and Thiazolidine Derivatives with Tin (IV) Chloride	Mikulski	BS
1998	Xiong	Teng	The Detection of Cocaine Metabolites in Urine	Mikulski	BS
1998	Young	Cara J.	"Recovery From a Sciatic Nerve Transection Enhanced By Treatment With Neurotrophin-3, But Not Nerve Growth Factor	Biology	BS
1998	Zwiesdak	Kelly J.	Preparation and 1H NMR Properties of 2-Aryl-3-Benzyl-1,3-Thiazolidin-4-Ones	Mascavage	BA
1997	Hauser	Stephen L.			BA
1997	Schneider	Kimberly K.	Preparation of 2-Aryl-3-Benzyl-1, 3-Thiazolidin-4-Ones	Mascavage	BA
1997	Pasquella	Mark J.	Chemistry/Business		BS
1997	Petzold	Elizabeth M.			BS

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1997	Read	Heather L.	Chemistry/Business		BS
1997	Sheely	Carrie S.	same as K. Schneider (CoInvestigator)	Mascavage	BS
1997	Spencer	Robert W.			BS
1997	Willard	Nicole M.	Crosslinker CX-100 in a Hydrophilic and Biocompatible Coating	Beavers	BS
1996	DiGiosaffatte	Holly L.	The Binding Activity of N6-substituted Adenosine Derivatives with Copper (II) Perchlorate	Mikulski	BA
1996	Fior	Dean E.	The Mechanism of Attack on Thionesters by Basic Amines	Campbell	BA
1996	Li	Wei	N6-Phenyladenosine Complex with Copper (II) Perchlorate	Mikulski	BA
1996	Morelli	Danielle L.	Copper Complexes with 2-Phenylaminoadenosine and 2-Chloroadenosine	Mikulski	BA
1996	Patel	Kiran R.	Purification and Molecular Modeling Studies of 2,3-Diphenylthiazolidin-4-ones and 2-Trichloromethyl-3-phenyl-1,3-thiazolidin-4-one	Mascavage	BA
1996	Merkel	Jacki I.	same as K. Patel (CoInvestigator)	Mascavage	BS
1996	Kurzinsky	Lee A.	The Development of a Database to Summarize the Environmental Fate and Toxicity for Selected Herbicides (Chemistry/Business)	Mikulski	BS
1996	Perry	Heather M.	Development of a General Computer Model for Transient Grating Experiments and Analysis of Experimental Results	Dougherty	BS
1995	Bryman	John H.	The Investigation of the Active Sites of Yohimbine	Mikulski	BA
1995	Shteyn	Marina	Uranium and Dysprosium Complexes with 2'- and 5'-Deoxyadenosine	Mikulski	BA
1995	Cano	Yazmin Y.	Time Resolved Laser Spectroscopy	Dougherty	BS
1995	Gorbacheva	Daniela V.	Preparation and 1H NMR Studies of 2,3-Diphenylthiazolidin-4-Ones	Mascavage	BS
1995	Laquintano	Dawn	Measurement of the Attenuation of the Energy Emission for the Supernova Remnant Cassiopeia A	Huber	BA
1995	Ripp	Michelle R.	same as D. Gorbacheva (CoInvestigator)	Mascavage	BS
1995	Son	Soonjoo	same as D. Gorbacheva (CoInvestigator)	Mascavage	BS
1995	Quinn	Frank M.	same as Y. Cano (CoInvestigator)	Dougherty	BS
1995	Spiska	Paul	same as Y. Cano (CoInvestigator)	Dougherty	BS
1994	Koch	Karen L.	Tyrosinase Activity in a Water Stressed System	Mikulski	BA
1994	Lontz	Robert N.	same as K. Koch (CoInvestigator)	Mikulski	BA
1994	Guimbaolibot	Ann	Preparation and NMR Properties of 2-Trichloromethyl-3-substitutedphenylthiazolidin-4-ones	Mascavage	ID
1994	Odell	Sandra	same as A. Guimbaolibot (CoInvestigator)	Mascavage	None
1994	Pine	Sharon R.	Characterization of the Biological Activity of Heparin Bonded to Various Substrates (Biology/Chemistry)	Beavers	BA
1994	Yakobson	Irina	Vanadium Complexes with 2'-and 5'-Deoxyadenosine	Mikulski	BA
1993	Mayer	Paul E.	A Partial Microwave Spectroscopic Analysis of the Methane-Ozone van der Waals Complex	Steyert	BS
1993	Shaw	James	The Incorporation of Estradiol Into Melanin and its Role In Facilitating the Further Binding of Estrogens to the Pigment	Off Campus	BS
1993	Nakhjavan	Jeffrey	Directional Coronary Atherectomy: A Safe and Effective Means of Treatment for Coronary Artery Disease	Off Campus	BA
1993	Walsh	Wendy E.	Vanadium Complexes with 2'-and 5'-Deoxyadenosine	Mikulski	BA
1992	Kim	Changsu	Explore the Role of DNA Supercoiling as a Common Regulatory Mechanism in the Regulation of Stress Response Genes in Escherichia Coli	Mikulski	BA
1992	Schmidt	Warren W.	same as C. Kim (CoInvestigator)	Mikulski	BA
1992	Adams	Cleveland E.			BS
1992	Greenawalt	Chantelle R.	Aerobic Denitrification in Activated Sludge	Breyer	BS
1992	Kelley	Cheryl D.	The Preparation of Quinone Imide and its Derivatives	Off Campus	BS
1992	Menzak	Alexandria U.	International Quality Standards: ISO 9000 (Chemistry/Business)	Mikulski	BS
1992	Milillo	Karen M.	Benzoyl Chloride in the Isolation of Dipeptides for Amino Acid Sequence Analysis	Mikulski	BS
1992	Nujorna	Yvonne N.	5'-Deoxyadenosine Complexes with 3d Metal Perchlorates	Mikulski	BS
1992	Uzelmeier III	Calvin E.	Study of Oxidation of Metal Carbonyls by HCl, Using 18-Crown-6 and the Liquid Clathrate Effect	Off Campus	BS
1991	Binnarsley	Ian K.	The Effects of Factoring Maalox Plus Tablets (Chemistry/Business)	Mikulski	BS
1991	Jeranek	Walter J.		Mikulski	BS
1991	Luckenbill	Renee J.	The Preparation and Characterization of Transition Metal Complexes with N6-Benzyl Adenine and N6-Benzoyl Adenine	Mikulski	BS
1990	Cairni	Richard J.	Study of the Effects of Nicotinamide on Angiogenesis	Mikulski	BA
1990	Holman	Marie E.	Statistical Analysis of Reliability of Radon Detectors for Residential Homes	Mikulski	BS
1990	Serrano	Francisco K.	Chemistry/Biology	Huber	BS
1990	Sokach	Mary E.	Synthesis and Characterization of Copper, Nickel, and Palladium Complexes of Sox (Chemistry/Biology)	Mikulski	BS
1990	Tener	Glenn A.	Allopurinol and Uric Acid Complexes with Copper (II) Chloride and Perchlorate	Mikulski	BS
1989	Dobson	Troy	Preparation of Chromium (III) Complexes with Biologically Active Substances	Mikulski	BA

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1989	Eang	Samoth	A Study of Ligand Field Strengths in Metal Complexes Involving Fe (II) and Fe (III)	Mikulski	BS
1989	Welsh	William	The Addition of Cobalt Metal Salts to Allopurinol and Uric Acid	Mikulski	BS
1989	Miller	Beth	Antigen Specific Cellular Immunotherapy of Cancer	Mikulski	BA
1989	Dajani	Hasan	Price vs. Sales at Rohrer (Chemistry/Business)	Mikulski	BA
1988	Udell	Kimberly	Synthesis of Xanthine and Hypoxanthine Complexes with First Row Transition Metal Bromides and Iodides	Mikulski	BS
1988	Kanach	Dorothy	Coordination Chemistry: Metal Complexes with Purine, Adenine and Guanine	Mikulski	
1987	Madison	Glenn	Adenine N (1)-Oxide Complexes with Metal Chlorides	Mikulski	BS
1987	Lowery	Paul	A Study of the Interaction of Transition Metal Chlorides with Tetracycline	Mikulski	BS
1987	Renn	Ann	Comparative Magnetic Behavior of Representative Metal Complexes with Biologically Important Ligands	Mikulski	BS
1986	Staley	Donna L.	Synthesis and Characterization of Metal Complexes with Hypoxanthine and Xanthine	Mikulski	BS
1986	Gaul	Michele	The Synthesis of Nickel and Cobalt Iodide Complexes with Xanthine and Xanthine Derivatives	Mikulski	BS
1985	Bayne	Monica	The Synthesis of Transition Metal Bromide and Iodide Complexes with Xanthine and Xanthine Derivatives	Mikulski	BS
1983	Borges	Guillermo	First Row Transition Metal Complexes with Deoxyadenosine	Mikulski	BS
1983	Kurlan	Matthew K.	Synthesis and Characterization of Complexes between the Transition Metals and Xanthine Derivative Bioligands	Mikulski	BS
1983	Grossman	Scott	Bioinorganic Syntheses by Reaction of Metal Salts with Xanthine and Xanthine Derivatives	Mikulski	BS
1983	Braccia	Domenick	Adenine Complexes with Precious Metal Chlorides	Mikulski	BS
1983	Lee	Chung Ja	Cytosine Complexes with Copper (II) Perchlorate	Mikulski	BA
1982	Fleming	Deborah	A Study of the Magnetic Properties of Tetracycline and Complexes with 3d Metal Perchlorates	Mikulski	BS
1982	Montelone	Anthony	Absorption of Ultraviolet Radiation by Various Contact Lens Materials	Mikulski	BA
1982	Moore	Terrance	A Study of Metal Perchlorate Complexes with Triethyl Thiophosphate	Mikulski	BS
1982	Weiss	Lynne	A Study of Guanine Complexes with Representative Transition Metal Chlorides	Mikulski	BS
1981	Minutella	Robert	First Row Transition Metal Complexes with Adenosine	Mikulski	BA
1981	DeFranco	Nancy	same as R. Minutella (CoInvestigator)	Mikulski	BS
1980	Smith	Yale	Polymeric Metal (III) Complexes of Triethyl Thiophosphate	Mikulski	BS
1980	Giles	Beverly	Ligand Field Strengths of Some Representative 3d Transition Metal Complexes with Purines	Mikulski	BA
1980	Fleming	James	Synthesis, Isolation and Characterization of Novel Metal Complexes Involving Tetracycline	Mikulski	BS
1980	Cocco	Susan	Purine Complexes with Divalent 3d Metal Chlorides and Perchlorates	Mikulski	BS
1980	Tran	Thu-Ba	Synthesis and Characterization of Cu (II) Complexes with Xanthine and its Derivatives	Mikulski	BS
1980	Mattucci	Linda	A Study of Guanine Complexes with Metal (II) and Metal (III) Perchlorates	Mikulski	BS
1980	DePrince	Randolph	First Row Transition Metal Perchlorate Complexes with Purine and Adenine N(1)-Oxides	Mikulski	BS
1980	Delcato	David	Ni (II) Poly (metal methylphenylphosphinates)	Mikulski	BS
1979	Rabin	Richard	The Identification of the Polymeric Products Obtained from the Treatment of Metal Chloride Solutions with Methyl Methylphenylphosphinate	Mikulski	BS
1979	Chauhan	Suneet	Reactions of Triethyl Thiophosphate with Metal Perchlorates	Mikulski	BS
1979	Ross	Judith	Interactions of Triethyl Thiophosphate with Representative Hard and Soft Lewis Acids	Mikulski	BS
1978	Tran	Thao	Synthesis and Characterization of Metal Complexes with Tri-isopropyl Phosphate	Mikulski	BS
1978	Harris	Nancy	A Study Involving Diethyl Acetylphosphonate and Diethyl Benzoylphosphonate with Metal Chlorides and Perchlorates	Mikulski	BS
1978	Sanford	Patricia	same as N. Harris (CoInvestigator)	Mikulski	BS
1977	Henry	William	Diethyl Benzoylphosphonate and Diethyl Acetylphosphonate As Ligands	Mikulski	BA
1977	Unruh	Joseph	Methyl Methylphenylphosphinato Metal Complexes	Mikulski	BS
1977	Marks	Barbara	Metal Perchlorate Complexes with Potentially Bidentate Organophosphoryl Ligands	Mikulski	BS
1977	Tuttle	Deborah	same as B. Marks (CoInvestigator)	Mikulski	BA

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1975	Lindsey,	Beth	"Electrophoretic and thin-layer chromatographic studies on a series of structurally related azo dyes."	Breyer	
1974	Chan,	Cora	"Electrophoretic and thin-layer chromatographic studies on a series of structurally related triphenylmethane dyes."	Breyer	
1974	Klimis,	Dorthy	"Thin-layer chromatography of a series of structurally-related aryl alkyl sulfonates."	Breyer	
1972	Dorsey,	Carmen	"Thin-layer chromatography of structurally-related triphenylmethane dyes."	Breyer	
1972	Seltzer,	Jane	"Reverse-phase thin-layer chromatography of surfactants from waste animal fats."	Breyer	
1972	Blazakis,	Lia	"Reverse-phase thin-layer chromatography of a series of structurally-related alkylester surfactants."	Breyer	
1971	Fischl,	Marsha	"A Systematic Study of the Variables Involved in the "Reverse-phase thin-layer Chromatography of Oxyethylated Surfactants."	Breyer	
1971	Miller,	Monique	"Dimedon Complexes of Nickel."	Tibbetts	
1971	Chance,	Kathy	"The Isolation and Structure Determination of the Red Pigment of the Lichen, Usnea Strigosa"	Tibbetts	
1971	Dorsey,	Carmen	"A Computer Program for the identification of unknown lichen compounds."	Eddy	
1971	Dorsey,	Carmen	"A New Modification of a Computer Program for the Spatial Locations of Atoms of a Chain Molecule Undergoing Intermolecular Rotations".	Eddy	
1970	Yanover,	Melissa	"The Coordination of Cooper II Ions as a Function of the Structure of Amino Acid Ligands."	Myrna Bair	
1970	Taylor,	Diane	"The Coordination of Cooper II Ions as a Function of the Structure of Amino Acid Ligands."	Myrna Bair	
1969	Grossman,	Carol	"Complexes of Copper (II) and Nickel (II) with Nucleic Acids and Their Derivatives."	Myrna Blair	
1969	Hurwit,	Shanna	"Complexes of Copper (II) and Nickel (II) with Nucleic Acids and Their Derivatives."	Myrna Blair	