Add new courses:

CHEM 210 – Foundations of Analytical Chemistry
3 Credit Hours
Principles and practices of wet chemical and instrumental methods of chemical analysis with statistical treatment of acquired data.
(RE) Prerequisite(s): 130 or 138.
Recommended Background: Physics 135 or Physics 137.

CHEM 219 – Foundations of Analytical Chemistry Laboratory
1 Credit Hour
Experiments on the principles and practices of wet chemical and instrumental methods of chemical analysis with statistical treatment of acquired data.
(RE) Corequisite(s): 210.
Recommended Background: Physics 135 or Physics 137.

CHEM 260 – Foundations of Organic Chemistry
3 Credit Hours
Compounds of carbon and their reactions. Reaction mechanisms, synthesis, spectroscopic, and other physical properties.
Credit Restriction: Students may not receive credit for both 260 and 268.
(RE) Prerequisite(s): 130 or 138.

CHEM 268 – Honors: Foundations of Organic Chemistry
3 Credit Hours
Enhanced version of Chemistry 260 with added emphasis on reactive species, important structural variations, synthesis, and biological implications.
Credit Restriction: Students may not receive credit for both 268 and 260.
(RE) Prerequisite(s): 130 or 138.
Comment(s): Students using 130 as a prerequisite must have a grade of B or better and permission of instructor. Intended and recommended for chemistry, biochemistry, and other physical science majors preparing for careers in science or health-related fields.

CHEM 269 – Foundations of Organic Chemistry Laboratory
1 Credit Hour
Experiments involving synthesis, purification, and characterization of organic compounds discussed in 260 and 268.
Registration Restriction: Permission of instructor.
Comment(s): Recommended for all chemistry majors. Chemistry majors needing minimum 2 credit hours of organic chemistry for professional school should take 269 and 449.

CHEM 300 – Introductory Research in Chemistry
1 Credit Hour
Introduction to the principles and practice of research in chemistry for Chemistry Majors. Written report required.
(RE) Prerequisite(s): 130 or 138.
Registration Restriction: Chemistry Major.

CHEM 311 – Advanced Analytical Chemistry
3 Credit Hours
Theory and practical applications of advanced instrumentation in analytical chemistry.
(RE) Prerequisite(s): 210 and 219 and Physics 136 and Mathematics 142.

CHEM 330 – Foundations of Inorganic Chemistry
3 Credit Hours
Introduction to the principles and practice of inorganic chemistry; atomic and molecular structure, periodicity, bonding, symmetry, main group and transition metal chemistry.
(RE) Corequisite(s): 260.
Recommended Background: general chemistry plus one semester organic chemistry.

CHEM 339 – Foundations in Inorganic Chemistry Laboratory
1 Credit Hour
Experiments demonstrating the principles and practice of inorganic chemistry; synthesis, characterization and properties of inorganic complexes.
(RE) Prerequisite(s): 260.
(RE) Corequisite(s): 330.
Recommended Background: General chemistry plus one semester organic chemistry including a laboratory.
CHEM 370 – Foundations of Physical Chemistry
3 Credit Hours
Quantum Mechanics, Chemical Thermodynamics, Kinetics and Statistical Mechanics.
(RE) Prerequisite(s): 130 or 138 and Physics 136 or 138.
Recommended Background: Mathematics 241.

CHEM 379 – Physical Chemistry Laboratory
1 Credit Hour
Experimental investigations at the microscopic level of chemical phenomena and molecular properties with examples relevant to Chemical Thermodynamics/Kinetics, Spectroscopy and Statistical Mechanics. Written lab reports required.
(RE) Corequisite(s): 370.

CHEM 380 – Foundations of Chemical Biology
3 Credit Hours
Introduction to the principles of chemical biology including the structure, properties and functions of biological molecules.
(RE) Prerequisite(s): 130 or 138.
(RE) Corequisite(s): 260.
Recommended Background: One semester organic chemistry.

CHEM 389 – Foundations of Chemical Biology Laboratory
1 Credit Hour
Experiments illustrating the principles and practices of chemical biology focusing on the analysis, characterization and detection of biological molecules.
(RE) Corequisite(s): 380.
Recommended Background: one semester organic chemistry.

CHEM 449 – Advanced Synthesis Laboratory
2 Credit Hours
Modern techniques of synthesis and characterization of organic and inorganic molecules and materials; handling air sensitive materials; chromatographic purification, spectroscopic characterization, X-ray structure determination.
(RE) Prerequisite(s): 260 and 269 or 369 and 330 and 339.

CHEM 459 – Advanced Measurement and Spectroscopy Laboratory
2 Credit Hours
Experiments introducing measurement of electronic signals, Fourier analysis, computer control of experiments, basic multivariate regression, and various advanced spectrosopies.
(RE) prerequisite(s): 210 and 219 and 370 and 379.

CHEM 470 – In-depth Physical Chemistry
3 Credit Hours
Advanced topics in Quantum Mechanics, Spectroscopy, Intermolecular forces and potential energy surfaces, Statistical Mechanics and Computational Modeling.
(RE) Prerequisite(s): 370.
Recommended Background: Mathematics 241 and 251.

Drop courses:

CHEM 150 – Chemistry and Society (3)
CHEM 230 – Inorganic Chemistry (3)
CHEM 240 – Chemical Programming (2)
CHEM 310 – Analytical Chemistry (3)
CHEM 319 – Analytical Chemistry Laboratory (1)
CHEM 320 – Advanced Analytical Chemistry (3)
CHEM 329 – Advanced Analytical Chemistry Laboratory (2)
CHEM 350 – Organic Chemistry I (3)
CHEM 358 – Honors: Organic Chemistry I (3)
CHEM 439 – Advanced Inorganic Chemistry Laboratory (1)
CHEM 450 – Advanced Organic Chemistry (3)
CHEM 471 – Biophysical Chemistry (3)
CHEM 473 – Physical Chemistry I (3)
CHEM 481 – Biophysical Chemistry (3)
CHEM 483 – Physical Chemistry II (3)
CHEM 489 – Physical Chemistry Laboratory II (2)
Revise Prerequisite:

CHEM 128 – Honors: General Chemistry I (4)
(DE) Prerequisite(s): ACT Composite score of 30 or higher or permission of instructor.

Formerly:
CHEM 128 – Honors: General Chemistry I (4)
(RE) Prerequisite(s): ACT Composite score of 30 or higher or permission of instructor.

Delete comment and add prerequisite:

CHEM 200 – Introduction to Chemical Research (1)
(RE) Prerequisite(s): 120 or 128.

Formerly:
No prerequisite.
Comment(s): Chemistry course numbered 230 or higher is a corequisite.

Revise course title, description, and prerequisite:

CHEM 360 – In-depth Organic Chemistry
3 Credit Hours
Compounds of carbon and their reactions. Reaction mechanisms, multistep synthesis, spectroscopic, and other physical properties. Credit Restriction: Students may not receive credit for both 360 and 368.
(RE) Prerequisite(s): 260 or 268.

Formerly:
CHEM 360 – Organic Chemistry II
3 Credit Hours
Compounds of carbon and their reactions. Reaction mechanisms, synthesis, spectroscopic, and other physical properties. Credit Restriction: Students may not receive credit for both 360 and 368.
(RE) Prerequisite(s): 350 or 358.

Revise course title, description, add comment:

CHEM 369 – Organic Chemistry Laboratory-preprofessional, non-chemistry majors
2 Credit Hours
Experiments on topics discussed in 260-360 and 268-368.
Contact Hour Distribution: 1-hour lecture and 4-hour lab.
(RE) Corequisite(s): 360 or 368.
Comment(s): Primarily for non-chemistry degree track, preprofessional students. Students majoring in either chemistry degree track may not take this course for credit toward the degree. They should take Chemistry 269.

Formerly:
CHEM 369 – Organic Chemistry Laboratory
2 Credit Hours
Experiments on topics discussed in 350-360 and 358-368.
Contact Hour Distribution: 1-hour lecture and 4-hour lab.
(RE) Corequisite(s): 360 or 368.

Revise prerequisite and registration restriction:

CHEM 400 – Research in Chemistry
3 Credit Hours
(RE) Prerequisite(s): 300.
Registration Restriction(s): Chemistry Major with senior standing.

Formerly:
No prerequisite.
Registration Restriction(s): Chemistry major; minimum student level – senior.

Revise credit hours and credit restriction:

CHEM 420 – Selected Topics in Chemistry
3 Credit Hours
Topics of current significance in chemistry.
Repeatability: May be repeated.
Credit Restriction: Only 6 credits may be applied to a major or minor in chemistry.
Registration Permission: Consent of instructor.

Formerly:

CHEM 420 – Selected Topics in Chemistry
1-3 Credit Hours
Topics of current significance in chemistry.
Repeatability: May be repeated. Maximum 6 hours.
Credit Restriction: Only 3 credits may be applied to a major or minor in chemistry.
Registration Permission: Consent of instructor.

Revise course title, description, and add prerequisite:

CHEM 430 – In-depth Inorganic Chemistry
3 Credit Hours
Transition metal and organometallic and bioinorganic chemistry, inorganic materials, nanomaterials, environmental impacts, synthesis and spectroscopic characterization.
(RE) Prerequisite(s): 330.

Formerly:

CHEM 430 – Advanced Inorganic Chemistry
3 Credit Hours
Atomic and molecular structure, bonding theories, descriptive chemistry of the elements; kinetics and mechanism of inorganic reactions; applications of modern techniques for characterization, coordination, and organometallic chemistry.

Revise prerequisite and delete corequisite:

CHEM 490 – Introductory Polymer Chemistry
3 Credit Hours
(RE) Prerequisite(s): 360.

Formerly:

(RE) Prerequisite(s): 360.
(RE) Corequisite(s): Biochemistry and Cellular and Molecular Biology 471 or Chemistry 473.

Drop Chemistry Major, BS, ACS Certified
Drop Chemistry Major, BS
Drop Chemistry Minor

Add new majors:

Chemistry Major, BS, ACS certified

The Bachelor of Science degree is available to students who intend to pursue graduate study in chemistry as well as careers in chemistry and the sciences. Students completing the requirements listed below will receive a degree certification from the American Chemical Society.
College Requirements
Arts and Sciences

Prerequisites

Select one sequence:

CHEM 120 - General Chemistry I
CHEM 130 - General Chemistry II
Or preferably
CHEM 128 - Honors: General Chemistry I
CHEM 138 - Honors: General Chemistry II

Select one sequence:

MATH 141 - Calculus I
MATH 142 - Calculus II
or
MATH 147 - Honors: Calculus I
MATH 148 - Honors: Calculus II
and
MATH 241 - Calculus III or MATH 247 - Honors: Calculus III

Corequisites

Select one sequence:

PHYS 135 - Introduction to Physics for Physical Science and Mathematics Majors I
PHYS 136 - Introduction to Physics for Physical Science and Mathematics Majors II
or
PHYS 137 - Honors: Fundamentals of Physics for Physics Majors I
PHYS 138 - Honors: Fundamentals of Physics for Physics Majors II

Major Requirements

Complete:

All of the Foundation Lecture Courses:
CHEM 210 – Foundations of Analytical Chemistry
CHEM 330 – Foundations of Inorganic Chemistry
CHEM 370 – Foundations of Physical Chemistry
CHEM 380 – Foundations of Chemical Biology

All Foundation Laboratory Courses:
CHEM 219 – Foundations of Analytical Chemistry Laboratory
CHEM 269 – Foundations of Organic Chemistry Laboratory
CHEM 339 – Foundations in Inorganic Chemistry Laboratory
CHEM 379 – Physical Chemistry Laboratory
CHEM 389 – Foundations of chemical Biology Laboratory

In-depth course
CHEM 360 – In-depth Organic Chemistry
or
CHEM 368 – Honors: Organic Chemistry II (prerequisite to CHEM 490 and BCMB 401)

Two of the following in-depth lecture courses:
CHEM 311 – Advanced Analytical Chemistry
CHEM 430 – In-depth Inorganic Chemistry
CHEM 470 – In-depth Physical Chemistry

One of the following:
CHEM 490 – Introductory Polymer Chemistry
BCMB 401 – Biochemistry I

Two of the following in-depth Laboratory courses:
CHEM 449 – Advanced Synthesis Laboratory
CHEM 459 – Advanced Measurement and Spectroscopy Laboratory
BCMB 419 – Cellular and Comparative Biochemistry Laboratory
CHEM 406 – Senior Seminar
CHEM 300 – Introductory Research in Chemistry

3 additional credit hours from chemistry courses at the 300 or 400 level

Notes
The curriculum for the Chemistry Major, BS in Chemistry is approved by the Committee on Professional Training of the American Chemical Society and will be certified as such upon completion of the required courses. Although not required for the major, certain additional cognitive courses are strongly recommended for students intending to become chemists: Matrix Algebra I (MATH 251); Organismal and Ecological Biology (BIOL 150); Probability and Statistics for Scientists and Engineers (STAT 251).

Chemistry Major, BS, ACS Certified (UTrack Requirements)

<table>
<thead>
<tr>
<th>Term 1</th>
<th>Hours</th>
<th>Milestone Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 120* or CHEM 128*</td>
<td>4</td>
<td>MATH 119 or Math ACT score of 25 or higher</td>
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<tr>
<td>ENGL 101 (or equivalent)*</td>
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<tr>
<td>Foreign Language (intermediate level)*</td>
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<td></td>
</tr>
<tr>
<td>MATH 141* or MATH 147*</td>
<td>4</td>
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<table>
<thead>
<tr>
<th>Term 2</th>
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<tr>
<td>CHEM 130* or CHEM 138*</td>
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<td>ENGL 102 (or equivalent)*</td>
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<tr>
<td>Foreign Language (intermediate level)*</td>
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<tr>
<td>MATH 142* or MATH 148*</td>
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<tr>
<td>A&amp;S Elective Requirements</td>
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<table>
<thead>
<tr>
<th>Term 3</th>
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<tbody>
<tr>
<td>CHEM 260 (Foundation Course)</td>
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<tr>
<td>CHEM 210 (Foundation Course)</td>
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<tr>
<td>Foundation Lab (must complete all CHEM 219, 269, 339, 379, 389)</td>
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<tr>
<td>PHYS 135* or PHYS 137*</td>
<td>4 – 5</td>
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<tr>
<td>A&amp;S Elective Requirements</td>
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<table>
<thead>
<tr>
<th>Term 4</th>
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<tbody>
<tr>
<td>CHEM 380 (Foundation Course)</td>
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<tr>
<td>Foundation Lab (must complete all CHEM 219, 269, 339, 379, 389)</td>
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</tr>
<tr>
<td>MATH 241</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 136* or PHYS 138*</td>
<td>4 – 5</td>
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<tr>
<td>A&amp;S Elective Requirements</td>
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<table>
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<tr>
<th>Term 5</th>
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<tbody>
<tr>
<td>CHEM 330 (Foundation Course)</td>
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</tr>
<tr>
<td>CHEM 370 (Foundation Course)</td>
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</tr>
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<td>Foundation Lab (must complete CHEM 219, 269, 339, 379, 389)</td>
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</tr>
<tr>
<td>A&amp;S Elective Requirements</td>
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<table>
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<tr>
<th>Term 6</th>
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<tbody>
<tr>
<td>Complete 3 of 4 In-depth Chemistry lecture courses: (CHEM 311, CHEM 360, CHEM 430, CHEM 470)</td>
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<tr>
<td>No Milestones</td>
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<tr>
<td>Term 7</td>
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<tr>
<td>Complete 3 of 4 In-depth Chemistry lecture courses: (CHEM 311, CHEM 360, CHEM 430, CHEM 470)</td>
<td>3</td>
</tr>
<tr>
<td>Complete 2 of 3 advanced laboratories: (CHEM 449, CHEM 459, BCMB419)</td>
<td>2</td>
</tr>
<tr>
<td>Complete CHEM 490 or BCMB401</td>
<td>3–4</td>
</tr>
<tr>
<td>A&amp;S elective requirements</td>
<td>6</td>
</tr>
</tbody>
</table>

**TOTAL (minimum)** | 120

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**Chemistry Major, BS**

The Bachelor of Science degree is available to students who desire a more flexible program than the requirements for the ACS certified BS in Chemistry curriculum.

**College Requirements**

**Arts and Sciences**

**Prerequisites**

Select one sequence:
- CHEM 120 - General Chemistry I
- CHEM 130 - General Chemistry II
- CHEM 128 - Honors: General Chemistry I
- CHEM 138 - Honors: General Chemistry II

Select one sequence:
- MATH 141 - Calculus I
- MATH 142 - Calculus II
- MATH 147 - Honors: Calculus I
- MATH 148 - Honors: Calculus II

**Corequisites**

Select one sequence:
- PHYS 135 - Introduction to Physics for Physical Science and Mathematics Majors I
- PHYS 136 - Introduction to Physics for Physical Science and Mathematics Majors II
- PHYS 137 - Honors: Fundamentals of Physics for Physics Majors I
- PHYS 138 - Honors: Fundamentals of Physics for Physics Majors II

Select one course:
- BIOL 150 - Organismal and Ecological Biology
- BIOL 158 - Honors Organismal and Ecological Biology
- MATH 251 (or) – Matrix Algebra I
- MATH 257 - Honors Matrix Algebra I
Major Requirements

Complete all of the Foundation Lecture Courses:
CHEM 210 – Foundations of Analytical Chemistry
CHEM 330 – Foundations of Inorganic Chemistry
CHEM 370 – Foundations of Physical Chemistry
CHEM 380 – Foundations of Chemical Biology

Complete four of five Foundation Laboratory Courses:
CHEM 219 – Foundations of Analytical Chemistry Laboratory
CHEM 269 – Foundations of Organic Chemistry Laboratory
CHEM 339 – Foundations in Inorganic Chemistry Laboratory
CHEM 379 – Physical Chemistry Laboratory
CHEM 389 – Foundations of Chemical Biology Laboratory

Complete two of following in-depth Lecture courses:
CHEM 311 – Advanced Analytical Chemistry
CHEM 360 – In-depth Organic Chemistry (or preferably Honors CHEM 368 – Honors: Organic Chemistry II)
CHEM 430 – In-depth Inorganic Chemistry
CHEM 470 – In-depth Physical Chemistry

Complete One of two in-depth Laboratory classes:
CHEM 449 – Advanced Synthesis Laboratory
CHEM 459 – Advanced Measurement and Spectroscopy Laboratory

Select an additional 8 hours:
8 additional credit hours from chemistry courses at the 300 or 400 level (BCMB 419 may also count towards the 8 additional credit hours)

Chemistry Major, BS (uTrack Requirements)
<table>
<thead>
<tr>
<th>Term</th>
<th>Hours</th>
<th>Milestone Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1</td>
<td></td>
<td></td>
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<tr>
<td>CHEM 120* or CHEM 128*</td>
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<td>MATH 119 or Math ACT score of 25 or higher</td>
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<td>ENGL 101 (or equivalent)*</td>
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<td>Foreign Language (intermediate level)*</td>
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<td>MATH 141* or MATH 147*</td>
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<tr>
<td>Term 2</td>
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<tr>
<td>CHEM 130* or CHEM 138*</td>
<td>4</td>
<td>CHEM 120*</td>
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<tr>
<td>ENGL 102 (or equivalent)*</td>
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<td>ENGL 101*</td>
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<td>Foreign Language (intermediate level)*</td>
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<td>MATH 130 or Math ACT score of 28 or higher</td>
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<td>MATH 142* or MATH 148*</td>
<td>4</td>
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<td>A&amp;S elective requirements</td>
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<tr>
<td>Term 3</td>
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<tr>
<td>Cognitive elective requirement²</td>
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<td>CHEM 130*</td>
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<td>CHEM 260 (Foundation Course)</td>
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<td>MATH 141</td>
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<tr>
<td>CHEM 210 (Foundation Course)</td>
<td>3</td>
<td>ENGL 102*</td>
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<td>Foundation Lab (must complete 4 of 5 from CHEM 219, 269, 339, 379, 389)</td>
<td>1</td>
<td>CHEM 210 or CHEM 260 with grade of C or higher</td>
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<tr>
<td>PHYS 135* or PHYS 137*</td>
<td>4 – 5</td>
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<tr>
<td>Term 4</td>
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<tr>
<td>CHEM 380 (Foundation Course)</td>
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<td>An additional Foundation Lecture course</td>
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<td>Foundation Lab (must complete 4 of 5 from CHEM 219, 269, 339, 379, 389)</td>
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<td>MATH 142*</td>
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<td>PHYS 136* or PHYS 138*</td>
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<td>A&amp;S elective requirements¹</td>
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<tr>
<td>Term 5</td>
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<tr>
<td>CHEM 330 (Foundation Course)</td>
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<td>4 of 5 Foundation Lecture courses with grade of C or higher</td>
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<tr>
<td>CHEM 370 (Foundation Course)</td>
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<tr>
<td>Foundation Lab (must complete 4 of 5 from CHEM 219, 269, 339, 379, 389)</td>
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<tr>
<td>A&amp;S elective requirements¹</td>
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<td></td>
</tr>
<tr>
<td>Term 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete 2 of 5 In-depth Chemistry Electives: (CHEM 311, CHEM 360, CHEM 430, CHEM 470, BCMB 401)</td>
<td>3 – 6</td>
<td>Complete all Foundation courses with grade of C or higher</td>
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<tr>
<td>Chem Elective</td>
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<tr>
<td>Complete 1 of 2 advanced laboratories: (CHEM 449 or CHEM 459) (satisfies WC requirement)</td>
<td>2</td>
<td>Complete Foundation lab requirement with grade of C or higher</td>
</tr>
<tr>
<td>A&amp;S elective requirements</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Term 7</td>
<td></td>
<td></td>
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<tr>
<td>Complete 2 of 5 In-depth Chemistry Electives: (CHEM 311, CHEM 360, CHEM 430, CHEM 470, BCMB 401)</td>
<td>3 – 6</td>
<td>No milestones</td>
</tr>
<tr>
<td>CHEM Elective</td>
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<td>A&amp;S Elective requirements¹</td>
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<td>Term 8</td>
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<tr>
<td>CHEM 406* (satisfies OC)</td>
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<td>No milestones</td>
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<tr>
<td>CHEM Elective</td>
<td>2 – 3</td>
<td></td>
</tr>
</tbody>
</table>
All students must complete at least 42 upper-division (300-400 level) hours in order to receive a degree from the College of Arts & Sciences.

Cognitive electives to the major include MATH 241 or 247; MATH 251 or 257; BIOL 150 or 158; STAT 251.

Add Chemistry Minor:

Minor Requirements

A minor in chemistry consists of 19 hours of the following courses.

I. Complete
A. Analytical chemistry courses:
   CHEM 210 – Foundations of Analytical Chemistry
   CHEM 219 – Foundations of Analytical Chemistry Laboratory

B. Organic chemistry courses:
   CHEM 360 – In-depth Organic Chemistry or 368 – Honors Organic Chemistry II
   CHEM 369 – Organic Chemistry Laboratory-preprofessional, non chemistry majors

II. Complete one of the following foundation courses plus the corresponding foundation lab
   b. Physical: CHEM 370 – Foundations of Physical Chemistry and CHEM 379 – Physical Chemistry Laboratory

III. Complete one of the following additional in-depth courses:
   a. Analytical: CHEM 311 – Advanced Analytical Chemistry
   b. Inorganic: CHEM 430 – In-depth Inorganic Chemistry
   c. Physical: CHEM 470 – In-depth Physical Chemistry
   d. Chemical Biology: BCMB 401- Biochemistry I

<table>
<thead>
<tr>
<th>A&amp;S elective requirements¹</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL (minimum)</td>
<td>120</td>
</tr>
</tbody>
</table>

¹ All students must complete at least 42 upper-division (300-400 level) hours in order to receive a degree from the College of Arts & Sciences.
² Cognitive electives to the major include MATH 241 or 247; MATH 251 or 257; BIOL 150 or 158; STAT 251.