Chemistry, B.S.

The mission of the Department of Chemistry is to conduct world-class, groundbreaking research in the chemical sciences while offering the highest quality of education to undergraduate students, graduate students, and postdoctoral associates. The department’s leadership in research includes the traditional areas of physical, analytical, inorganic, and organic chemistry, and has rapidly evolved to encompass environmental chemistry, chemical biology, biophysical chemistry, soft and hard materials chemistry, and nanotechnology. The Department of Chemistry prides itself on its highly interactive, diverse, and collegial scientific environment. Our emphasis on collaboration connects us to colleagues across campus, around the country, and throughout the world.

The undergraduate chemistry major leads to a bachelor of science or a bachelor of arts degree awarded by the College of Letters & Science. The curriculum provides excellent preparation in chemistry, along with a wide breadth of liberal arts coursework. At the same time, the program provides significant opportunities for students to participate in scientific inquiry, within both laboratory courses and research laboratories. Students from other colleges within the university may pursue the chemistry major as an additional major. When pursuing a chemistry major, the undergraduate student must meet university general education requirements and breadth requirements of their own college, along with the specific requirements for the chemistry major.

The chemistry major provides students with the critical thinking and problem-solving skills necessary to be successful in a wide variety of careers in the chemical industries (e.g., consumer and agricultural products, materials, energy, petroleum, paper, food, etc.), as well as environmental, pharmaceutical, and other health-related sciences. Students are also well-prepared for graduate-level work in chemistry, chemical physics, biochemistry, biophysics, materials chemistry, and other related fields. Students who excel in undergraduate chemistry coursework are often able to obtain funding for their graduate work through teaching or research assistantships and fellowships. Combined with a master’s program in secondary education, the major qualifies the student to teach chemistry in secondary schools. Chemistry majors have also been successful in a variety of professional programs where they have studied medicine, pharmacy, dentistry, veterinary medicine, environmental chemistry, chemical biology, biophysical chemistry, soft and hard materials chemistry, and nanotechnology. The Department of Chemistry prides itself on its highly interactive, diverse, and collegial scientific environment. Our emphasis on collaboration connects us to colleagues across campus, around the country, and throughout the world.

The curriculum provides excellent preparation in chemistry, along with a wide breadth of liberal arts coursework. At the same time, the program provides significant opportunities for students to participate in scientific inquiry, within both laboratory courses and research laboratories. Students from other colleges within the university may pursue the chemistry major as an additional major. When pursuing a chemistry major, the undergraduate student must meet university general education requirements and breadth requirements of their own college, along with the specific requirements for the chemistry major.

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How to Get In

Students may declare the chemistry major after they have completed General Chemistry (CHEM 104, CHEM 109, or CHEM 116). Transfer students may declare in their first semester at UW-Madison, if they have transfer credit for one of these courses. Students should schedule an appointment with the undergraduate chemistry advisor to declare and develop a course plan toward graduation. To better inform their decision, undecided students who are exploring chemistry along with other majors are encouraged to take an additional chemistry course or two beyond General Chemistry before declaring. Any student interested in chemistry is welcome to schedule an appointment (https://www.chem.wisc.edu/content/undergraduate-advising) with the advisor to further explore the major.

Students are advised to declare the major no later than the end of their sophomore year. There are many advantages to declaring the chemistry major early, including access to chemistry advising, access to scholarships only available to chemistry majors, and access to announcements for chemistry majors. Students who have declared the major become a part of our chemistry community, enabling them to better connect with faculty, staff, and other chemistry majors.

Requirements

University General Education Requirements

All undergraduate students at the University of Wisconsin—Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as needed. For additional information, see the university Undergraduate General Education Requirements (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatestudytext) section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- Breadth—Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B *
- Ethnic Studies *
- Quantitative Reasoning Part A & Part B *

* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

College of Letters & Science Breadth and Degree Requirements: Bachelor of Science (B.S.)

Students pursuing a bachelor of science degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum. View a comparison of the degree requirements here. (https://pubs.wisc.edu/home/archives/ug15/images/babs2009.pdf)

Bachelor of Science Degree Requirements

<table>
<thead>
<tr>
<th>Mathematics</th>
<th>Two (2) 3+ credits of intermediate/advanced level MATH, COMP SCI, STAT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Limit one each: COMP SCI, STAT</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foreign Language</th>
<th>Complete the third unit of a foreign language</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Language</th>
<th>Note: A unit is one year of high school work or one semester/term of college work.</th>
</tr>
</thead>
</table>
L&S Breadth

- Humanities, 12 credits: 6 of the 12 credits must be in literature
- Social Sciences, 12 credits
- Natural Sciences, 12 credits: must include 6 credits in biological science; and must include 6 credits in physical science

Liberal Arts and Science Coursework

108 credits

Depth of Intermediate/Advanced work

60 intermediate or advanced credits

Major

Declare and complete at least one (1) major

Total Credits

120 credits

UW-Madison Experience

30 credits in residence, overall

30 credits in residence after the 86th credit

Minimum GPAs

2.000 in all coursework at UW–Madison

2.000 in intermediate/advanced coursework at UW–Madison

NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements and do not need to complete the L&S breadth and degree requirements above. Please note that the following special degree programs are not considered majors so are not available to non-L&S-degree-seeking candidates:

- Applied Mathematics, Engineering and Physics (Bachelor of Science–Applied Mathematics, Engineering and Physics)
- Journalism (Bachelor of Arts–Journalism; Bachelor of Science–Journalism)
- Music (Bachelor of Music)
- Social Work (Bachelor of Social Work)

REQUIREMENTS FOR THE MAJOR

MATH & PHYSICS

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MATH 222</td>
<td>Calculus and Analytic Geometry 2</td>
<td>4-5</td>
</tr>
<tr>
<td>MATH 276</td>
<td>Topics in Calculus II</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>General Physics</td>
<td>10</td>
</tr>
<tr>
<td>PHYSICS 201</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 247</td>
<td>A Modern Introduction to Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 208</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 202</td>
<td>General Physics</td>
<td></td>
</tr>
<tr>
<td>PHYSICS 248</td>
<td>A Modern Introduction to Physics</td>
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</table>

Total Credits

14-15

CHEMISTRY

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>CHEM 104</td>
<td>General Chemistry II</td>
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<tr>
<td>CHEM 109</td>
<td>Advanced General Chemistry</td>
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</tr>
<tr>
<td>CHEM 115</td>
<td>Chemical Principles I</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 329</td>
<td>Fundamentals of Analytical Science</td>
<td>4-5</td>
</tr>
<tr>
<td>CHEM 116</td>
<td>Chemical Principles II</td>
<td></td>
</tr>
<tr>
<td>CHEM 327</td>
<td>Fundamentals of Analytical Science</td>
<td></td>
</tr>
<tr>
<td>CHEM 311</td>
<td>Chemistry Across the Periodic Table</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 343</td>
<td>Introductory Organic Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 344</td>
<td>Introductory Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 345</td>
<td>Intermediate Organic Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 562</td>
<td>Physical Chemistry</td>
<td>8-9</td>
</tr>
<tr>
<td>CHEM 563</td>
<td>Physical Chemistry Laboratory</td>
<td>7</td>
</tr>
<tr>
<td>CHEM 564</td>
<td>Physical Chemistry Laboratory</td>
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</tr>
<tr>
<td>CHEM 561</td>
<td>Physical Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 565</td>
<td>Biophysical Chemistry</td>
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</tr>
<tr>
<td>CBE 310</td>
<td>Chemical Process Thermodynamics</td>
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</tr>
<tr>
<td>M S &amp; E 330</td>
<td>Thermodynamics of Materials</td>
<td></td>
</tr>
<tr>
<td>CHEM 562</td>
<td>Physical Chemistry</td>
<td></td>
</tr>
<tr>
<td>CHEM 563</td>
<td>Physical Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 564</td>
<td>Physical Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>BIOCHEM 501</td>
<td>Introduction to Biochemistry</td>
<td>9</td>
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<tr>
<td>BIOCHEM/ NUTR SCI 510</td>
<td>Nutritional Biochemistry and Metabolism</td>
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<tr>
<td>BIOCHEM 625</td>
<td>Mechanisms of Action of Vitamins and Minerals</td>
<td></td>
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<tr>
<td>BMOLCHEM 504</td>
<td>Human Biochemistry Laboratory</td>
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<tr>
<td>CBE 440</td>
<td>Chemical Engineering Materials</td>
<td></td>
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<tr>
<td>CBE 540</td>
<td>Polymer Science and Technology</td>
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<tr>
<td>CBE 547</td>
<td>Introduction to Colloid and Interface Science</td>
<td></td>
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<tr>
<td>CHEM 346</td>
<td>Intermediate Organic Chemistry Laboratory</td>
<td></td>
</tr>
<tr>
<td>CHEM 524</td>
<td>Chemical Instrumentation</td>
<td>11</td>
</tr>
<tr>
<td>CHEM 681</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>CHEM 682</td>
<td>Senior Honors Thesis</td>
<td></td>
</tr>
<tr>
<td>CHEM 691</td>
<td>Senior Thesis</td>
<td></td>
</tr>
<tr>
<td>CHEM 692</td>
<td>Senior Thesis</td>
<td></td>
</tr>
</tbody>
</table>
RESIDENCE AND QUALITY OF WORK IN THE MAJOR

1. 2.000 GPA in all CHEM and major courses
2. 2.000 GPA in at least 15 upper-level credits in the major in residence. Upper-level work includes CHEM 346, CHEM/ M S & E 421, CHEM 500-699, BIOCHEM 501, BIOCHEM 507, BIOCHEM 508, BIOCHEM/NUTR SCI 510, BIOCHEM 625, BIOCHEM 681/682, BIOCHEM 691/692, BIOCHEM 699, BMOLCHEM 504, CBE 310, CBE 440, CBE 540, CBE 547, CBE 599, and M S & E 330.

15 credits in CHEM, taken at UW–Madison

NOTES
1. MATH 234 and MATH 320 are highly recommended.
2. PHYSICS 207 & PHYSICS 208 is the preferred sequence for chemistry majors, while PHYSICS 201 & PHYSICS 201i is recommended for Engineering students. PHYSICS 247 & PHYSICS 248 is intended for students considering a major in Physics, Astronomy-Physics, or Applied Math, Engineering and Physics.
3. Enrollment in CHEM 115 and CHEM 116 is by invitation only. Entering first-year students are screened on the basis of high school record and placement scores, and additional information is sent to those who might be eligible.
4. Chemistry majors are strongly encouraged to take CHEM 329 or CHEM 116 instead of CHEM 327.
5. CHEM 343 must be taken first, followed by CHEM 345. CHEM 344 may be taken concurrently with or after CHEM 345.
6. CBE 310 is recommended only for students who are also majoring in chemical and biological engineering. M S & E 330 is recommended only for students also majoring in materials science and engineering.
7. It is recommended that CHEM 563 be taken after Physical Chemistry Part I and that CHEM 564 be taken after CHEM 562. Especially strong students needing to complete physical chemistry in two semesters may take CHEM 563 concurrently with CHEM 561 (or CHEM 565) and CHEM 564 concurrently with CHEM 562.
8. One credit from each of CHEM 116 and CHEM 565 count toward the 5 credits. Only 2 of the 3 credits from CHEM 524 count. The other credit from CHEM 524 count toward the additional laboratory work requirement.
9. Due to significant overlap, only one of BIOCHEM 501 Introduction to Biochemistry and BIOCHEM 507 General Biochemistry I may count towards this requirement.
10. BMOLCHEM 504 is not recommended for students who are also majoring in Biochemistry, because it overlaps significantly with required biochemistry coursework. Only 1 of the 3 credits count toward advanced non-laboratory coursework. The remaining 2 credits count towards the additional laboratory work.

Only 1 of the 3 credits from CHEM 524 counts for additional laboratory work requirement. The other 2 credits count toward the advanced non-laboratory coursework.

HONORS IN THE MAJOR

Students may declare Honors in the Chemistry Major in consultation with the chemistry major advisor (https://www.chem.wisc.edu/content/undergraduate-advising). To be admitted to the Honors Program in Chemistry, students must have declared a major in chemistry and achieved a 3.200 overall GPA. They must also have achieved a 3.200 GPA in all CHEM courses taken and courses accepted for the major.

HONORS IN THE CHEMISTRY MAJOR REQUIREMENTS

To earn Honors in the Major in Chemistry, students must satisfy both the requirements for the major (above) and the following additional requirements:

• Earn a 3.300 overall university GPA
• Earn a 3.300 GPA for all CHEM courses and all courses accepted for the major
• Complete an additional 3 credits, for a total of 8 credits, of advanced non-laboratory work. This requirement is met by the same credits and courses that are accepted for “Advanced Non-laboratory Work” in the regular major.
• Complete a two-semester Senior Honors Thesis in CHEM 681 Senior Honors Thesis and CHEM 682 Senior Honors Thesis, for a total of 6 credits.

UNIVERSITY DEGREE REQUIREMENTS

Total Degree
To receive a bachelor’s degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

Residency
Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. “In residence” means on the UW–Madison campus with an undergraduate degree classification. “In residence” credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

Quality of Work
Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

LEARNING OUTCOMES

1. Identify, formulate and solve integrative problems using appropriate information and approaches.
2. Demonstrate an understanding of basic chemical transformations, including the ability to predict chemical reactivity and properties.
3. Recognize the relationship between structure, bonding and the properties of molecules and materials.
4. Model chemical systems and experimental data using relevant quantitative, mathematical and computational methods.
5. Design, conduct and analyze experiments safely and successfully.
6. Locate, evaluate and use information in the chemical literature.
7. Communicate chemical knowledge effectively through written reports, oral presentations and visual aids.
8. Work collaboratively with others, both chemists and those from other disciplines, to solve problems and create new knowledge.
9. Recognize how chemistry relates to contemporary issues in our society.
10. Understand professional and ethical responsibility.

**FOUR-YEAR PLAN**

The Sample Four-Year Plan is a tool to assist you and your advisor(s). Use it along with your DARS report and the Course Guide. You will make your own Four-Year Plan based on your placement scores, incoming credits, and individual interests. As you become involved in athletics, honors, research, student organizations, study abroad, volunteer experiences, and/or work, you might adjust the order of your courses to make room for these experiences. You will likely revise your 4-year plan several times during college.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 109 or 103¹</td>
<td>1-2</td>
<td>3-5</td>
</tr>
<tr>
<td>MATH 221</td>
<td>5</td>
<td>CHEM 104 (if needed)²</td>
</tr>
<tr>
<td>Communications A (complete during first year)</td>
<td>3</td>
<td>MATH 222</td>
</tr>
<tr>
<td>Foreign Language (if required)</td>
<td>4</td>
<td>Ethnic Studies</td>
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<td>L&amp;S Breadth</td>
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<tr>
<td><strong>Total Credits</strong></td>
<td>16-17</td>
<td>14-16</td>
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<thead>
<tr>
<th>Second Year</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
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</tr>
<tr>
<td>CHEM 343³</td>
<td>3</td>
<td>CHEM 345</td>
</tr>
<tr>
<td>PHYSICS 207</td>
<td>5</td>
<td>CHEM 344</td>
</tr>
<tr>
<td>L&amp;S Breadth</td>
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<td>PHYSICS 208</td>
</tr>
<tr>
<td>Communications B (consult with advisor about timing)³</td>
<td>3-4</td>
<td>Research (optional)⁵</td>
</tr>
<tr>
<td>L&amp;S Breadth</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>15</td>
<td>15</td>
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<table>
<thead>
<tr>
<th>Third Year</th>
<th>Credits</th>
<th>Spring</th>
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<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
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<tr>
<td>CHEM 329⁶</td>
<td>1-3</td>
<td>4</td>
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<tr>
<td>MATH 234 (recommended, but not required)</td>
<td>4</td>
<td>CHEM 311</td>
</tr>
<tr>
<td>Research (optional)⁵</td>
<td>1-3</td>
<td>Advanced Non-laboratory Coursework⁸</td>
</tr>
<tr>
<td>L&amp;S Breadth</td>
<td>3</td>
<td>Research (optional)⁵</td>
</tr>
<tr>
<td><strong>Total Credits</strong></td>
<td>13-15</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fourth Year</th>
<th>Credits</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 562</td>
<td>3</td>
<td>CHEM 564</td>
</tr>
<tr>
<td>CHEM 563</td>
<td>1-2</td>
<td>Research or other Additional Lab Work¹⁰</td>
</tr>
<tr>
<td>Research or other Additional Lab Work⁹</td>
<td>1-3</td>
<td>Advanced Non-laboratory Coursework (if needed)</td>
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<td>L&amp;S Breadth</td>
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<tr>
<td>L&amp;S Breadth</td>
<td>3</td>
<td>L&amp;S Breadth</td>
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<tr>
<td>L&amp;S Breadth</td>
<td>3</td>
<td>Elective¹¹</td>
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<tr>
<td><strong>Total Credits</strong></td>
<td>16</td>
<td>15</td>
</tr>
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</table>

Total Credits 120-125

¹ CHEM 103 General Chemistry I/CHEM 104 General Chemistry II is a two-semester sequence in General Chemistry. Students with a strong high school chemistry background (usually two years) and placement into at least first semester calculus are eligible for CHEM 109 Advanced General Chemistry. CHEM 109 is an advanced, fast-paced option that covers General Chemistry in one semester. CHEM 109 is offered only in the fall semesters and an honors level section is available. An additional option is the CHEM 115 Chemical Principles I/CHEM 116 Chemical Principles II sequence, which is a small honors sequence for exceptionally well-prepared students. Enrollment in this sequence is by invitation only, and the two courses cover both general and analytical chemistry.

² Students who took CHEM 109 in their first semester will not need CHEM 104. Instead, they may proceed to the next level of chemistry courses sooner by taking CHEM 311 Chemistry Across the Periodic Table or CHEM 329 Fundamentals of Analytical Science or CHEM 343 Introductory Organic Chemistry in the second semester of their first year. In this case, some subsequent chemistry courses may also be taken sooner than shown in this plan.

³ Students must declare a major by the time they reach 86 credits. Students interested in chemistry may declare the major after taking CHEM 103 or CHEM 104 General Chemistry I. CHEM 104 is an advanced, fast-paced option that covers General Chemistry in one semester. CHEM 104 is required for the chemistry major, while CHEM 103 does not satisfy additional lab credits required for the major, while CHEM 699 does. Alternatively, research may be conducted as a volunteer or for pay. Students must search for and be accepted into a research group before beginning research.

⁴ According to L&S policy, students must complete at least 60 credits at the intermediate or advanced level.

⁵ Options include CHEM 561 Physical Chemistry, CHEM 565 Biophysical Chemistry, and CBE 310 Chemical Process Thermodynamics (only for students also majoring in Chemical & Biological Engineering).
Five advanced non-laboratory credits are required for the major. Please see the Requirements tab in the Guide for a list of courses that count towards this requirement.

Three credits of additional lab work are required for the major. These credits can be satisfied by research (CHEM 699, for example) or by courses. Please see the Requirements tab in the Guide for a complete list of options. CHEM 346 is one option, and when taken for 2 credits also satisfies Comm-B. CHEM 346 is ONLY offered in FALL semester, with most students taking it in their fourth year. Students not planning to take CHEM 346 should plan to take their Comm-B earlier through one of their other required breadth courses.

CHEM 524 Chemical Instrumentation is an option that is only offered in the spring semesters. CHEM 524 (3 credits) satisfies 1 additional lab work credit and 2 advanced non-laboratory credits.

Please refer to the Requirements tab for additional College of Letters & Science Breadth and Degree requirements as well as Residence and Quality of Work requirements for the major.

ADVISORY AND CAREERS

ADVISING

The chemistry advisor (http://www.chem.wisc.edu/content/undergraduate-advising) provides advising for chemistry majors and prospective chemistry majors. Both appointments and drop-in hours are available. See Undergraduate Advising (https://www.chem.wisc.edu/content/undergraduate-advising) on the Chemistry website for more details.

Chemistry majors interested in getting involved in research should explore the undergraduate research (https://undergradresearch.chem.wisc.edu) pages on the chemistry website. Students needing additional information may contact the undergraduate research director by email (chem_ugr_research@chem.wisc.edu).

Students with enrollment and course access questions should first visit our enrollment inquiries (http://www.chem.wisc.edu/content/enrollment-inquiries) web page. If further assistance is needed, students may visit the Undergraduate Chemistry Office (room 1328 Chemistry) during normal business hours, email (undergrad@chem.wisc.edu), or call 608-263-2424.

CAREER SERVICES

The chemistry major prepares graduates for a wide variety of careers in the chemical and related industries (e.g., consumer and agricultural products, materials, energy, petroleum, paper, and food), as well as environmental, pharmaceutical, and other health-related sciences. Combined with a master's program in secondary education, the major qualifies the student to teach chemistry in secondary schools. The major prepares students for graduate-level work in chemistry, chemical physics, biochemistry, biophysics, materials chemistry, and other related fields. Students who excel in undergraduate chemistry coursework are able to obtain funding for graduate studies in chemistry and related sciences through teaching or research assistantships and fellowships. Some chemistry major graduates go on to professional schools to study medicine, pharmacy, dentistry, veterinary medicine, business, or law.

Students are encouraged to begin their career planning early and to take advantage of the numerous resources offered by SuccessWorks (https://careers.ls.wisc.edu) at the College of Letters & Science (see below). Information about careers, internships, resumes, cover letters, job search strategies, interviewing, and graduate school preparation are all available through SuccessWorks. Students can also register for Handshake (https://wisc.joinhandshake.com/login), an online resource for students to make connections with potential employers. Current career, research, and internship opportunities of specific interest to chemistry students can be found on the Career Services (http://www.chem.wisc.edu/content/career-services) pages of the chemistry website.

L&S CAREER RESOURCES

SuccessWorks at the College of Letters & Science helps students leverage the academic skills learned in their major, certificates, and liberal arts degree; explore and try out different career paths; participate in internships; prepare for the job search and/or graduate school applications; and network with professionals in the field (alumni and employers). In short, SuccessWorks helps students in the College of Letters & Science discover themselves, find opportunities, and develop the skills they need for success after graduation.

SuccessWorks can also assist students in career advising, résumé and cover letter writing, networking opportunities, and interview skills, as well as course offerings for undergraduates to begin their career exploration early in their undergraduate career.

Students should set up their profiles in Handshake (https://careers.ls.wisc.edu/handshake) to take care of everything they need to explore career events, manage their campus interviews, and apply to jobs and internships from 200,000+ employers around the country.

- SuccessWorks (https://careers.ls.wisc.edu)
- Set up a career advising appointment (https://careers.ls.wisc.edu/make-an-appointment)
- INTER-LS 210 L&S Career Development: Taking Initiative (1 credit, targeted to first- and second-year students)—for more information, see Inter-LS 210: Career Development, Taking Initiative (https://careers.ls.wisc.edu/inter-ls-210-career-development-taking-initiative)
- INTER-LS 215 Communicating About Careers (3 credits, fulfills Com B General Education Requirement)
- Handshake (https://careers.ls.wisc.edu/handshake)
- Learn how we’re transforming career preparation: L&S Career Initiative (http://ls.wisc.edu/lsci)

PEOPLE

PROFESSORS

Berry, John
Bertram, Timothy
Blackwell, Helen
Brunold, Thomas
Burke, Steven (associate chair for graduate program)
Burstyn, Judith (chair)
Cavagnero, Silvia
Choi, Kyoung-Shin
Coon, Joshua
Ediger, Mark
Fredrickson, Daniel
Gellman, Samuel
Hamers, Robert
Hermans, Ije
Jin, Song
Landis, Clark (associate chair for undergraduate program)
McMahon, Robert
Moore, John
Nathanson, Gilbert
Record, Thomas
Schmidt, Jordan
Schwartz, David
Shakhashiri, Bassam
Sibert, Edwin
Smith, Lloyd
Stahl, Shannon
Weisshaar, James (associate chair for research)
Weix, Daniel
Woods, Claude
Wright, John
Yethiraj, Arun
Yoon, Tehshik
Zanni, Martin

ASSOCIATE PROFESSORS
Boydston, Andrew
Garand, Etienne
Goldsmith, Randall

ASSISTANT PROFESSORS
Buller, Andrew
Martell, Jeffrey
Pazicni, Samuel
Stowe, Ryan
Wang, Tina
Wickens, Zachary
Yang, Yang

AFFILIATED PROFESSORS
Feng, Dawei (Assistant Professor of Materials Science and Engineering)
Forest, Katrina (Professor of Bacteriology)
Ge, Ying (Professor of Cell and Regenerative Biology)
Gilbert, Pupa (Professor of Physics)
Golden, Jennifer (Assistant Professor of Pharmacy)
Gopaln, Padma (Professor of Materials Science and Engineering)
Hoskins, Aaron (Associate Professor of Biochemistry)
Kuech, Thomas (Professor of Chemical and Biological Engineering)
Li, Lingjun (Professor of Pharmacy)
Lynn, David (Professor of Chemical and Biological Engineering)
Mecozi, Sandro (Professor of Pharmacy)
Middlecamp, Catherine (Professor, Nelson Institute for Environmental Studies)
Pedersen, Joel (Professor of Soil Science)
Tang, Weiping (Professor of Pharmacy)
Yu, Lian (Professor of Pharmacy)

INSTRUCTIONAL STAFF
Bain, Rachel (Senior Instructional Technology Specialist)
Block, Stephen (Lecturer and General Chemistry Assistant Laboratory Director)
Bowman, Matthew (Senior Lecturer)
Doolittle, Pamela (Analytical Chemistry Laboratory Director)
Ellison, Aubrey (Lecturer and Organic Chemistry Assistant Laboratory Director)
Esselman, Brian (Lecturer and Organic Chemistry Assistant Laboratory Director)
Gustin, Léa (Lecturer and General Chemistry Assistant Laboratory Director)
Hill, Nicholas (Organic Chemistry Laboratory Director)
Hooker, Paul (Senior Lecturer)
Lamont, Liana (General Chemistry Lecturer and Instructional Coordinator)
Maynard, James (Lecture Demonstrator)
McClain, Robert (Analytical Chemistry Laboratory Director)
Stoll, Lindy (General Chemistry Curriculum Coordinator)
Tatarsky, Amy (Faculty Assistant)
Wendt, Mark (Physical Chemistry Laboratory Director)
Wilkinson, Chad (General Chemistry Laboratory Director)
Zelewski, Linda (Senior Lecturer)
Zhou, Jia (Faculty Assistant)

CHEMISTRY LEARNING CENTER
Dang, Allice (Assistant Faculty Associate)
Jetzer, Kelly (Instructional Specialist)
Jacob, Anthony (Director)
Laboy, José (Faculty Associate)
Lee, Agnes (Faculty Associate)
Ramey, Shea (Faculty Associate)
Reitz, Tracey (Assistant Faculty Associate)
Toland, David (Associate Faculty Associate)
Zavala, Yashira (Assistant Faculty Associate)

STUDENT SERVICES AND ADVISING
Barta, Cheri (Undergraduate Research Director)
Hamers, Jeanne (Undergraduate Chemistry Director)
McCullough, Katie (Student Services Coordinator)

WISCONSIN EXPERIENCE

RESEARCH
There are many research opportunities for undergraduates in the Department of Chemistry. When conducting research, students will have the opportunity to work alongside world-class faculty, staff, and graduate students to gain hands-on research experiences that will supplement their liberal arts education and prepare students for future careers. We have researchers involved in all the core areas of chemistry: analytical, chemical biology, chemical education, inorganic, materials, organic, physical, and theoretical. Many of our researchers conduct research across disciplines, including medicine, pharmacy, biology, engineering, energy, environmental sciences, and physics. Although preference is given to chemistry majors in good academic standing, any student interested in conducting chemistry research can seek out opportunities in our department. Students have the option of volunteering in a research lab or conducting research for course credit by enrolling in CHEM 299 Directed Study, CHEM 699 Directed Study, CHEM 681/CHM 682 Senior Honors Thesis, or CHEM 691/CHM 692 Senior Thesis. Students can also gain research experiences through the elective courses CHEM 260 Entering Research I, CHEM 261 Entering Research II, and CHEM 346 Intermediate Organic Chemistry Laboratory, as well as the required course CHEM 329 Fundamentals of Analytical Science. In some cases, experienced undergraduates may be paid to conduct research. For additional information about undergraduate research, including how to get involved, please visit the department's Undergraduate Research (https://www.chem.wisc.edu/content/research-overview) page.
STUDENT ORGANIZATIONS

A number of student organizations are available for students interested in the chemical sciences.

- The American Chemical Society (ACS) Student Chapter (https://win.wisc.edu/organization/acs) facilitates opportunities for students in the chemical sciences to promote the learning and advancement of chemistry. The chapter supports students in their academic development, professional development, and research pursuits.
- Alpha Chi Sigma (AXE) (https://alphachisigmauw.wordpress.com) is a national, co-ed, professional chemistry organization that was founded at UW-Madison in 1902. The UW-Madison chapter has an active membership of about 40 students, both graduate and undergraduate. The organization also has two houses, at 619 and 621 North Lake Street, which house nearly half of the members. The houses are the primary locations for events like tutoring, chapter dinners, meetings, and social events.
- Students Participating in Chemical Education (SPICE) (http://ice.chem.wisc.edu/outreach/spice) trains undergraduates to perform chemistry demonstrations in order to interest elementary and middle school students in chemistry and science via cool experiments, hands-on activities, and exploration stations at public venues.
- The UW–Madison student chapter of NOBCChE (https://win.wisc.edu/organization/NOBCCHE) (National Organization for the Professional Advancement of Black Chemists and Chemical Engineers) seeks to encourage students of color to pursue graduate and professional degrees in chemistry, chemical engineering, and other chemistry-related fields. Members participate in professional development through national conference presentations, networking, and community service activities.
- SACNAS (http://uwmadisonsacnas.weebly.com) (the Society for the Advancement of Hispanics/Chicanos and Native Americans) is a society of scientists dedicated to fostering the success of Hispanic/Chicano and Native American scientists—from college students to professionals—to attain advanced degrees, careers, and positions of leadership in science.

CERTIFICATION/LICENSURE

ACS CERTIFIED DEGREE

The UW–Madison Department of Chemistry is approved by the American Chemical Society (ACS) to certify the degrees of graduating students who have completed the curriculum and professional training recommended by ACS for chemistry bachelor's degree graduates. Certification indicates that the student has completed rigorous course work that provides them with the skills needed for a successful career in science.

Students graduating with the chemistry major from UW–Madison already meet most of the requirements for ACS certification. They can obtain the certification by electing to take specific courses that satisfy both the requirements of the major and the ACS guidelines. Additional requirements for certification are:

- A course in biochemistry, satisfied by BIOCHEM 501 Introduction to Biochemistry or BIOCHEM 507 General Biochemistry I (3 credits)
- At least 400 total laboratory hours, which can be satisfied by the combination of all the required core laboratory courses (in organic, inorganic, analytical and physical chemistry) plus two to three laboratory credits from any combination of CHEM 346 Intermediate Organic Chemistry Laboratory, CHEM 524 Chemical Instrumentation (3 credit course, but only one credit is a lab credit), CHEM 681/CHEM 682 Senior Honors Thesis, CHEM 691/ CHEM 692 Senior Thesis or BMOLCHEM 504 Human Biochemistry Laboratory. The exact number of lab credits required from these courses depends on how the student has satisfied the core lab requirements. Please consult the Chemistry Major Advisor (https://www.chem.wisc.edu/content/undergraduate-advising) for more details.

The biochemistry course satisfies three of the five credits of advanced work required for the chemistry major, while two credits from CHEM 524 also count towards the advanced work. CHEM 346, 1 credit of CHEM 524, CHEM 681/CHEM 682, CHEM 691/CHEM 692 and BMOLCHEM 504 all count towards the three additional lab credits required for the major.

Note that neither CHEM 299 Directed Study nor CHEM 699 Directed Study can be used to satisfy the lab hours needed for ACS certification. However, CHEM 699 can be used to satisfy additional lab credits needed for the chemistry major.

RESOURCES AND SCHOLARSHIPS

ACADEMIC RESOURCES

A number of resources are available to students seeking assistance with their chemistry courses. Students are strongly encouraged to attend the office hours of the instructors for the course.

The Chemistry Learning Center (CLC) (http://www.chem.wisc.edu/areas/clc/mission.htm) supports students in introductory chemistry courses (CHEM 103, CHEM 104, and CHEM 108) and in some sections of organic chemistry. The center welcomes as many students as possible but unfortunately does not have sufficient resources to support all students seeking help. The center is funded to work with specific groups of students, such as first-generation low-income students, underrepresented students, students on academic probation, students with disabilities, students who have trouble understanding English, new transfer students, recently returning veterans, and students at-risk of failing the course. These are general guidelines and the center considers each student seeking assistance on a case-by-case basis, taking into account available program space. Program eligibility is usually determined by an interview with a staff member.

Further assistance may be sought from various tutoring services on campus, including the Greater University Tutoring Services (GUTS) (http://www.guts.wisc.edu), University Housing Tutoring (http://www.housing.wisc.edu/residencehalls-academics-tutoring.htm), and the College of Engineering Undergraduate Learning Center (ULC) (https://www.engr.wisc.edu/academics/student-services/ulc). Alpha Chi Sigma (AXE) (https://win.wisc.edu/organization/axsigma) is a co-ed professional chemistry fraternity that also offers tutoring. For students seeking more individualized tutoring, the Department of Chemistry maintains a list of private tutors (https://www.chem.wisc.edu/content/tutors) available for hire.

SCHOLARSHIPS

Through the generosity of alumni and other friends of the department, the Department of Chemistry is able to offer scholarships and summer research support. In 2018, the department awarded over 40 undergraduate scholarships and awards that totaled almost $135,000.
Any student who is a chemistry major or is conducting research with a chemistry faculty member is eligible to apply for the scholarships. An overall GPA of at least 3.000 is required for application; awards are based on both merit and financial need. Students may apply for academic year scholarships and/or summer research support. Learn more about chemistry scholarships (https://www.chem.wisc.edu/content/chemistry-scholarships) and how to apply.