The Department of Chemistry has several fundamental responsibilities. They are (a) to train students to understand, to criticize meaningfully and to carry out scientific investigations, (b) to provide instruction and laboratory experience for those who wish to make chemistry their livelihood and/or pursue advanced study in chemistry, (c) to provide instruction and laboratory experience for those who wish to use chemistry as a background in an allied profession, and (d) to provide students not majoring in chemistry with up-to-date instruction in the principles of chemistry and methods of scientific inquiry.

In meeting these responsibilities, the department offers both B.A. and B.S. degrees in standard concentrations in the discipline and administers and contributes to interdisciplinary concentrations in Biochemistry, Environmental Chemistry, and Chemical Engineering. Students can also complete a chemistry or biochemistry concentration accredited by the American Chemical Society for which they will receive a Certificate of Merit. Many students who continue their studies in chemistry toward advanced degrees choose one of these accredited concentrations. A Chemistry/Education program is also offered in cooperation with the School of Education to prepare students for a career in teaching science (including chemistry in junior high and secondary schools.)

**FACULTY**

WENDY S. WOLBACH, PH.D., Associate Professor and Chair  
The University of Chicago

JURGIS A. ANYSAS, PH.D., Professor Emeritus  
Illinois Institute of Technology

AVROM A. BLUMBERG, PH.D., Professor  
Yale University

FRED W. BREITBEIL, III, PH.D., Professor Emeritus  
University of Cincinnati

SANAT K. DHAR, PH.D., Professor Emeritus  
Wayne State University

MATTHEW R. DINTENER, Assistant Professor  
Syracuse University

KATHLEEN M. HELM-BYCHOWSKI, PH.D., Assistant Professor  
University of California, Berkeley

GREGORY B. KHARAS, PH.D., Associate Professor  
Technion Institute

SARA STECK MELFORD, PH.D., Associate Professor  
Northwestern University

EDWIN F. MEYER, PH.D., Professor Emeritus  
Northwestern University

THOMAS J. MURPHY, PH.D., Professor  
Iowa State University

RICHARD F. NIEDZIELA, PH.D., Assistant Professor  
The University of Chicago

WILLIAM R. PASTERCZYK, PH.D., Professor Emeritus  
Loyola University, Stritch School of Medicine

FRANKLIN S. PROUT, PH.D., Professor Emeritus  
Vanderbilt University
In addition to the 28 quarter hours required in the liberal studies core, students are required to complete 48 quarter hours distributed through five learning domains as part of their Bachelor of Science degree in Chemistry. The number and distribution of courses in each of the areas are as follows:

**Core:** 28 quarter hours required

**First Year Program:** (16 quarter hours required) Discover Chicago or Explore Chicago, Focal Point Seminar, and Composition and Rhetoric I and II.

**Sophomore Seminar:** (4 quarter hours required) Sophomore Seminar on Multiculturalism in the United States

**Junior Year Experiential Learning:** (4 quarter hours required) If your junior year experiential learning requirement also fulfills a major field requirement, you may substitute a liberal studies domain elective (from outside your major field area) or the third course in the modern language option for this requirement.

**Senior Capstone:** (4 quarter hours required) Chemistry requires students majoring in Chemistry to complete the senior capstone in Chemistry, unless you are a double major and/or in the Honors program. If you are a double major and/or in the Honors Program you must follow the capstone guidelines for that area if the capstone is required. If the capstone is optional in the other areas, you can elect which capstone to complete.

**Arts and Literature:** 12 quarter hours required. At most 2 courses from the same department or program.

**Philosophical Inquiry:** 8 quarter hours required.

**Religious Dimensions:** 8 quarter hours required; 4 quarter hours in patterns and problems, and 4 quarter hours in traditions in context.

**Scientific Inquiry:** not required.

**Self, Society and the Modern World:** 12 quarter hours required. At most 2 courses from the same department or program.

**Understanding the Past:** 8 quarter hours required; 4 quarter hours of history pre-1800 and 4 quarter hours of history primarily between 1800-1945. In addition, courses must be from two different categories: 1) Asia, 2) Latin America, 3) Africa, 4) North America or Europe and 5) intercontinental or comparative.

Although study in chemistry contributes to a student's liberal education, courses offered by the department of chemistry are not applied towards liberal studies requirements for the chemistry major. Exceptions to this rule are the junior experiential learning and the senior capstone requirements.

In addition, the department of chemistry recommends that students who are seeking accreditation by the American Chemical Society fulfill the Modern Language Option by completing a three course language sequence. The three-course language sequence may substitute for two domain courses and one open elective. The option reduces their requirements by one course among two of the following combinations of learning domains: Philosophical Inquiry or Religious Dimensions; Understanding the Past or Self, Society, and the Modern World; or Arts and Literature.

**DEPARTMENTAL PROGRAM REQUIREMENTS**

**COMMON CORE**

Chemistry: 111 General and Analytical Chemistry I; 113 General and Analytical Chemistry II; 115 General and Analytical Chemistry III; 127 Quantitative Analysis (or 147 Analytical Tech-
niques); 171 Mechanistic Organic Chemistry I; 173 Mechanistic Organic Chemistry II; 175 Mechanistic Organic Chemistry III; 192 Mathematical Methods of Chemistry; 210 Physical Chemistry I; 211 Physical Chemistry II. (Better prepared students may substitute 131 General Chemistry I and 133 General Chemistry II for 111-113-115.)

Physics: 170 University Physics I; 171 University Physics II; 172 University Physics III. Mathematics: 160 Calculus for Mathematics and Science Majors I; 161 Calculus for Mathematics and Science Majors II; 162 Calculus for Mathematics and Science Majors III.

I. STANDARD CONCENTRATION
Common Core in Chemistry, Physics, and Mathematics plus: 215 Physical Chemistry III; 261 Instrumental Analysis; 321 Intermediate Inorganic Chemistry; one course from among the following 265 Air Chemistry, 267 Water Chemistry of Natural Systems, or 269 Solid Waste Chemistry. In addition, a student must take courses selected in consultation with a departmental advisor.

AMERICAN CHEMICAL SOCIETY ACCREDITATION
For the standard chemistry concentration to be accredited by the American Chemical Society and for the students to be eligible to receive a Certificate of Merit, they must complete the following additional requirements:

Chemistry: 312 Quantum Chemistry or 313 Computational Chemistry; 356 Spectral Interpretation, 240 Introductory Biochemistry or 340 Biochemistry I, and one other 4 quarter hour chemistry course numbered above 300.

Mathematics/Physics: Mathematics 260 Multivariable Calculus I; and any two courses from Mathematics 261 Multivariable Calculus II; Physics 270 University Physics IV, Physics 300 Methods of Computational and Theoretical Physics I, and Physics 301 Methods of Computational and Theoretical Physics II.

In addition, the American Chemical Society recommends that students take one year of German or other modern language and/or establish proficiency in computer programming. Students who wish to do this should take the following courses:

German: 101 Basic German; 102 Basic German; and 103 Basic German or equivalent courses in another modern language. (Students are placed within the language sequence on the basis of their high school language background. See the Modern Languages section of this Bulletin for the placement guide.) Students can receive Liberal Studies credit for these courses.


II. BIOCHEMISTRY CONCENTRATION
Common Core in Chemistry and Mathematics plus: 215 Physical Chemistry III; 261 Instrumental Analysis; 340 Biochemistry I; 342 Biochemistry II; 344 Biochemistry III; 341 Experimental Biochemistry I.

Biology: Three 4-quarter hour courses selected in consultation with the Biochemistry advisor.

Physics: Either the sequence of core courses 170, 171, and 172 or 150, 151, and 152.

Electives: To be selected in consultation with the Biochemistry advisor.

AMERICAN CHEMICAL SOCIETY ACCREDITATION
For the standard biochemistry concentration to be accredited by the American Chemical Society and for the students to be eligible to receive a Certificate of Merit, they must complete the following additional requirements:

Biology: one course from 210 Microbiology, 215 Ecology, 250 Cell Biology, or 260 Genetics and two courses from 310 Vertebrate Physiology, 330 Developmental Biology, 340 Neurobiology, 360 Molecular Biology, and 370 Immunobiology.

In addition the American Chemical Society recommends that students take one year of German or other modern language and/or establish a proficiency in computer programming as outlined above in regular chemistry accreditation section.

III. ENVIRONMENTAL CONCENTRATION
Common Core in Chemistry, Physics and Mathematics plus: 215 Physical Chemistry III; 261 Instrumental Analysis; 265 Air Chemistry; 267 Water Chemistry of Natural Systems; 268 Toxicological Chemical Hazards (or Biology 365 Principles of Toxicology); and 269 Solid Waste Chemistry.
Geography: 225 Weather, Climate, and Man, or 242 Geographical Information Systems or equivalent.
Computer Science: 110 Elements of Computer Science and Information Systems, or 215 Introduction to Structured Programming Using C++, or 240 Personal Computing for Programmers.
Electives: To be selected in consultation with a departmental advisor.

IV. TEACHER OF CHEMISTRY: SECONDARY LEVEL
In cooperation with the School of Education, the Department of Chemistry offers a concentration of study which combines the requirements for a major in Chemistry with certification for teaching chemistry at the junior high, middle, and senior high school levels. A student electing such a program should consult the Chemistry Department chairman and the School of Education counselor as soon as possible after entering DePaul.

BACHELOR OF ARTS

LIBERAL STUDIES PROGRAM
(See requirements on p. 126)

DEPARTMENTAL PROGRAM REQUIREMENTS

COMMON CORE
(See requirements on p. 126)

STANDARD CONCENTRATION
Common Core in Chemistry, Physics, and Mathematics. Physics 150, 151, and 152 may be substituted for Physics 170, 171, and 172. Mathematics 150, 151, and 152 may be substituted for Mathematics 160, 161, and 162.
In addition, the student must demonstrate competence in a Modern Language (see Liberal Arts section of Bulletin for definition).
General Electives to be selected in consultation with a departmental advisor, whenever possible. Note that this degree permits students to develop a number of different minors. The following concentrations do not represent all the programs that could be developed around this degree. Also note that a student may not combine a Bachelor of Arts in Chemistry with a Bachelor of Science in another discipline.

HEALTH-RELATED SCIENCES CONCENTRATION
Common Core in Chemistry, Physics, and Mathematics plus: 340 Biochemistry I; 341 Experimental Biochemistry I; 342 Biochemistry II.
Biology: 101 General Biology I; 102 General Biology II; 103 General Biology III.
Electives: To be selected when possible in consultation with the Biochemistry advisor; biology courses listed under the ACS Biochemistry degree would be particularly appropriate.
BUSINESS CONCENTRATION
Common Core in Chemistry, Physics, and Mathematics plus the following College of Commerce classes:

- Accounting: 101 Principles of Accounting I; 102 Principles of Accounting II.
- Management: 300 Managerial Concepts and Practices I; 301 Managerial Concepts and Practices II.

Electives: To be selected in consultation with a departmental advisor. The additional business courses would lead to a Pre-MBA minor: Economics: 306 Intermediate Macroeconomics and 315 Introduction to Money and Banking; Management: 302 Organizational Behavior; and Management Information Systems: 340 Management Information Systems.

The College of Commerce minors in Marketing and Management, as opposed to the pre-MBA minor above would have the following requirements for a minor in one of these two fields.

MARKETING
- Interdisciplinary Commerce Studies: 200 Introduction to Business
- Marketing: 301 Principles of Marketing; 305 Introduction to Marketing Research; 310 Consumer Behavior; plus an additional two Marketing electives.

MANAGEMENT
- Management: 300 Managerial Concepts and Practices I; 301 Managerial Concepts and Practices II (MGT 300 and 301 must be taken in sequence); 302 Organization Behavior; 307 Human Resource Management; 322 Management and Measurement of Quality; and one elective chosen from: Interdisciplinary Commerce Studies: 200 Introduction to Business; Business Law: 201 Business Law; Management: Any other 300-level course.

COMPUTATIONAL CHEMISTRY CONCENTRATION
Common Core in Chemistry, Physics, and Mathematics plus the following courses (which will lead to a minor in computer science).
- Chemistry: 313 Computational Chemistry
- Mathematics: 140 Discrete Mathematics I.

Electives: To be selected in consultation with a departmental advisor.

SPECIAL PROGRAMS
PRE-ENGINEERING CURRICULUM IN CHEMICAL ENGINEERING
The Chemical Engineering option is offered in conjunction with Illinois Institute of Technology (IIT). In the five-year program, students simultaneously earn a B.S. in chemistry from DePaul University and a Chemical Engineering (Ch.E.) degree from IIT. Students complete the B.S. in chemistry (Standard Concentration) at DePaul University. Students supplement their DePaul B.S. with twenty additional chemical engineering and related courses taken at IIT. It is recommended that interested students contact the Chemistry Department chair as soon as possible if interested in this program.
MASTER OF SCIENCE DEGREE PROGRAM

Students planning to integrate a B.S. and M.S. degree program at DePaul University should inquire of the chair of the Department of Chemistry as undergraduate juniors whether they can begin studies in the Graduate School that are applicable toward a master's degree.

CHEMISTRY MINOR

A student wishing to obtain a minor in Chemistry normally must take seven courses in the department from among the following: Chemistry 111, 113, and 115, 127 (or 147), 171 (or 121), 173 (or 123), and any one of 210, 240, 265, 267, 269, or 340. Better-prepared students may substitute 131 and 133 for the 111-115 sequence.

SEQUENCING AND PREREQUISITES

Students should begin their General Chemistry, Physics, and Calculus sequences in their freshman year, provided they have an adequate mathematics background. The Organic Chemistry sequence and Quantitative Analysis should be taken in the sophomore year and the Physical Chemistry sequence in the junior year. Students not yet prepared for calculus should take the prerequisite courses in the first year and take Calculus and General Physics one year later than suggested above. Advanced courses in Chemistry may be taken as soon as students have met the appropriate prerequisites.

Students in Biochemistry should take General Biology (Bio. 101, 102, 103) in their freshman or sophomore years and Biochemistry after they have completed both the General Biology and Organic Chemistry sequences (Chem 175 or 125).

Since the Common Core in Chemistry, Calculus, and Physics is particularly demanding in the first two years, students should take the majority of their Liberal Studies courses in their junior and senior years. This is necessary so that students have the necessary prerequisites for advanced courses.

CHEMISTRY

General Topics
CHE 100 Our Chemical World
CHE 101 Exploring Matter
CHE 102 Atoms and Molecules

General and inorganic Chemistry
CHE 111 General and Analytical Chemistry I
CHE 113 General and Analytical Chemistry II
CHE 115 General and Analytical Chemistry III
CHE 131 General Chemistry I
CHE 133 General Chemistry II
CHE 321 Intermediate inorganic Chemistry

Special Topics
CHE 103 Environmental Chemistry
CHE 104 Chemicals, Drugs and Living Systems
CHE 105 Exploring Nutrients/science of Nutrition
CHE 106 Geochemistry
CHE 107 Proteins and their Genes
CHE 108 The Conquest of Disease and Associated Problems
CHE 109 Forensic Chemistry
CHE 110 National Security: Science & Technology
Analytical Chemistry
CHE 127 Quantitative Analysis
CHE 147 Analytical Techniques
CHE 261 Instrumental Analysis
CHE 356 Spectral interpretation

Organic Chemistry
CHE 171 Mechanistic Organic Chemistry I
CHE 173 Mechanistic Organic Chemistry II
CHE 175 Mechanistic Organic Chemistry III
CHE 251 Laboratory Projects in Polymer Science

Physical Chemistry
CHE 192 Mathematical Methods of Chemistry
CHE 210 Physical Chemistry I
CHE 211 Physical Chemistry II
CHE 215 Physical Chemistry III
CHE 312 Quantum Chemistry
CHE 313 Computational Chemistry

Environmental Chemistry
CHE 265 Air Chemistry
CHE 267 Water Chemistry
CHE 268 Toxicological Chemical Hazards
CHE 269 Solid Waste Chemistry

Biochemistry
CHE 240 Introductory Biochemistry
CHE 340 Biochemistry I
CHE 341 Experimental Biochemistry I
CHE 342 Biochemistry II
CHE 343 Experimental Biochemistry II
CHE 344 Biochemistry III

Advanced Study
CHE 330 Senior Capstone in the Physical Sciences
CHE 385 Advanced Chemical Techniques
CHE 390 Statistical Analysis of Data
CHE 392 Internship
CHE 394 Seminar
CHE 396 Research Methods
CHE 397 Research
CHE 398 Senior Seminar and Thesis
CHE 399 Independent Study

COURSES
All courses carry 4 quarter hours of credit except for Chemistry 112, 114, and 116, which are listed separately to provide flexible scheduling for the laboratory experience portion of Chemistry 111, 113, and 115 respectively, and carry 0 credit, or unless otherwise specified. All odd-numbered courses, except 399, include a laboratory and are assessed a laboratory fee.
CHE 100 OUR CHEMICAL WORLD A course for non-science majors that develops the essential concepts of chemistry with some focus on applications of these methods and ideas toward a particular aspect of human activity or condition. Only one of series 100-102 may be taken for credit.

CHE 101 EXPLORING MATTER A course for non-science majors that develops the fundamental concepts of chemistry with experimental exploration to complement the methods and ideas encountered in reading and discussion in class. Only one of series 100-102 may be taken for credit. (Lab fee)

CHE 102 ATOMS AND MOLECULES A course for non-science majors that develops the basic concepts of chemistry with discussion of some applications of chemical methods to the study of nature and the modification of the circumstances of human beings. The course will include a quantitative special project to enhance understanding of a particular application of chemistry. Only one of series 100-102 may be taken for credit.

CHE 103 ENVIRONMENTAL CHEMISTRY A discussion and laboratory exploration of the technological origins, effects, and control of environmental pollutants. (Lab fee)

CHE 104 CHEMICALS, DRUGS AND LIVING SYSTEMS A discussion of the molecular basis of the interaction of specific chemical compounds (chiefly pharmaceuticals and drugs) with living organisms.

CHE 105 EXPLORING NUTRIENTS/SCIENCE OF NUTRITION A discussion and laboratory exploration of the chemical molecules which supply nutrients for living organisms. This course also includes a quantitative project, applicable to the individual student, to enhance the understanding of the principles of nutrition. (Lab fee)

CHE 106 GEOCHEMISTRY An introduction to basic chemical and geological concepts through a discussion of scientific laws governing the composition and chemical transformation of the components making up the earth.

CHE 107 PROTEINS AND THEIR GENES A discussion and laboratory introduction to many aspects of proteins: their chemical structures, biological functions, how genes store the information to make them, and how changes in genes can lead to changes in proteins, and to cancer and other diseases. (Lab fee)

CHE 108 THE CONQUEST OF DISEASE AND ASSOCIATED PROBLEMS A discussion of how science and technology have extended life expectancy over the past two centuries in addition to a discussion of a multitude of problems such as the cost of health care, allocating scarce resources, safety and risk, etc.

CHE 109 FORENSIC CHEMISTRY Discussion and laboratory exploration of the application of modern science to problems in criminology, evidence, art, and archaeology.

CHE 110 NATIONAL SECURITY: SCIENCE & TECHNOLOGY A detailed discussion of the ways in which natural science and technology affect the nature of warfare, shape national security policy, and influence efforts to limit and control weapons.

CHE 111 GENERAL AND ANALYTICAL CHEMISTRY I Introductory course with laboratory for science majors emphasizing inorganic chemistry and chemical principles governing behavior of matter. PREREQUISITE(S): MAT 101.
CHE 113 GENERAL AND ANALYTICAL CHEMISTRY II Continuation of 111 including more advanced inorganic and physical chemical concepts in lecture and an introduction to quantitative analysis in laboratory. PREREQUISITE(S): CHE 111.

CHE 115 GENERAL AND ANALYTICAL CHEMISTRY III Continuation of 113 including equilibrium and descriptive chemistry in lecture and quantitative and qualitative analysis in aqueous solutions. PREREQUISITE(S): CHE 113.

CHE 127 QUANTITATIVE ANALYSIS Use of the quantitative nature of chemistry to solve practical problems of analysis in lecture and laboratory. PREREQUISITE(S): CHE 115 or CHE 133.

CHE 131 GENERAL CHEMISTRY I Rigorous introductory course for students who had AP Chemistry or equivalent. Basic physical and inorganic chemistry topics with advanced laboratory experiments. CHE 131 and 133 substitute for 111, 113, 115. Placement in course is conditional upon performance on placement exam. COREQUISITE(S): MAT 160.

CHE 133 GENERAL CHEMISTRY II (Continuation of CHE 131) CHE 131 and 133 substitute for 111, 113, 115. PREREQUISITE(S): CHE 131.

CHE 147 ANALYTICAL TECHNIQUES Lecture and laboratory course involving quantitative chemical analysis. PREREQUISITE(S): CHE 115 or CHE 133. (Lab fee)

CHE 171 MECHANISTIC ORGANIC CHEMISTRY I First in a sequence of courses that investigate organic chemistry in a manner that will aid those who intend to pursue careers in chemistry or in other sciences. Introduction to organic chemistry, stereochemistry, free radical substitution and electrophilic addition. PREREQUISITE(S): CHE 115 or CHE 133.

CHE 173 MECHANISTIC ORGANIC CHEMISTRY II Aromatically and electrophilic and nucleophilic substitution. PREREQUISITE(S): CHE 171.

CHE 175 MECHANISTIC ORGANIC CHEMISTRY III Carbanions and the preparation and reactions of many organic compounds including those of biological interest. PREREQUISITE(S): CHE 173.

CHE 192 MATHEMATICAL METHODS OF CHEMISTRY The course is designed to provide the basic statistical background, computer handling methods, and calculus techniques necessary to perform successfully in Physical Chemistry (including lab) and beyond. COREQUISITE(S): CHE 210 required.

CHE 210 PHYSICAL CHEMISTRY I Thermodynamics: Concepts of heat, work and energy; meaning of enthalpy, free energy and entropy; reaction and phase equilibrium; dependence of thermodynamic properties on temperature and pressure. PREREQUISITE(S): CHE 115 or CHE 133; MAT 162. COREQUISITE(S): CHE 192.

CHE 211 PHYSICAL CHEMISTRY II Thermodynamics continued; electrochemistry, transport processes and crystal structure. PREREQUISITE(S): CHE 147 or 127; 210.

CHE 215 PHYSICAL CHEMISTRY III Surface chemistry, statistical thermodynamics, kinetics. PREREQUISITE(S): CHE 211.

CHE 240 INTRODUCTORY BIOCHEMISTRY An introduction to the chemistry of living systems, directed at those who want only a general survey of the main topics in biochemistry. The structures and functions of the four major macro-molecules, energy metabolism and biosynthesis, and the processes for making DNA, RNA and proteins will be discussed. PREREQUISITE(S): CHE 125 or 175. Offered Spring of Odd-Numbered Years.
CHE 251 LABORATORY PROJECTS IN POLYMER SCIENCE This course involves research projects, syntheses, and characterizations of novel polymers. PREREQUISITE(S): CHE 175.

CHE 261 INSTRUMENTAL ANALYSIS Lecture and laboratory course dealing with the use of modern instrumentation in chemical analysis. PREREQUISITE(S): CHE 215.

CHE 265 AIR CHEMISTRY Chemical interactions of air pollutants and our natural gaseous environment. Laboratory: analysis of ambient air pollutants. Offered in Spring Quarter of even-numbered years. PREREQUISITE(S): CHE 127 or 147.

CHE 267 WATER CHEMISTRY The chemistry of natural water systems, and the effects of man on the chemistry of those systems. Laboratory: analysis of contiguous waterways. Offered in Autumn Quarter of even-numbered years. PREREQUISITE(S): CHE 127 or 147.

CHE 268 TOXICOLOGICAL CHEMICAL HAZARDS Biochemical interactions of chemicals in the natural and workplace environments. Offered in Spring Quarter of odd-numbered years. PREREQUISITE(S): CHE 127 or 147 and 25 or 175.

CHE 269 SOLID WASTE CHEMISTRY Fundamental chemical processes involved in the processing of solid wastes. Offered in Winter or Spring Quarters of odd-numbered years. PREREQUISITE(S): CHE 127 or 147.

CHE 312 QUANTUM CHEMISTRY (Cross-listed as CHE 412) Quantum chemistry, electronic structure of atoms and molecules, molecular spectroscopy. Offered in Spring of odd-numbered years. PREREQUISITE(S): CHE 215.

CHE 313 COMPUTATIONAL CHEMISTRY Molecular modeling. Force field, semi-empirical quantum mechanical and ab initio quantum mechanical calculations by computer. Applications emphasized. Offered in Spring of even-numbered years. PREREQUISITE(S): CHE 215.

CHE 321 INTERMEDIATE INORGANIC CHEMISTRY Lecture and laboratory course emphasizing synthesis, structure and reactions of metal ligand compounds of general and biological interest. PREREQUISITE(S): CHE 175, 210, 215.

CHE 330 SENIOR CAPSTONE IN THE PHYSICAL SCIENCES (Cross Listed with PHY 330) (Senior Capstone) A course for graduating chemistry and physics majors to integrate physical science experience with non-scientific fields.

CHE 340 BIOCHEMISTRY I First in a three-course sequence, directed at those who wish an in-depth exploration of modern biochemistry. This course covers the structures and functions of the four major macromolecules, concentrating on enzyme kinetics and regulation. General biology sequence strongly recommended. PREREQUISITE(S): CHE 215 or 175. Note: 240 is not recommended as a prerequisite.

CHE 341 EXPERIMENTAL BIOCHEMISTRY I (2 credit hours) Covers classical and modern techniques for isolating and characterizing proteins, nucleic acids, and carbohydrates. COREQUISITE(S): CHE 340

CHE 342 BIOCHEMISTRY II Energy metabolism and biosynthetic pathways, with emphasis on their coordinated regulation. PREREQUISITE(S): CHE 340.

CHE 343 EXPERIMENTAL BIOCHEMISTRY II (Offered by Arrangement) (2 credit hours) Selected experiments in enzymology, cell membrane structure, and in molecular, viral, bacterial and animal genetics. PREREQUISITE(S): CHE 341.
CHE 344 BIOCHEMISTRY III Information metabolism: nucleic acid structure and replication, transcription and translation. Also included are methods of biotechnology and an introduction to reading the primary literature. PREREQUISITE(S): CHE 342.

CHE 356 SPECTRAL INTERPRETATION Spectral Interpretation. Organic structure determination through the interpretation of spectral information. PREREQUISITE(S): CHE 175, 261.

CHE 385 ADVANCED CHEMICAL TECHNIQUES (2 credits) This is a laboratory course which may be in the fields of analytical, biochemical, inorganic, organic or physical chemistry. This course may be repeated for credit if topic is different. PREREQUISITE(S): Consent of chair.

CHE 390 STATISTICAL ANALYSIS OF DATA This course introduces students to statistical methods that can be used in the error analysis of experimental data. Computers are used to apply concepts discussed in lecture to actual data sets. Familiarity with Excel or a modern programming language is required. Offered Winter of Even-Numbers Years.

CHE 392 INTERNSHIP Experiential learning experience in a government agency, industrial firm, business, or non-profit organization. PREREQUISITE(S): Junior status or permission.

CHE 394 SEMINAR Formal and/or informal discussions on topical subjects in chemistry. Variable credit. This course may be repeated for credit. PREREQUISITE(S): Consent.

CHE 396 RESEARCH METHODS The student will use various forms of information technology (e.g., indexes and databases, journal, Internet, etc.), to write a research paper or a research proposal on a topic. A research proposal must summarize the rationale for conducting the research, the historical development of the project topic, the materials and methods that will be used to conduct the project, and a timeline for completing the project. Variable credit. PREREQUISITE(S): Consent.

CHE 397 RESEARCH Experimental exploration of a research topic. The student is expected to gain skills in laboratory techniques and procedures in pursuing answers to a research project. Variable credit. PREREQUISITE(S): Consent.

CHE 398 SENIOR SEMINAR AND THESIS The student will choose a faculty mentor and a project. The project may be based on laboratory or library research. The grade for the thesis will be based on the thesis and on a seminar in which the thesis is presented to the chemistry students and faculty. Variable credit. PREREQUISITE(S): Consent.

CHE 399 INDEPENDENT STUDY Expanding one's knowledge in chemistry on an informal basis by individual consultation with department faculty. Variable credit. PREREQUISITE(S): Consent.