Students also devote a large measure of time to operational excellence problem techniques. Prerequisite: Statistics I or permission of instructor. Offered fall semester. Three credits.

BA 495 Business Policy and Strategy
This is the capstone course for all business majors and as such covers aspects of the McKenna school curriculum. The class covers the field of strategic management. This course utilizes a multi-performance approach. Each student participates in a simulation where teams operate and control every aspect of a corporation. Each corporation then competes in this virtual reality, utilizing every business course the have taken in various decision that are required. Students are not only expected to understand the role various levels of management play in strategic planning and control, but a required to demonstrate the abilities throughout the simulation. The course also utilizes case studies to give real-life examples of strategic situations. Students must be able to conduct a internal and external analyses (SWOT, 5 Forces, etc) of the company, which includes an analysis of cultural and political issues. Students must be adept at creating and presenting business applications, cases, etc. on power point technology. Students must demonstrate a fluid facility with major presentation technology, including overhead CD rom, VCR, DVD, Internet, Microsoft PowerPoint and Excel, Blackboard, and Smart Board technology. Prerequisite: Senior status. Every semester. Three credits.

BA 496 Principles, People, and Values in Operational Excellence
This course provides a largely principle-based exploration of issues related to Operational Excellence. Although drawing on a variety of sources, major emphasis is on "Lean," in the manner practiced by Toyota, and its applicability to many types of operational problems in diverse organizations. Using a combination of lectures, Harvard and other case studies, and class discussion the course aims to equip students with the ability and confidence to more clearly and deeply assess problems and develop solutions that aspire to highest standards. Prerequisite: BA 492 or equivalent work experience. Offered as needed. Three credits.

BA 497 Leadership
This course presents a theoretical and applied treatment of a pervasive and challenging task of leading in the new global economy—continuously and successfully dealing with the issues of constant improvement within a framework of ethical leadership. Students will learn the leadership theories, concepts, and applications that will allow them to successfully initiate, analyze, and implement various types of organizational changes. BA 497 is the capstone class for the operational excellence minor. Offered fall semester. Three credits.

BA 500 Independent Study
May be repeated. Offered every semester. Variable credit.

BA 525 Global Experience
Spend your spring break in a city abroad. The curriculum varies according to the city visited, but focuses on the various business and cultural themes. Offered spring semester. Two credits.

BA 550 Cooperative Education
This course pertains to Business Administration Internships where work experience is utilized to extend the student's learning experience. Students are employed in an area related to their academic endeavor. The purpose of the program is to integrate academic studies and employment activities. Offered every semester. McKenna School students have an upward limit of six credits for internships. Pass/fail optional only. Variable credit up to three credits.

Chemistry

Matthew A. Fisher, Chairperson
Bettie A. Davis; Caryl L. Fish; Daryle H. Fish; Steven J. Gravelle; Michael Sierk; Jason Vohs

Adjunct Faculty: Beth Bollinger; Laura Wilkinson

Professor Emeriti: William C. Dzombak and Andrew B. Turner

Undergraduate study in chemistry provides students with the background to pursue numerous career paths and interests. These possibilities include graduate school, employment in a wide variety of industrial research positions, chemical sales and management, professional programs such as medical school and law school, art conservation, science policy, journalism, and forensics. The overall goal of the chemistry curriculum at Saint Vincent is to provide students with a solid foundation in various areas of modern chemistry so that they can pursue a variety of career possibilities. The chemistry program at Saint Vincent is approved by the American Chemical Society.

The Chemistry Department offers students the possibility to earn a B.S. degree in Chemistry, Biochemistry, or Environmental Chemistry. Students receiving the B.S. degree in Chemistry are certified by the American Chemical Society. Minors in Chemistry and Biochemistry are also offered. Specific requirements for each of these programs can be found below.

Students may also obtain certification in Secondary Education by receiving a major in Chemistry and a minor in Secondary Education. Interested students may consult the "Teacher Preparation" section and the requirements for Secondary Education under the Education Department.

No matter which degree program a student chooses, he or she will find the following features common to all of the programs offered by the Department.

- The three majors offered by the Chemistry Department build on a common core of chemistry courses (general, organic, physical, analytical, and biochemical).
- These degree programs differ mainly in the courses taken by students in their junior and senior years. Topics found in these major dependent courses include inorganic, polymer and materials chemistry, physical organic, biochemistry and environmental chemistry.
- There exists a continuous focus on writing as a tool for thinking and a critical skill for chemists to develop. All of the Chemistry faculty have participated in the Interdisciplinary Writing Program at Saint Vincent.
- The Chemistry faculty believe that proficiency in a particular discipline is best accomplished when set in the broad context of liberal arts. Therefore, the degree programs in the Chemistry Department include courses in the humanities, social sciences and other natural sciences.
- The curriculum strongly emphasizes a laboratory experience that reflects chemistry as it is currently practiced. Several of the upper-level laboratory courses are taught as "integrated labs," providing faculty and students the flexibility to explore the interdisciplinary nature of chemistry.
- The courses in the Chemistry Department build toward the senior research project, which serves as a "capstone experience" for students. In preparation for their senior research project, students prepare a proposal for original research during the spring semester of their junior year. The research project is then conducted by the students in their senior year under the guidance of one of the Chemistry faculty members. The research project provides the student with a first-hand experience of the nature of scientific investigation. Upon completion of their project, the students write a thesis and present their results to an outside audience, typically at a National Meeting of the American Chemical Society.

Requirements for Minor in Chemistry (26 or 27 credits):

CH 101-102	General Chemistry I, II	6
CH 103-104	General Chemistry Laboratory I, II	2
CH 216	Quantitative Analysis	3
CH 218	Quantitative Analysis Laboratory	1
CH 221-224	Organic Chemistry I, II with Laboratory	8
CH 231	Physical Chemistry I	3
CH 233	Physical Chemistry I Laboratory	1
2 or 3 credits elected from one of the following:		
CH 232	Physical Chemistry II	3
CH 242	Instrumental Analysis	2

Requirements for Minor in Biochemistry (28 credits):

CH 101-102	General Chemistry I, II	6
CH 103-104	General Chemistry Laboratory I, II	2
CH 216	Quantitative Analysis	3
CH 218	Quantitative Analysis Laboratory	1
CH 221-224	Organic Chemistry I, II with Laboratory	8
CH 251, 253	Proteins and Metabolism wit Laboratory	4
CH 252, 254	Nucleic Acids and Membranes with Laboratory	4

Typical First-Year Schedules

Chemistry (B.S.)

Fall

CH 101	General Chemistry I	3
CH 103	General Chemistry I Laboratory	1
MA 111	Calculus I	4
EL 102	Language & Rhetoric	3
	Modern and Classical Language	3
Total Fall		14

Spring

CH 102	General Chemistry II	3
CH 104	General Chemistry II Laboratory	1
MA 112	Calculus II	4
	Social Sciences	3
TH 119	Exploring Religious Meaning	3
	Modern and Classical Language	3
Total Spring		17
Total First-Year		31

All students will take one course designated as a First-Year Seminar which will satisfy a Core Curriculum requirement.

Biochemistry (B.S.)

Fall

CH 101	General Chemistry I	3
CH 103	General Chemistry I Laboratory	1
MA 111	Calculus I	4
BL 150	General Biology I	3
BL 151	General Biology I Laboratory	1
EL 102	Language & Rhetoric	3
Total Fall		15

Spring

CH 102	General Chemistry II	3
CH 104	General Chemistry II Laboratory	1
MA 112	Calculus II	4
BL 152	General Biology II	3
BL 153	General Biology II Laboratory	1
TH 119	Exploring Religious Meaning	3
	Social Sciences	3
Total Spring		18
Total First-Year		33

All students will take one course designated as a First-Year Seminar which will satisfy a Core Curriculum requirement.

Environmental Chemistry (B.S.)

Fall

CH 101	General Chemistry I	3
CH 103	General Chemistry I Laboratory	1
MA 111	Calculus I	4
EL 102	Language & Rhetoric	3
	Modern and Classical Language	3
Total Fall		14

Spring

CH 102	General Chemistry II	3
CH 104	General Chemistry II Laboratory	1
MA 112	Calculus II	4
ES 150	Earth Systems Science	3
ES 152	Earth Systems Science Laboratory	1
TH 119	Exploring Religious Meaning	3
	Modern and Classical Language	3
Total Spring		18
Total First-Year		32

All students will take one course designated as a First-Year Seminar which will satisfy a Core Curriculum requirement.

Course Descriptions

CH 101 General Chemistry I
A study of chemical principles including atomic structure; chemical bonding; types of chemical reactions; stoichiometry; solution chemistry; and chemistry of the elements. Natural Science Tier 1 Course. No prerequisite. Offered fall semester. Three credits
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CH 102 General Chemistry II
A study of chemical principles related to quantitative chemical analysis. Topics include the nature of liquids and solids; chemical kinetics; equilibrium; thermodynamics; acids and bases; precipitation reactions; electrochemistry; and nuclear reactions. Natural Science Tier 2 course. Prerequisite: CH 101. Three credits.

CH 103 General Chemistry I Laboratory
Laboratory studies related to the principles in general chemistry with emphasis on quantitative measurements. Natural Science Tier 1 Course. Must be taken simultaneously with, or after successful completion of CH 101. Offered fall semester. One credit.

CH 104 General Chemistry II Laboratory
Laboratory studies related to the principles covered in CH 102. Natural Science Tier 2 course. Must be taken simultaneously with, or after successful completion of CH 102. One credit.

CH 107 Chemistry of Daily Life (Tier 2)
This course is designed for the non-science major and is an introductory study of the structure and function of organic molecules, including examples from biochemistry and everyday life. Topics include: basic hydrocarbons, functional group chemistry, proteins, carbohydrates and lipids. Selected topics in biochemistry and how drugs work are presented as well as chemical aspects of current issues such as nutrition, and diabetes. This course does not require math skills beyond pre-algebra. Natural Science Tier 2 Course. Prerequisite: Natural Science Tier 1 Course. Offered spring semester. Three credits.

CH 108 Chemistry of Daily Life Laboratory (Tier 2)
This lab provides non-science majors with an introduction to some elementary methods dealing with the synthesis and reactions of organic molecules, pharmaceutical synthesis, chemical analysis of foods, and characterization of biochemical compounds. Must be taken simultaneously with, or after successful completion of CH 107. Natural Science Tier 2 Course. Offered spring semester. One credit.

Learning Objectives:

• Students graduating with a degree in chemistry will have an understanding of chemical principles in organic, inorganic, physical and analytical chemistry that allows them to apply those principles to advanced topics. Students in biochemistry and environmental chemistry will be able to apply principles specific to their disciplines to advanced topics.

• Students graduating with a degree in chemistry will be able to perform a variety of modern chemical laboratory techniques and run modern instrumentation. Students in environmental chemistry and biochemistry will be able to perform laboratory techniques specific to their disciplines.

• Students graduating with a degree in chemistry will be able to communicate in both oral and written forms that are appropriate to the modern practice of chemistry. Students should be able to apply the six principles of good writing to their chemistry writing.

• Students in their junior and senior year in chemistry will be able to design, develop, conduct and report on an independent research project.

Environmental Science

Students who are interested in a multidisciplinary environmental major should consider the environmental science major. All environmental courses are listed under the Environmental Science program.

Teacher Preparation

Requirements for Certification in Chemistry (7-12):

See the Education Department for teacher certification requirements in Secondary Education. Interested students must contact the Chairperson of the Education Department and confer with Dr. Caryl Fish in the Chemistry department. All programs begin in the sophomore year by registering for ED 100: Foundations of Education.

Requirements for a Bachelor of Science Degree in Chemistry
(See Core Curriculum requirements.)

Chemistry Major Requirements (66 credits):

CH 101-102	General Chemistry I, II*	6
CH 103-104	General Chemistry Laboratory I, II*	2
CH 216	Quantitative Analysis	3
CH 218	Quantitative Analysis Laboratory 1	
CH 221-222	Organic Chemistry I, II	6
CH 223-224	Organic Chemistry Laboratory I, II	2
CH 228	Introduction to Biochemistry	3
CH 231-232	Physical Chemistry I, II	6
CH 233	Physical Chemistry I Laboratory	1
CH 241	Inorganic Chemistry	3
CH 242	Instrumental Analysis	2
CH 282	Advanced Physical Methods	2
CH 283	Advanced Chemical Methods	2
CH 301	Research Laboratory	2
CH 300, 302	Research Seminar I, II	2
CH 321	Special Topics	3
MA 111-113	Calculus I, II, III*	12
PH 111-112	General Physics I, II	6
PH 113-114	General Physics Laboratory I, II	2

**General Chemistry I & II with Laboratory fulfill the Natural Science core requirement. Calculus I fulfills the Mathematics core requirement.*

Electives 10 credits

Requirements for a Bachelor of Science Degree in Biochemistry
(See Core Curriculum requirements.)

Biochemistry Major Requirements (75 credits):

BL 150,152	General Biology I and II	6
BL 151,153	General Biology I and II Laboratory	2
BL 208	Cell Biology	3
BL 209	Cell Biology Laboratory	1
BL 214	Molecular Genetics	3
BL 215	Molecular Genetics Laboratory	1
CH 101-102	General Chemistry I, II*	6
CH 103-104	General Chemistry Laboratory I, II*	2
CH 221-222	Organic Chemistry I, II	6
CH 223-224	Organic Chemistry Laboratory I, II	2
CH 231-232	Physical Chemistry I, II	6
CH 233	Physical Chemistry I Laboratory	1
CH 242	Instrumental Analysis	2
CH 251	Proteins and Metabolism	3
CH 253	Proteins and Metabolism Laboratory	1
CH 252	Nucleic Acids and Membranes	3
CH 254	Nucleic Acids and Membranes Laboratory	1
CH 282	Advanced Physical Methods	2
CH 301	Research Laboratory	2
CH 300, 302	Research Seminar I, II	2
MA 111-113	Calculus I, II, III*	12
PH 111-112	General Physics I, II	6
PH 113-114	General Physics Laboratory I, II	2

**General Chemistry I & II with Laboratory fulfill the Natural Science core requirement. Calculus I fulfills the Mathematics core requirement.*

Electives (1 credit)

Requirements for a Bachelor of Science Degree in Environmental Chemistry (See Core Curriculum requirements.)

Environmental Chemistry Major Requirements (73 credits):

BL 150,152	General Biology I and I	6
CH 101-102	General Chemistry I, II*	6
CH 103-104	General Chemistry Laboratory I, II*	2
ES 150	Earth Systems Science	3
ES 152	Earth Systems Science Laboratory	1
CH 216	Quantitative Analysis	3
CH 218	Quantitative Analysis Laboratory	1
CH 221-222	Organic Chemistry I, II	6
CH 223-224	Organic Chemistry Laboratory I, II	2
CH 228	Introduction to Biochemistry	3
CH 231-232	Physical Chemistry I, II	6
CH 233	Physical Chemistry I Laboratory	1
CH 242	Instrumental Analysis	2
CH 276	Advanced Environmental Chemistry	3
CH 277	Methods of Environmental Analysis	2
CH 282	Advanced Physical Methods	2
CH 301	Research Laboratory	2
CH 300, 302	Research Seminar I, II	2
MA 111-113	Calculus I, II, III*	12
PH 111-112	General Physics I, II	6
PH 113-114	General Physics Laboratory I, II	2

**General Chemistry I & II with Laboratory fulfill the Natural Science core requirement. Calculus I fulfills the Mathematics core requirement.*

Recommended Core Curriculum courses:

SO 161	Environmental Sociology	3
BA 350	Statistics I	3
PS 390	Environmental Law	3
EL 111	Green Writing: Literature and the Environment	3

Electives (3 credits)

CH 110 Chemistry of Cooking (Tier 2)
Chemistry of Cooking focuses on the chemistry involved in the structure, preparation, color, flavor, aroma, and texture of the foods we eat everyday. CH 110 is designed for the non-science major who is looking to fulfill the science core requirements. The emphasis in this course will be understanding chemical concepts such as physical and chemical changes, chemical bonding, solubility, energy, acids and bases, and an introduction to the structure and function of organic molecules. This course does not require math skills beyond pre-algebra. Natural Sciences Tier 2 Course. Prerequisite: Natural Sciences Tier 1 Course. Offered spring semester odd-numbered years. Three credits

CH 112 Chemistry of Cooking Laboratory (Tier 2)
This lab provides non-science majors with an introduction to laboratory methods dealing with measurement, the chemical analysis of foods, classification of physical and chemical changes, and the synthesis and reactions of organic molecules specific to food chemistry. Must be taken simultaneously with or after successful completion of CH 110. Natural Sciences Tier 2 Course. Offered spring semester odd-numbered years. One credit.

CH 121 Science and Global Sustainability (Tier 1)
This course will examine key scientific concepts related to three major aspects of the broader issue of global sustainability - global climate change, feeding the world's population, and threats to world health. Each of these aspects will serve as the focal point for several weeks of the course. Basic concepts of biology, chemistry, and physics will be introduced as appropriate within the context of each aspect. Prerequisites - none. Natural Science Tier 1 course. Offered fall semester. Three credits.

CH 123 Science and Global Sustainability Lab (Tier 1)
The laboratory exercises are designed to physically illustrate the principles discussed in CH 121 and to provide students with experience in the process of doing science - asking questions, forming hypotheses, and data analysis. Must be taken simultaneously with, or after successful completion of CH 121. Natural Science Tier 1 Course. Offered fall semester. One credit.

CH 216 Quantitative Analysis
This course covers topics in chemistry such as titrations, potentiometry, volumetric analysis, ion specific electrodes, absorption spectroscopy, and chromatography. Prerequisite: CH 102. Offered spring semester. Three credits.

CH 218 Quantitative Analysis Laboratory
This course contains laboratory experiments that are related to the principles covered in CH 216. Must be taken simultaneously with, or after successful completion of CH 216. Offered spring semester. One credit.

CH 221-222 Organic Chemistry I and II
The basic principles of the chemistry of carbon compounds are developed with emphasis on nomenclature, physical properties, spectroscopy, structure, reactions, mechanisms, and synthesis. Prerequisites: CH 102, 104 . Offered every year.
Three credits each semester.

CH 223-224 Organic Chemistry Laboratory I and II
This laboratory complements CH 221-222 by introducing the basic organic laboratory techniques of synthesis, isolation, and analysis, including chromatography and infrared and nuclear magnetic resonance spectroscopy. Emphasis is placed on developing microscale techniques. Students are encouraged to work more independently as the year progresses. Must be taken simultaneously with, or after successful completion of CH 221-222, respectively. Offered every year. One credit each semester.

CH 228 Introduction to Biochemistry
This course is designed to provide an overview of modern biochemistry for chemistry majors and other students with minimal background in biology. The chemistry of amino acids, basic principles of protein structure, enzyme kinetics, lipids and membranes, intermediary metabolism, and nucleic acid chemistry is covered. No previous background in biology is necessary. Prerequisites: CH 221-224. Offered spring semester of odd-numbered years. Three credits.

CH 231-232 Physical Chemistry I and II
A study of the laws and theories used by chemists to describe, interpret and predict physical properties and chemical changes. Topics discussed include thermodynamics, kinetics, quantum mechanics, and spectroscopy. Prerequisites: CH 222-224 with grade of C- or better; PH 111-114; MA 111- 113. Offered every year. Three credits each semester.

CH 233 Physical Chemistry I Laboratory
In this laboratory, students conduct experiments that are based on physical chemical phenomena covered in CH 231 such as gas laws and thermodynamics. Thorough data analysis and report writing are also emphasized in this course. Must be taken simultaneously with, or after successful completion of CH 231. Offered fall semester. One credit.

CH 241 Inorganic Chemistry
An in-depth study of special topics in inorganic chemistry including molecular orbital theory, chemical bonding, point group symmetry, acid-base theories, and coordination and organometallic chemistry. Prerequisite: CH 231. Offered spring semester of even-numbered years. Three credits.

CH 242 Instrumental Analysis
The emphasis in this course is on applications of instrumental analysis to all aspects of chemistry. Students will gain knowledge of the theory and usage of a variety of modern instrumental methods including spectrophotometry, spectroscopy, chromatography, and electroanalytical techniques. They will also gain experience in applying their knowledge in solving analytical problems. Prerequisites: CH 216 or CH 253. Offered spring semester. Two credits.

CH 251 Proteins and Metabolism
This course is concerned with how macromolecular structures selfassemble, chemical mechanisms of reactions that occur in living systems, and the molecular basis of cellular regulation. Protein structure/ function and metabolism are the central themes of this course. The specific objectives are to familiarize the student with the structure and function of amino acids/peptides/proteins, enzyme catalysis, and regulation, carbohydrate structure and function, and an overview of metabolism, synthetic/degradative pathways and their regulation. Prerequisites: CH 221-224; one year of general biology is strongly recommended. Offered fall semester. Three credits.

CH 252 Nucleic Acids and Membranes
This course focuses on two major themes, the structure and function of membranes and the biochemistry of nucleic acids. The topics covered will include: structures of lipids and membranes, membrane proteins, signal transduction, structure of DNA and RNA, DNA replication and repair, RNA synthesis, protein synthesis, and the biochemical basis for control of gene expression. Emphasis throughout the course will be on the molecular mechanisms and protein components involved in various structures and processes. Prerequisites: CH 221-224; one year of general biology strongly recommended. Offered spring semester. Three credits.

CH 253 Proteins and Metabolism Laboratory
This laboratory course is intended to expose the student to laboratory aspects of modern protein chemistry and expand on some material covered in CH 251. Students will carry out experiments illustrating physical properties of proteins, protein purification (including various forms of chromatography and electrophoresis), and enzyme kinetics/inhibition. Must be taken simultaneously with, or after successful completion of CH 251. Offered fall semester. One credit.

CH 254 Nucleic Acids and Membranes Laboratory
This laboratory course introduces students to experimental techniques used in the study of membranes and nucleic acids. Methods will include membrane structure and dynamics, ligand binding to DNA, DNA electrophoresis, and characterization of nucleic acid/protein complexes. Must be taken simultaneously with, or after completion of CH 252. Offered spring semester. One credit.

CH 276 Advanced Environmental Chemistry
This course will incorporate the study of the chemistry of air, water and soil in terms of both the natural and polluted environments. The topics covered will include: stratospheric ozone, chemistry of the troposphere, toxic organic chemicals, natural water chemistry, water treatment processes, and heavy metal contamination in soils. Prerequisite: CH 216. Offered fall semester of even-numbered years. Three credits.

CH 277 Methods of Environmental Analysis
A laboratory course emphasizing the sampling, preparation, and analysis of water and air samples. The course is primarily laboratory based in which teams of students work on a set of environmental projects. Students are responsible for the planning, preparation, sampling, analysis, and reporting for each project. Each project will emphasize a different type of environmental matrix and different types of chemical analysis. Sample analysis will include use of atomic absorption spectrophotometry, chromatography, inductively coupled plasma spectrophotometry, turbidity, and conductivity. Prerequisite: CH 216. Offered fall semester of even-numbered years. Two credits.

CH 282 Advanced Physical Methods
This course is an integrated laboratory that introduces advanced students to the physical and instrumental methods used by chemists. Students in this course will learn about (1) the integrated nature of chemical research, (2) a variety of advanced laboratory techniques, and (3) the methods of experimental design and report presentation. The laboratory experiments focus on atomic behavior, molecular structure and kinetics. Taken simultaneously with, or after CH 232 and CH 242. Offered every spring semester. Two credits.

CH 283 Advanced Chemical Methods
This course is an integrated laboratory that introduces advanced students to a variety of contemporary topics in experimental chemistry. Students in this course will learn about (1) the integrated nature of chemical research, (2) a variety of advanced laboratory techniques, and (3) the methods of experimental design and report presentation. The laboratory experiments focus on advanced organic chemistry, inorganic chemistry, polymers, and materials science. Taken simultaneously with, or after CH 321. Offered fall semester of odd-numbered years. Two credits.

CH 300 Research Seminar I
This course will introduce the student to the research experience and will include an orientation to the library and use of reference materials. Students will be assigned articles to read and discuss. An introduction to writing and presenting a research proposal will be included. Students will be introduced to the procedure for maintaining a laboratory research notebook. Students must be available to attend CH 302 when outside speakers present seminars on selected topics in that course. Prerequisite: CH 231/233 or CH 251/253 with a grade of C- or better. Offered spring semester. One credit.

CH 301 Research Laboratory
Independent study or investigation involving intensive work with faculty guidance in the laboratory and library. This course includes an assessment of cumulative laboratory skills. Prerequisite: CH 300. Offered fall semester. Two credits.

CH 302 Research Seminar II
Presentation of research work completed during the previous semester; the oral presentation is made after the thesis report has been written. Outside speakers may present seminars on selected topics. Prerequisite: CH 301. Offered spring semester. One credit.

CH 304 Biochemistry Seminar
This course focuses on writing a critical analysis of the literature on a topic related to biochemistry. Students work largely independently but under the supervision of a faculty member. Concurrent registration in CH 300 or permission of instructor required. Prerequisites: CH 251 and 253. One credit.

CH 321 Special Topics
The purpose of this course is to introduce students to topics of contemporary interest in chemistry. Topics discussed are drawn from the following areas: organic and inorganic kinetics, stereochemistry, molecular orbital theory, spectroscopy, electrochemistry, solid state chemistry, polymer science, surface chemistry, and photochemistry. Prerequisites: CH 221-224. Offered fall semester of odd-numbered years. Three credits.

CH 350 Independent Study
Studies to be chosen and developed by the student with the guidance of the professor directing the study. May be repeated. Variable credit.

CH 550 Cooperative Education – Chemistry Internship
Work experience program extending the learning experience beyond the college into the world of work, through internships, field work and cooperative programs. Students may or may not be paid depending on the site. May be repeated. Variable credit.