## Chemistry Department

**Major:** Chemistry (CHEM)  
**Concentration:** ACS Certified (ACSZ)  
**Version:** Spring 2015

### University Graduation Requirements:
- Complete the All-University Core Curriculum (AUCC)\(^1\) – See back side.  
- Earn grades of “C” or higher in the major course requirements (listed below).  
- Complete a minimum of 120 credits; a minimum of 42 upper-division credits (300-level +).  
- Must have 30 upper-division credits at CSU.  
- Fifteen of last 30 credits must be at CSU.  
- Keep cumulative and AUCC courses GPA of 2.0+.

### Chemistry Requirements (45 credits):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 111</td>
<td>General Chemistry I (F, S, SS, AUCC3A)</td>
<td>4</td>
<td>MATH 118</td>
</tr>
<tr>
<td>CHEM 112</td>
<td>General Chemistry I Laboratory (F, S, SS)</td>
<td>1</td>
<td>CHEM 111 or concurrent registration</td>
</tr>
<tr>
<td>CHEM 113</td>
<td>General Chemistry II (F, S, SS, AUCC3A)</td>
<td>3</td>
<td>CHEM 107 or CHEM 111; MATH 124</td>
</tr>
<tr>
<td>CHEM 114</td>
<td>General Chemistry II Laboratory (F, S, SS)</td>
<td>1</td>
<td>CHEM 108 or CHEM 112; CHEM 113 or concurrent registration</td>
</tr>
<tr>
<td>CHEM 345</td>
<td>Organic Chemistry I (F) (Recommended)</td>
<td>4</td>
<td>CHEM 113</td>
</tr>
<tr>
<td>CHEM 346</td>
<td>Organic Chemistry II (S) (Recommended)</td>
<td>4</td>
<td>CHEM 345</td>
</tr>
<tr>
<td>CHEM 347</td>
<td>Modern Organic Chemistry I (F, S, SS)</td>
<td>3</td>
<td>CHEM 113</td>
</tr>
<tr>
<td>CHEM 348</td>
<td>Modern Organic Chemistry II (F, S, SS)</td>
<td>3</td>
<td>CHEM 341</td>
</tr>
<tr>
<td>CHEM 349</td>
<td>Modern Organic Chemistry Lab (F, S, SS)</td>
<td>2</td>
<td>CHEM 114; CHEM 343 or concurrent registration</td>
</tr>
<tr>
<td>CHEM 261</td>
<td>Fundamentals of Inorganic Chemistry (S)</td>
<td>3</td>
<td>CHEM 113</td>
</tr>
<tr>
<td>CHEM 335</td>
<td>Introduction to Analytical Chemistry (F, S)</td>
<td>3</td>
<td>CHEM 113; concurrent registration in CHEM 334</td>
</tr>
<tr>
<td>CHEM 334</td>
<td>Quantitative Analysis Laboratory (F, S)</td>
<td>1</td>
<td>CHEM 114; concurrent registration in CHEM 335</td>
</tr>
<tr>
<td>CHEM 440</td>
<td>Advanced Organic Chemistry Laboratory (F, AUCC4A)</td>
<td>2</td>
<td>CHEM 344 or CHEM 346</td>
</tr>
<tr>
<td>CHEM 474</td>
<td>Physical Chemistry I (F)</td>
<td>3</td>
<td>CHEM 113; MATH 261; PH 142; concurrent registration in CHEM 475</td>
</tr>
<tr>
<td>CHEM 475</td>
<td>Physical Chemistry Laboratory I (F)</td>
<td>1</td>
<td>CBE 333 or CHEM 334; CHEM 474 or concurrent registration or CBE 310 or concurrent registration</td>
</tr>
<tr>
<td>CHEM 476</td>
<td>Physical Chemistry II (S, AUCC4B)</td>
<td>3</td>
<td>CHEM 474</td>
</tr>
<tr>
<td>CHEM 477</td>
<td>Physical Chemistry Laboratory II (S)</td>
<td>1</td>
<td>CHEM 475; concurrent registration in CHEM 476</td>
</tr>
<tr>
<td>CHEM 431</td>
<td>Instrumental Analysis (F)</td>
<td>4</td>
<td>CHEM 334; CBE 310 or concurrent registration or CHEM 474 or concurrent registration.</td>
</tr>
<tr>
<td>CHEM 461</td>
<td>Inorganic Chemistry (S)</td>
<td>3</td>
<td>CHEM 261; CHEM 476 or concurrent registration</td>
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<tr>
<td>CHEM 462</td>
<td>Inorganic Chemistry Laboratory (S)</td>
<td>2</td>
<td>CHEM 461 or concurrent registration</td>
</tr>
<tr>
<td>CHEM 493</td>
<td>Senior Seminar (varies, AUCC4C)</td>
<td>2</td>
<td>CHEM 474</td>
</tr>
</tbody>
</table>

### Other Requirements (39 credits):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Prerequisite(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 160</td>
<td>Calculus for Physical Scientists (F, S, SS)</td>
<td>4</td>
<td>MATH 124 and MATH 126 with minimum grade of B</td>
</tr>
<tr>
<td>MATH 280A1</td>
<td>Applied Mathematics for Chemists I (F) (Recommended)</td>
<td>4</td>
<td>MATH 160</td>
</tr>
<tr>
<td>MATH 280A2</td>
<td>Applied Mathematics for Chemists II (S) (Recommended)</td>
<td>4</td>
<td>MATH 280 or MATH 161</td>
</tr>
<tr>
<td>MATH 161</td>
<td>Calculus for Physical Scientists II (F, S, SS)</td>
<td>4</td>
<td>MATH 124; MATH 160</td>
</tr>
<tr>
<td>MATH 261</td>
<td>Calculus for Physical Scientists III (F, S, SS)</td>
<td>4</td>
<td>MATH 161</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Physics for Scientists and Engineers I (F, S, SS, AUCC3A)</td>
<td>5</td>
<td>MATH 126; MATH 160 or concurrent registration</td>
</tr>
<tr>
<td>MATH 142</td>
<td>Physics for Scientists and Engineers II (F, S, SS)</td>
<td>5</td>
<td>PH 141; MATH 161 or concurrent registration</td>
</tr>
<tr>
<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
<td>3</td>
<td>MATH 117 or 118 or 124 or 125 or 152 or 155 or 160</td>
</tr>
<tr>
<td>STAT 315</td>
<td>Statistics for Engineers and Scientists</td>
<td>3</td>
<td>MATH 161 or MATH 255</td>
</tr>
<tr>
<td>BC 351</td>
<td>Principles of Biochemistry (F, S, SS)</td>
<td>4</td>
<td>BZ 110, 120 or LIFE 102; CHEM 245, 341 or 345 Varies</td>
</tr>
<tr>
<td>BC 401</td>
<td>Comprehensive Biochemistry I (F)</td>
<td>3</td>
<td>BZ 110, 120 or LIFE 102; CHEM 245, 341 or 345 Varies</td>
</tr>
</tbody>
</table>

\(^1\) If you plan to attend Pharmacy School, you must take ECON101 or 202 or 204 from AUCC Category 3C. If you plan to attend Medical School, you should take at least 12 credits from AUCC Category 3C.  
\(^2\) If you plan to attend Pharmacy School, you must take both BZ104/105 and BZ110/111.  
\(^3\) Advanced science electives must be 300-level or higher. All 3+, 4+ and 5+ courses offered by departments in the College of Natural Sciences apply. Courses in other departments may apply as well, please check with a chemistry advisor.  
\(^4\) If you plan to attend Veterinary School you must take MIP 450. If you plan to attend Medical School, you must take BMS 300, BMS 301. If you plan to attend Pharmacy School, you must take MIP 300/302, BMS 300 (LIFE102 is the prerequisite), BMS 301. Please, check with a Key Health Professions Advisor for additional professional schools admission requirements. See back of the page for more Chemistry electives.

\*\*\* Important Note \*\*\*
Remember that ONLY your Degree Progress Audit (DPA) will be used as the basis for awarding your degree. Always check your DPA on RAMWeb to keep on track for your degree.
### Category 1. Basic Competencies

**Intermediate Writing (3 credits)**
- CO 150 College Composition
- HONR 193 Honors Seminar (Must be enrolled in the University Honors Program)

**B. Mathematics (3 credits)**
- MATH 117 College Algebra in Context I
- MATH 118 College Algebra in Context II
- MATH 124 Logarithmic and Exponential Functions
- MATH 125 Numerical Trigonometry
- MATH 126 Analytic Trigonometry
- MATH 130 Math in the Social Sciences
- MATH 133 Financial Mathematics
- MATH 135 Patterns of Phenomena I
- MATH 141 Calculus in Management Sciences
- MATH 155 Calculus for Biological Scientists I
- MATH 160 Calculus for Physical Scientists I
- MATH 161 Calculus for Physical Scientists II
- MATH 255 Calculus for Biological Scientists II

### Category 2. Additional Communication

#### A. Oral Communication (Before Fall 2008 only)
- BUS 300 Business Writing and Communication
- CHEM 301 Advanced Scientific Writing: Chemistry
- CO 300 Writing Arguments
- CO 301A Writing in the Disciplines – Arts and Humanities
- CO 301B Writing in the Disciplines – Sciences
- CO 301A Writing in the Disciplines – Social Sciences
- CO 301A Writing in the Disciplines – Education
- CO 302 Writing Online
- JTC 300 Professional and Technical Communication

#### B. Advanced Writing (3 credits)
- BUS 300 Business Writing and Communication
- CHEM 301 Advanced Scientific Writing: Chemistry
- CO 300 Writing Arguments
- CO 301A Writing in the Disciplines – Arts and Humanities
- CO 301B Writing in the Disciplines – Sciences
- CO 301A Writing in the Disciplines – Social Sciences
- CO 301A Writing in the Disciplines – Education
- CO 302 Writing Online
- JTC 300 Professional and Technical Communication

### Category 3. Foundations and Perspectives

#### A. Biological/Physical Sciences (7 credits)
- AA 100 Introduction to Astronomy
- AA 101 Astronomy Laboratory
- ANTH 120 Human Origins and Variation
- ANTH 121 Human Origins and Variation Laboratory
- BIPM 102 Insects, Science and Society
- BZ 101 Humans and Other Animals
- BZ 104 Basic Concepts of Plant Life
- BZ 105 Basic Concepts of Plant Life Laboratory
- BZ 110 Principles of Animal Biology
- BZ 111 Animal Biology Laboratory
- BZ 120 Principles of Plant Biology
- CHEM 103 Chemistry in Context
- CHEM 104 Chemistry in Context Laboratory
- CHEM 107 Fundamentals of Chemistry
- CHEM 108 Fundamentals of Chemistry Laboratory
- CHEM 111 General Chemistry I
- CHEM 112 General Chemistry I Laboratory I
- FW 104 Wildlife Ecology and Conservation
- GEOL 120 Exploring Earth: Physical Geology
- GEOL 121 Introduction to Geology Laboratory
- GEOL 122 The Blue Planet: Geology of Our Environment
- GEOL 124 Geology of Natural Resources
- HORT 100 Horticultural Sciences
- LAND 200 Fundamentals of Ecology
- LIFE 102 Attributes of Living Systems
- LIFE 201A Introductory Genetics-Applied Genetics
- LIFE 201B Introductory Genetics-Molecular
- LIFE 220 Fundamentals of Ecology
- MIP 101 Introduction to Human Disease
- NR 120A Environmental Conservation
- NR 130 Global Environmental Systems
- NR 150 Oceanography
- PH 110 Descriptive Physics
- PH 111 Descriptive Physics Laboratory
- PH 121 General Physics I
- PH 122 General Physics II
- PH141 Physics for Scientists and Engineers I
- PH142 Physics for Scientists and Engineers II
- WR 304 Principles of Watershed Management

#### B. Arts/Humanities (6 credits)
- ART 100 Introduction to Visual Arts
- D 110 Understanding Dance
- E 140 The Study of Literature
- E 232 Introduction to Humanities
- E 242 Reading Shakespeare
- E 270 Introduction to American Literature
- E 276 Survey of British Literature I
- E 277 Survey of British Literature II
- ESTT 240 Native American Cultural Expressions
- HONR 392 Seminar (Must be enrolled in the University Honors Program)
- LARA 200 Second Year Arabic I
- LARA 201 Second Year Arabic II
- LARA 250 Arabic Language, Literature and Culture in Translation
- LCHI 200 Second Year Chinese I
- LCHI 201 Second Year Chinese II
- LCHI 250 Chinese Language, Literature and Culture in Translation
- LFRE 200 Second Year French I
- LFRE 201 Second Year French II
- LFRE 250 French Language, Literature and Culture in Translation
- LGER 200 Second Year German I
- LGER 201 Second Year German II
- LGER 250 German Language, Literature and Culture in Translation
- LPNJ 200 Second Year Japanese I
- LPNJ 201 Second Year Japanese II
- LPNJ 250 Japanese Language, Literature and Culture in Translation
- LRUS 200 Second Year Russian I
- LRUS 201 Second Year Russian II
- LRUS 250 Russian Language, Literature and Culture in Translation
- LSPA 200 Second Year Spanish I
- LSPA 201 Second Year Spanish II
- LSPA 250 Spanish Language, Literature and Culture in Translation
- MU 100 Music Appreciation
- MU 111 Music Theory Fundamentals
- MU 131 Introduction to Music History and Literature
- PHIL 100 Appreciation of Philosophy
- PHIL 103 Moral and Social Problems
- PHIL 110 Logic and Critical Thinking
- PHIL 120 History and Philosophy of Scientific Thought
- SPCM 100 Communication and Popular Culture
- SPCM 201 Rhetoric in Western Thought
- TH 141 Introduction to Theatre

#### C. Social/Behavioral Sciences (3 credits)
- ANTH 110 Introductory Cultural Anthropology
- AREC 202 Agricultural and Resource Economics
- AREC 240 Issues in Environmental Economics
- ECON 101 Economics of Social Issues
- ECON 202 Principles of Microeconomics
- ECON 204 Principles of Macroeconomics
- ECON 212 Racial Inequality and Discrimination
- ECON 240 Issues in Environmental Economics
- EDUC 275 Schooling in the US
- ETST 100 Introduction to Theatre
- LFRE 100 Introduction to Theatre
- HDFS 101 Individual and Family Development
- HIST 115 Islamic World to 1500
- HIST 120 Asian Civilizations I
- HIST 121 Asian Civilizations II
- HIST 150 US History to 1876
- HIST 151 US History since 1876
- HIST 170 World History, Ancient-1500
- HIST 171 World History, 1500-Present
- HIST 252 Asian History
- HIST 255 Native American History
- NR 320 Natural Resources History and Policy

#### D. Historical Perspectives (3 credits)
- AMST 100 Self/Community in American Culture, 1860-1877
- AMST 102 Self/Community in American Culture Since 1877
- ANTH 140 Introduction to Prehistory
- ETST 250 African American History
- ETST 252 Asian American History
- ETST 255 Native American History
- HIST 100 Western Civilization, Pre Modern
- HIST 101 Western Civilization, Modern
- HIST 115 Islamic World to 1500
- HIST 120 Asian Civilizations I
- HIST 121 Asian Civilizations II
- HIST 150 US History to 1876
- HIST 151 US History since 1876
- HIST 170 World History, Ancient-1500
- HIST 171 World History, 1500-Present
- HIST 252 Asian History
- HIST 255 Native American History
- NR 320 Natural Resources History and Policy

#### E. Global and Cultural Awareness (3 credits)
- AGRI 116 Plants and Civilizations
- AGRI 270 World Interdependence-Population and Food
- AM 250 Clothing, Adornment and Human Behavior
- ANTH 200 Cultures in the Global System
- E 238 20th Century Fiction
- E 245 World Drama
- ECON 211 Gender in the Economy
- ETST 100 Introduction to Ethnic Studies
- ETST 205 Ethnicity and the Media
- ETST 253 Chicana/o History and Culture
- ETST 256 Border Crossings: People/Politics/Culture
- HORT 171 Environmental Issues in Agriculture
- IE 116 Plants and Civilizations
- IE 270 World Interdependence-Population and Food
- IE 370 Model United Nations
- LB 170 World Literatures to 1500
- LB 171 World Literatures-The Modern Period
- PHIL 170 World Philosophies
- POLS 131 Current World Problems
- POLS 232 International Relations
- POLS 241 Comparative Government and Politics
- SA 482 Approved Study Abroad Courses (Contact the Office of International Programs)
- SOC 205 Contemporary Race-Ethnic Relations
- SOCR 171 Environmental Issues in Agriculture

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1. This requirement must be completed within the first 60 credits (CSC and transfer taken).
2. First-time students entering a college or university on or after July 1, 2008 must take an advanced writing course.
3. At least one course must have a laboratory component. Sometimes the laboratory component is a separate course number. Credit allows for only one time of the following: GEOL 120, GEOL 122, GEOL 124, GEOL 150, G CC 130, G 140. Credit allowed for only one of the following: GEOL 121, GEOL 150, G 140. Credit not allowed for both LIFE 201 A and LIFE 201 B. Credit not allowed for both NR 130 and G CC 130 and NR 130.
4. No more than three credits of intermediate foreign language (starting 200, **L 200**) may be used toward this category.