

CHEMISTRY: ENVIRONMENTAL CHEMISTRY, BS

For the Degree of Bachelor of Science in Chemistry, Environmental Chemistry Concentration

This concentration is designed to provide a background in environmental chemistry that is sufficient in breadth and depth to prepare a person to work as an environmental chemist in the public or private sectors and/or to pursue an advanced degree in the field. Students who complete this concentration will be certified in environmental chemistry by the American Chemical Society (ACS). The Environmental Chemistry Concentration is based on the Specialized Curriculum in Chemistry.

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Specialized Curriculum

Graduation requires grade point averages of at least 2.0 overall and 2.0 in chemistry, mathematics, and physics courses.

Students in the Specialized Curriculum in Chemistry must include a course in Biochemistry in the Advanced Chemistry area or the Technical Electives area to be certified by the American Chemical Society as having met its specifications.

Departmental distinction: Students qualify for graduation with distinction by exhibiting superior performance in both course work and in senior thesis research. To be eligible, a student must have a UIUC coursework major grade point average of 3.25, must take CHEM 499 (normally for two semesters) and submit a senior thesis for evaluation, and must have their undergraduate research advisor submit to the department Head a letter of support attesting to the effort invested by the student. The minimum major GPAs for Distinction, High Distinction, and Highest Distinction are 3.25, 3.5, and 3.75, respectively. Final decisions on awarding Distinction honors will be made by the Head or designee.

General education: Students must complete the Campus General Education (<https://courses.illinois.edu/gened/DEFAULT/DEFAULT/>) requirements including the campus general education language requirement.

Minimum hours required for graduation: 120 hours, to include a minimum of 40 hours of upper-division coursework generally at the 300 and 400 level. These hours can be drawn from all elements of the degree.

| Code | Title | Hours |
|---|---|--------|
| Orientation and Professional Development | | |
| LAS 101 | Design Your First Year Experience | 1 |
| OR | | |
| LAS 100 & LAS 101 | Success in LAS for International Students and Design Your First Year Experience | 3 |
| OR | | |
| LAS 102 | Transfer Advantage | 1 |
| Total Hours | | 1 or 3 |

| Code | Title | Hours |
|---|--|--|
| Major Core Requirements and Electives | | |
| Core Chemistry | | 37 |
| CHEM 150 | First Semester Success in Chemistry (On- and off-campus transfer students in the BS curriculum may substitute 1 additional hour of 200 level or higher Chemistry (including CHEM 297, CHEM 397, CHEM 497, or CHEM 499) for CHEM 150. This may not include CHEM 222 or CHEM 223 for students who took the CHEM 102, CHEM 103, CHEM 104, and CHEM 105 sequence instead of CHEM 202, CHEM 203, CHEM 204, and CHEM 205.) | |
| CHEM 202 | Accelerated Chemistry I | |
| CHEM 203 | Accelerated Chemistry Lab I | |
| CHEM 204 | Accelerated Chemistry II | |
| CHEM 205 | Accelerated Chemistry Lab II | |
| If necessary, CHEM 102, CHEM 103, CHEM 104, CHEM 105, CHEM 222, and CHEM 223 may be substituted for CHEM 202, CHEM 203, CHEM 204, and CHEM 205. | | |
| CHEM 236 | Fundamental Organic Chem I | |
| CHEM 237 | Structure and Synthesis | |
| CHEM 312 | Inorganic Chemistry | |
| CHEM 315 | Instrumental Chem Systems Lab | |
| CHEM 420 | Instrumental Characterization | |
| CHEM 436 | Fundamental Organic Chem II | |
| CHEM 442 | Physical Chemistry I | |
| CHEM 444 | Physical Chemistry II | |
| CHEM 445 | Physical Principles Lab I | |
| Advanced Chemistry | | 11 |
| CHEM or BIOC courses numbered 300 or higher, which must include three laboratory courses from the following: | | |
| CHEM 317 | Inorganic Chemistry Lab | |
| CHEM 437 | Organic Chemistry Lab | |
| CHEM 447 | Physical Principles Lab II | |
| CHEM 483 | Solid State Structural Anlysis | |
| BIOC 455 | Technqs Biochem & Biotech | |
| A student who has earned at least 6 credit hours in any combination of CHEM 397, CHEM 497, or CHEM 499 must complete only two laboratory courses from the list, one of which must be CHEM 317, CHEM 437, or CHEM 447. | | |
| Mathematics | | 16-19 |
| MATH 220 | Calculus | |
| or MATH 221 | | Calculus I |
| MATH 225 | Introductory Matrix Theory | |
| or MATH 227 | | Linear Algebra for Data Science |
| or MATH 257 | | Linear Algebra with Computational Applications |
| or MATH 415 | | Applied Linear Algebra |
| MATH 231 | Calculus II | |
| MATH 241 | Calculus III | |
| MATH 285 | Intro Differential Equations | |
| Physics | | 10 |
| PHYS 211 | University Physics: Mechanics | |
| PHYS 212 | University Physics: Elec & Mag | |

| | | |
|---|-------------------------------|------------|
| PHYS 214 | Univ Physics: Quantum Physics | |
| Technical Electives | | 7-9 |
| CHEM (300 or higher), BIOC, CHBE (200 or higher) | | |
| Courses in life sciences (all courses at 200 or higher) | | |
| Mathematics or computer science above the basic level | | |
| Other courses in the physical and biological sciences and engineering including CHEM 199 (Three hours maximum credit in CHEM 199. Additional courses in sciences and engineering can be taken, upon consultation with the SCS advisor and approval from the chemistry department. Approved courses must generally have a strong technical prerequisite, such as one year of college-level math or science.) | | |

| Code | Title | Hours |
|--|---|-----------|
| Required Technical Elective Courses for the Environmental Chemistry Concentration | | 12 |
| These courses can contribute, in whole or in part, to the required 7-9 hours of technical electives for the Specialized Curriculum in Chemistry. | | |
| Basic Courses | | |
| CHEM 360 or CEE 330 | Chemistry of the Environment Environmental Engineering | 3 |
| Advanced Courses | | 9 |
| Select three courses from the following: | | |
| ATMS 420 | Atmospheric Chemistry | |
| ATMS 449 | Biogeochemical Cycles | |
| CEE 443 | Env Eng Principles, Chemical | |
| CHEM 397 | Individual Study Junior | |
| CHEM 460 | Green Chemistry | |
| CHEM 497 | Individual Study Senior | |
| CHEM 499 | Senior Thesis | |
| GEOL 380 | Environmental Geology | |
| GEOL 460 | Geochemistry | |
| NRES 351 | Introduction to Environmental Chemistry | |
| NRES 487 | Soil Chemistry | |
| NRES 490 | Surface Water System Chemistry | |
| Other 400 level courses dealing with economic, engineering, or biological aspects of environmental chemistry, upon consultation with the SCS advisor and approval of the chemistry department. | | |

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Sample Sequence

This sample sequence is intended to be used only as a guide for degree completion. All students should work individually with their academic advisors to decide the actual course selection and sequence that works best for them based on their academic preparation and goals. Enrichment programming such as study abroad, minors, internships, and so on may impact the structure of this four-year plan. Course availability is not guaranteed during the semester indicated in the sample sequence.

Students must fulfill their Language Other Than English requirement by successfully completing a third level of a language other than English. See the corresponding section on the Degree and General Education

Requirements page (<http://catalog.illinois.edu/general-information/degree-general-education-requirements/>).

First Year

| First Semester | Hours | Second Semester | Hours |
|-----------------|-------|---|-----------|
| LAS 101 | | 1 CHEM 204 | 3 |
| CHEM 150 | | 1 CHEM 205 | 2 |
| CHEM 202 | | 3 MATH 231 | 3 |
| CHEM 203 | | 2 PHYS 211 | 4 |
| MATH 220 or 221 | | 4 Composition I course or Language Other than English (3rd level) | 4 |
| | | Language Other than English (3rd level) or Composition I course | 4 |
| | | 15 | 16 |

Second Year

| First Semester | Hours | Second Semester | Hours |
|--------------------------|-------|---|-----------|
| CHEM 236 | | 4 CHEM 436 | 3 |
| CHEM 237 | | 2 Environmental Chemistry Technical Electives | 3 |
| PHYS 212 | | 4 PHYS 214 | 2 |
| MATH 241 | | 4 MATH 225 or 415 | 3 |
| General Education course | | 3 MATH 285 | 3 |
| | | General Education course | 3 |
| | | 17 | 17 |

Third Year

| First Semester | Hours | Second Semester | Hours |
|--------------------------|-------|----------------------------|-----------|
| CHEM 442 | | 4 CHEM 444 | 4 |
| CHEM 420 | | 2 CHEM 445 | 2 |
| CHEM 315 | | 2 CHEM 312 | 3 |
| General Education course | | 3 General Education course | 3 |
| General Education course | | 3 General Education course | 3 |
| | | 14 | 15 |

Fourth Year

| First Semester | Hours | Second Semester | Hours |
|---|-------|---|-------|
| Advanced Chemistry course | | 3 Advanced Chemistry course | 3 |
| Advanced Chemistry lab | | 2 Additional Advanced Chemistry course | 3 |
| Environmental Chemistry Technical electives | | 3 Environmental Chemistry Technical Electives | 3 |

| | | |
|--------------------------|----------------------------|-----------|
| CHEM 360 or CEE 330 | 3 General Education course | 3 |
| General Education course | 3 | |
| | 14 | 12 |

Total Hours 120

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Students graduating with the BS in Chemistry will have:

1. A thorough knowledge of the basic principles of chemistry, including atomic and molecular structure, chemical dynamics and the chemical and physical properties of substances.
2. An exposure to the subfields of chemistry, such as analytical, organic, physical, materials, inorganic, as well as chemical biology.
3. The ability to read, evaluate, interpret, and present (via oral and written communication) numerical, chemical and general scientific data, information and literature.
4. The ability to carry out experiments, use appropriate experimental apparatus effectively, and demonstrate proper laboratory safety skills.

Undergraduate Degree Programs in Chemistry

For the Degree of Bachelor of Science in Liberal Arts and Sciences

- Major in Computer Science & Chemistry, BSLAS (http://catalog.illinois.edu/undergraduate/eng_las/computer-science-chemistry-bslas/)
- Major in Chemistry (Sciences and Letters) (<http://catalog.illinois.edu/undergraduate/las/chemistry-bslas/#degreerequirementstext>)
- Major in Chemistry (Sciences and Letters), Chemistry Teaching Concentration (<http://catalog.illinois.edu/undergraduate/las/chemistry-bslas/chemistry-teaching/>)

For the Degree of Bachelor of Science in Chemistry

- Major in Chemistry (Specialized Curriculum) (<http://catalog.illinois.edu/undergraduate/las/chemistry-bs/#degreerequirementstext>)
- Major in Chemistry (Specialized Curriculum), Environmental Chemistry Concentration (p. 1)

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Chemistry

Chemistry website (<https://chemistry.illinois.edu>)

Chemistry faculty (<https://chemistry.illinois.edu/directory/faculty-by-type/>)

SCS Academic Advising (<http://advising.scs.illinois.edu/>)

College of Liberal Arts & Sciences

Liberal Arts & Sciences College & Admissions requirements (<http://catalog.illinois.edu/schools/las/>)

LAS website (<https://las.illinois.edu/>)