CHEMISTRY, BACHELOR OF SCIENCE (B.S.) WITH A CONCENTRATION IN BIOCHEMISTRY

The curriculum in chemistry prepares students for graduate study in chemistry and related fields and for admission to schools of medicine, dentistry, pharmacy and veterinary medicine. It prepares students to teach in secondary schools or to work in chemical and industrial laboratories and in related fields of business and industry. The department also offers required and elective courses in chemistry to students in other programs of study.

The Department of Chemistry offers five areas of concentration for completing the Bachelor of Science in Chemistry: chemical science, professional chemist, professional chemist with honors, biochemistry and chemical modeling. With proper selection of electives, the degree satisfies admission requirements to most schools of medicine, dentistry, pharmacy and veterinary medicine.

The biochemistry concentration focuses on the biological aspects of chemistry, including molecular genetics and molecular biotechnology. This degree is another option for students planning to study medicine or dentistry.

Learning outcomes
• Structure: Students will demonstrate understanding of the relationship between molecular structure and function.
• Descriptive chemistry: Students will be conversant with common chemical phenomena both symbolically and sensorially.
• Measurement and numeracy: Students will perform calculations needed to describe and model common chemical phenomena.
• Communication: Students will develop written and oral communication skills needed to explain chemical phenomena to novices and experts.
• Literacy: Students will search, read and assess scientific literature.
• Laboratory skills: Students will develop and practice laboratory bench and instrumentation skills.
• Information processing: Students will interpret tables, graphs, drawings and models.
• Critical thinking: Students will practice critical thinking and problem solving.

Special requirements
Students must complete 43 credits in chemistry and related courses and 27 to 29 credits of collateral requirements.

A minimum grade of C is required in each prerequisite course:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 100</td>
<td>Introductory Chemistry (if required through placement qualifiers)</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101</td>
<td>General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 102</td>
<td>General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 301</td>
<td>Organic Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>

Degree requirements for Chemistry, Bachelor of Science (B.S.) with a concentration in biochemistry

General education requirements

University Core Education Curriculum (minimum 21 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 111</td>
<td>Play course video for Focused Inquiry I</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 112</td>
<td>Play course video for Focused Inquiry II</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 200</td>
<td>Inquiry and the Craft of Argument</td>
<td>3</td>
</tr>
<tr>
<td>Approved humanities/arts</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved natural/physical sciences</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved quantitative literacy</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved social/behavioral sciences</td>
<td>3-4</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 21-24

Additional College of Humanities and Sciences requirements (11-23 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>HUMS 202</td>
<td>Choices in a Consumer Society</td>
<td>1</td>
</tr>
<tr>
<td>Approved H&amp;S diverse and global communities</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved H&amp;S human, social and political behavior (fulfills University Core social/behavioral sciences)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved H&amp;S literature and civilization (fulfills University Core human, social and political behavior)</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved H&amp;S science and technology (fulfills University Core natural/physical sciences)</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved H&amp;S general education electives</td>
<td>6-8</td>
<td></td>
</tr>
<tr>
<td>Experiential fine arts</td>
<td>1-3</td>
<td></td>
</tr>
<tr>
<td>Foreign language through the 102 level (by course or placement)</td>
<td>0-8</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours: 11-23

Collateral requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 151</td>
<td>Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 152</td>
<td>Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 300</td>
<td>Cellular and Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>MATH 200</td>
<td>Calculus with Analytic Geometry and Calculus with Analytic Geometry</td>
<td>8</td>
</tr>
</tbody>
</table>

Select one of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS 201</td>
<td>General Physics and General Physics</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 207</td>
<td>University Physics I and University Physics II</td>
<td>3</td>
</tr>
<tr>
<td>STAT 210</td>
<td>Basic Practice of Statistics (fulfills quantitative literacy)</td>
<td>3</td>
</tr>
</tbody>
</table>
Major requirements

**Chemistry core**
- CHEM 101 & CHEZ 101: General Chemistry and General Chemistry Laboratory I (4 hours)
- CHEM 102 & CHEZ 102: General Chemistry and General Chemistry Laboratory II (4 hours)
- CHEM 301 & CHEZ 301: Organic Chemistry and Organic Chemistry Laboratory I (5 hours)
- CHEM 302 & CHEZ 302: Organic Chemistry and Organic Chemistry Laboratory II (5 hours)
- CHEM 303: Physical Chemistry (3 hours)
- CHEM 309 & CHEZ 309: Quantitative Analysis and Quantitative Analysis Laboratory (5 hours)
- CHEM 320: Inorganic Chemistry I (3 hours)
- CHEM 398: Professional Practices and Perspectives Seminar (1 hour)
- CHEM 403: Biochemistry I (3 hours)
- CHEM 404: Biochemistry II (3 hours)

**Chemistry electives**
Select at least one of the approved electives below (three credits minimum) or any 500-level CHEM class for which prerequisites have been met.

Total Hours: 44

Open electives
Select one to 17 open elective credits

Total minimum requirement 120 credits

Approved H&S diverse and global communities 3

Spring semester
- CHEM 102: General Chemistry (4 hours)
- CHEZ 102: General Chemistry Laboratory II (4 hours)
- HUMS 202: Choices in a Consumer Society (1 hour)
- MATH 201: Calculus with Analytic Geometry (4 hours)
- UNIV 112: Focused Inquiry II (3 hours)
- Approved H&S human, social and political behavior (3 hours)

Term Hours: 14

Sophomore year

Fall semester
- BIOL 151 & BIOZ 151: Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I (4 hours)
- CHEM 301 & CHEZ 301: Organic Chemistry and Organic Chemistry Laboratory I (5 hours)
- CHEM 309: Quantitative Analysis (5 hours)
- CHEZ 309: Quantitative Analysis Laboratory (3 hours)
- Approved H&S literature and civilization (3 hours)

Term Hours: 15

Spring semester
- BIOL 152 & BIOZ 152: Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II (4 hours)
- CHEM 302: Organic Chemistry (5 hours)
- CHEZ 302: Organic Chemistry Laboratory II (5 hours)
- CHEM 309: Quantitative Analysis (5 hours)
- CHEZ 309: Quantitative Analysis Laboratory (3 hours)

Term Hours: 17

Junior year

Fall semester
- BIOL 300: Cellular and Molecular Biology (3 hours)
- CHEM 320: Inorganic Chemistry I (3 hours)
- CHEM 403: Biochemistry I (3 hours)
- PHYS 201: General Physics or University Physics I (4-5 hours)
- PHYS 207: General Physics or University Physics II (4-5 hours)
- Foreign language (101 level) (4 hours)

Term Hours: 17-18

Spring semester
- CHEM 398: Professional Practices and Perspectives Seminar (1 hour)
- CHEM 404: Biochemistry II (3 hours)
- PHYS 202: General Physics or University Physics II (4-5 hours)
- PHYS 208: General Physics or University Physics II (4-5 hours)
- STAT 210: Basic Practice of Statistics (3 hours)
- Foreign language (102 level) (4 hours)

Term Hours: 15-16

Senior year
Chemistry, Bachelor of Science (B.S.) with a concentration in biochemistry

### Fall semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 303</td>
<td>Physical Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>&amp; CHEZ 303</td>
<td>and Physical Chemistry Laboratory I</td>
<td></td>
</tr>
<tr>
<td>Approved H&amp;S general education electives</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Chemistry elective</td>
<td></td>
<td>3-5</td>
</tr>
<tr>
<td>Experiential fine arts</td>
<td></td>
<td>1-3</td>
</tr>
</tbody>
</table>

**Term Hours:** 15-19

### Spring semester

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 304</td>
<td>Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>Open electives (upper-level if needed)</td>
<td></td>
<td>9-12</td>
</tr>
</tbody>
</table>

**Term Hours:** 12-15

**Total Hours:** 120-129

- Chemistry (CHEM) (p. 3)
- Chemistry labs (CHEZ) (p. 4)

A minimum grade of C is required in each prerequisite course:

**CHEM 100** Introductory Chemistry (if required through placement qualifiers) 3

**CHEM 101** General Chemistry 3

**CHEM 102** General Chemistry 3

**CHEM 301** Organic Chemistry 3

**CHEM 302** Organic Chemistry 3

**CHEM 309** Quantitative Analysis 3

In chemistry laboratories each student is charged for breakage incurred. Approved safety glasses are required. Failure to check out of laboratory, upon withdrawal or for other reasons, will incur a charge, billed from the Student Accounting Department.

### Chemistry

**CHEM 100. Introductory Chemistry. 3 Hours.**

Semester course; 3 lecture and 1 recitation hour. 3 credits. Prerequisite: students must be eligible to take MATH 131 or higher. A course in the elementary principles of chemistry for individuals who do not meet the criteria for enrollment in CHEM 101; required for all students without a high school chemistry background who need to take CHEM 101-102. These credits may not be used to satisfy any chemistry course requirements in the College of Humanities and Sciences.

**CHEM 101. General Chemistry. 3 Hours.**

Continuous courses; 3 lecture and 1 recitation hour. 3-3 credits. Prerequisite: CHEM 100 with a grade of C or higher, or high school chemistry and a satisfactory combination of Math SAT score and high school GPA. Pre- or corequisite: MATH 151. Prerequisite for CHEM 102: CHEM 101 with a grade of C or higher. Fundamental principles and theories of chemistry, including qualitative analysis.

**CHEM 102. General Chemistry. 3 Hours.**

Continuous courses; 3 lecture and 1 recitation hour. 3-3 credits. Prerequisite: CHEM 100 with a grade of C or higher, or high school chemistry and a satisfactory combination of Math SAT score and high school GPA. Pre- or corequisite: MATH 151. Prerequisite for CHEM 102: CHEM 101 with a grade of C or higher. Fundamental principles and theories of chemistry, including qualitative analysis.

**CHEM 103. Organic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisite: CHEM 100 with a grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

**CHEM 104. Physical Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisite: CHEM 100 with a grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

**CHEM 105. Physical Chemistry for the Life Sciences. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 300 or CLSE 201 with minimum grades of C, and PHYS 202 or PHYS 208, and MATH 201 or MATH 301 or MATH 307. Ideal and nonideal gases, thermodynamics, free energy and chemical equilibrium.

**CHEM 106. Industrial Applications of Inorganic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 301-302 and CHEM 309 with minimum grades of C, and MATH 200. Concepts and principles of physical chemistry as related to the life sciences, forensic science and the B.S in science programs. Major topics include thermodynamics of proteins and nucleic acids, enzyme kinetics and spectroscopic techniques useful in biophysical research such as circular dichroism, nuclear magnetic resonance and magnetic resonance imaging.

**CHEM 107. Chemistry in the News. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are used to interpret newspaper and magazine articles of current interest relating to chemistry in manufacturing, the global environment and medicine. Not applicable for credit toward the B.S. in Chemistry.

**CHEM 108. Chemistry in Society. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are presented through the use of decision-making activities related to real-world societal issues. Not applicable for credit toward the B.S. in Chemistry.

**CHEM 112. Chemistry in the News. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are used to interpret newspaper and magazine articles of current interest relating to chemistry in manufacturing, the global environment and medicine. Not applicable for credit toward the B.S. in Chemistry.

**CHEM 110. Chemistry and Society. 3 Hours.**

Semester course; 3 lecture hours. 3 credits. The basic principles of chemistry are presented through the use of decision-making activities related to real-world societal issues. Not applicable for credit toward the B.S. in Chemistry.

**CHEM 301. Organic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisite: CHEM 102 with a minimum grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

**CHEM 302. Organic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisite: CHEM 102 with a minimum grade of C. Prerequisite for CHEM 302: CHEM 301 with a minimum grade of C. A comprehensive survey of aliphatic and aromatic compounds with emphasis on their structure, properties, reactions, reaction mechanisms and stereochemistry.

**CHEM 303. Physical Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 309 or CLSE 201 with minimum grades of C, and PHYS 202 or PHYS 208, and MATH 201 or MATH 301 or MATH 307. Ideal and nonideal gases, thermodynamics, free energy and chemical equilibrium.

**CHEM 304. Physical Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 309 or CLSE 201 with minimum grades of C, and PHYS 202 or PHYS 208, and MATH 201 or MATH 301 or MATH 307. Ideal and nonideal gases, thermodynamics, free energy and chemical equilibrium.

**CHEM 305. Physical Chemistry for the Life Sciences. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 300 or CLSE 201 with minimum grades of C, and PHYS 202 or PHYS 208, and MATH 201 or MATH 301 or MATH 307. Ideal and nonideal gases, thermodynamics, free energy and chemical equilibrium.

**CHEM 306. Industrial Applications of Inorganic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 301-302 and CHEM 309 with minimum grades of C, and MATH 200. Concepts and principles of physical chemistry as related to the life sciences, forensic science and the B.S in science programs. Major topics include thermodynamics of proteins and nucleic acids, enzyme kinetics and spectroscopic techniques useful in biophysical research such as circular dichroism, nuclear magnetic resonance and magnetic resonance imaging.

**CHEM 307. Industrial Applications of Inorganic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 301-302 and CHEM 309 with minimum grades of C, and MATH 200. Concepts and principles of physical chemistry as related to the life sciences, forensic science and the B.S in science programs. Major topics include thermodynamics of proteins and nucleic acids, enzyme kinetics and spectroscopic techniques useful in biophysical research such as circular dichroism, nuclear magnetic resonance and magnetic resonance imaging.

**CHEM 308. Organic Chemistry. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 301 with a grade of C, and MATH 151. Theory and practice of gravimetric, volumetric and instrumental analysis techniques and treatment of multiple equilibria in aqueous solutions.

**CHEM 309. Quantitative Analysis. 3 Hours.**

Continuous courses; 3 lecture hours. 3 credits. Prerequisites: CHEM 102 with a minimum grade of C, and MATH 151. Theory and practice of gravimetric, volumetric and instrumental analysis techniques and treatment of multiple equilibria in aqueous solutions.
CHEM 310. Medicinal Chemistry and Drug Design. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 302.
This course is designed to expose undergraduate chemistry, biology
and pre-medicine majors to the history, theory and practice of medicinal
chemistry. The course will emphasize a combination of fundamentals
and applications of drug design. In particular, the molecular aspects of
drug action will be discussed. Special emphasis will also be placed on
the methods used by medicinal chemists to design new drugs. Crosslisted
as: MEDC 310.

CHEM 320. Inorganic Chemistry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 101-102
with minimum grades of C. A systematic, unified study of the structures,
properties, reactions and practical applications of inorganic compounds.

CHEM 350. Guided Inquiry in Chemistry. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Prerequisites:
CHEM 101-102 with minimum grades of B. Student facilitators lead
recitation sections using guided inquiry, group-based activities.
Introduces students to the principles of guided inquiry, active learning
and collaborative learning in chemistry through practical, hands-on class
work, discussions, readings and a final project.

CHEM 351. Chemistry Preceptorship. 1.5 Hour.
Semester course; 1.5 lecture hours. 1.5 credits. Course may be repeated
once for a total of 3 credits. Prerequisites: completion of relevant course
with minimum grade of C, completion of CHEM 350 with a grade of B
and permission of course instructor and departmental chair. Student
facilitators lead recitation sections or laboratories in chemistry courses.
Responsibilities vary and may include, but are not limited to, attending
all classes, holding weekly review sessions or office hours and/or routine
grading. A weekly reflection journal and final project are required.

CHEM 391. Topics in Chemistry. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits
per semester; maximum total of 6 credits for all chemistry topics courses
may be applied to the major. Prerequisites: CHEM 101-102 and CHEZ 101,
102. A study of a selected topic in chemistry. See the Schedule of
Classes for specific topics to be offered each semester.

CHEM 392. Directed Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for
a maximum total of 8 credits; only 3 credits are applicable to the
chemistry major. Prerequisites: CHEM 102 and CHEZ 101 and 102. The
independent investigation of chemical problems through readings and
experimentation under the supervision of a research adviser. Written
interim and final reports are required.

CHEM 398. Professional Practices and Perspectives Seminar. 1 Hour.
Seminar course; 1 lecture hour. 1 credit. Prerequisites: completion of
18 credits in chemistry. Seminar course for students considering
careers in chemistry-related fields covering topics such as scientific
professionalism and ethics, and using chemical literature.

CHEM 401. Applications of Instrumental Techniques in Organic and
Forensic Chemistry. 4 Hours.
Semester course; 3 lecture and 3 laboratory hours. 4 credits.
Prerequisites: CHEM 302 and CHEZ 302. Theory and laboratory practice
of instrumental and chemical methods applied to the analysis of organic
compounds with emphasis on applications in forensic chemistry.

CHEM 403. Biochemistry I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 302
with a minimum grade of C. A presentation of structural biochemistry,
enzymology, biophysical techniques, bioenergetics and an introduction to
intermediary metabolism.

CHEM 404. Biochemistry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: CHEM 403 with
a minimum grade of C. A presentation of metabolism and its regulation
as integrated catobolism and anobolism of molecules that are essential to
life.

CHEM 406. Inorganic Chemistry II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 304
and 320. An advanced study of inorganic chemistry, including inorganic
spectroscopy, organometallic compounds and catalysis, and bioinorganic
systems.

CHEM 409. Instrumental Analysis. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisites: CHEM 303 and
309, and CHEZ 309. Theory and practice of modern spectrophotometric,
electroanalytical and chromatographic and nuclear magnetic resonance
methods.

CHEM 491. Topics in Chemistry. 1-4 Hours.
Semester course; variable hours. Variable credit. Maximum of 4 credits
per semester; maximum total of 6 credits for all chemistry topics courses
may be applied to the major. Prerequisites: CHEM 102 and CHEZ 101
and 102. A study of a selected topic in chemistry. See the Schedule of
Classes for specific topics to be offered each semester and prerequisites.

CHEM 492. Independent Study. 1-4 Hours.
Semester course; variable hours. 1-4 credits. May be repeated for
a maximum total of 8 credits; only 3 credits are applicable to the
chemistry major. Prerequisites: CHEM 102 and CHEZ 101 and 102. The
independent investigation of chemical problems through readings and
experimentation under the supervision of a research adviser. Written
interim and final reports will be required.

CHEM 493. Chemistry Internship. 1-3 Hours.
Semester course; variable hours. Variable credit. Maximum of 3 credits;
1 credit will be given for each 150 hours (approximately one month) of
part-time or full-time chemical work experience. Prerequisites: CHEM 102
and CHEZ 101 and 102. Acquisition of chemistry laboratory experience
through involvement in a professional chemistry setting. Written progress
and final reports will be required.

CHEM 498. Honors Thesis. 1 Hour.
Semester course; 1 credit. Prerequisites: completion of 29 credits in
chemistry, including CHEM 398 and at least six credits of CHEM 492.
Students submit to the Department of Chemistry a thesis based on their
independent study research. Students also present their results to the
department as a research seminar.

Chemistry Labs
CHEZ 101. General Chemistry Laboratory I. 1 Hour.
Semester course; 1 lecture and 2 laboratory hours. 1 credit. Pre-
or corequisite: CHEM 101. Experimental work correlated with CHEM 101
with selected forensic science applications. Each student is charged for
breakage incurred. Approved safety glasses are required. Failure to check
out of laboratory upon withdrawal or for other reasons will incur a charge
billed from the Student Accounting Department.

CHEZ 102. General Chemistry Laboratory II. 1 Hour.
Semester course; 1 lecture and 2 laboratory hours. 1 credit. Prerequisites:
CHEM 101 and CHEZ 101 with minimum grades of C. Pre- or corequisite:
CHEM 102. Experimental work includes qualitative analysis with selected
forensic science applications. Each student is charged for breakage
incurred. Approved safety glasses are required. Failure to check out of
laboratory upon withdrawal or for other reasons will incur a charge billed
from the Student Accounting Department.
CHEZ 110. Chemistry and Society Laboratory. 1 Hour.
Semester course; 2 laboratory hours. 1 credit. Prerequisite or corequisite:
CHEM 110. Experimental work correlated with CHEM 110. Not applicable
for credit toward the B.S. in Chemistry. Each student is charged for
breakage incurred. Approved safety glasses are required. Failure to check
out of laboratory upon withdrawal or for other reasons will incur a charge
billed from the Student Accounting Department.

CHEZ 301. Organic Chemistry Laboratory I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 102
and CHEZ 102 with minimum grades of C. Prerequisite or corequisite: CHEM 301.
Experimental work correlated with CHEM 301. Each student is charged
for breakage incurred. Approved safety glasses are required. Failure to
check out of laboratory upon withdrawal or for other reasons will incur a
charge billed from the Student Accounting Department.

CHEZ 302. Organic Chemistry Laboratory II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 301
and CHEZ 301 with minimum grades of C. Prerequisite or corequisite: CHEM 302.
Experimental work correlated with CHEM 302. Each student is charged
for breakage incurred. Approved safety glasses are required. Failure to
check out of laboratory upon withdrawal or for other reasons will incur a
charge billed from the Student Accounting Department.

CHEZ 303. Physical Chemistry Laboratory I. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 102
and CHEZ 102. Prerequisite or corequisites: CHEM 303, 309 and CHEZ 309. This
course covers experiments in calorimetry, molecular and thermodynamic
properties of gases and liquids, surfaces, electrochemistry, equilibria,
polymers, phase diagrams, and biophysical chemistry. Extensive report
writing, laboratory notebook writing and statistical analysis of data are
emphasized. A final project may be required.

CHEZ 304. Physical Chemistry Laboratory II. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 303,
309 and CHEZ 303, 309. Prerequisite or corequisite: CHEM 304. This course
covers experiments in absorption and emission spectroscopy, infrared
and Raman spectroscopy, NMR spectroscopy, kinetics, photochemistry,
biophysical chemistry and modeling. Report writing, laboratory notebook
writing and statistical analysis of data are emphasized. A final project
may be required.

CHEZ 309. Quantitative Analysis Laboratory. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits.
Prerequisites: CHEM 102 and CHEZ 102 with minimum grades of C.
Prerequisite or corequisite: CHEM 309. Laboratory associated with quantitative
analysis. Includes practice in volumetric and instrumental laboratory
techniques as applied to measurement sciences.

CHEZ 406. Inorganic Chemistry Laboratory. 2 Hours.
Semester course; 1 lecture and 3 laboratory hours. 2 credits.
Prerequisites: CHEM 320 and CHEZ 102. Prerequisite or corequisite: CHEM 406.
Examination of inorganic nonmetal, transition metal and organometallic
compounds using modern inorganic methods of synthesis and
characterization. Each student is charged for breakage incurred.
Approved safety glasses are required. Failure to check out of laboratory
upon withdrawal or for other reasons will incur a charge billed from the
Student Accounting Department.

CHEZ 409. Instrumental Analysis Laboratory. 2 Hours.
Semester course; 4 laboratory hours. 2 credits. Prerequisites: CHEM 302,
304 and 309 with minimum grades of C; CHEZ 303 and 309 with
minimum grades of C. Prerequisite or corequisite: CHEM 409. Practice of
electrochemical, spectroscopic and chromatographic methods of
analysis.