

# Chemistry B.A. or B.S.

## Chemistry B.A. Major

The B.A. Chemistry major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

This program provides experience in all basic areas of chemistry. With appropriate choice of university electives, the B.A. Chemistry major meets the needs of pre-medical students and students preparing for additional study in related areas such as biochemistry, industrial hygiene, pharmacology and medicinal chemistry, clinical chemistry, and toxicology. It is also suitable for students who wish to combine a chemistry major with a major in another discipline.

### Required

Mathematics:		
MATH 1420	Calculus I *	4
MATH 1421	Calculus II	4
Chemistry and Biochemistry:		
CHEM 1110 & CHEM 1120 or CHEM 1130	General Chemistry I and General Chemistry II (*) General Chemistry I-II	5-8
CHEM 1610	Careers In Chemistry	1
CHEM 2010	Chemical Safety Seminar	1
CHEM 2110	Descriptive Inorganic Chemistry	4
CHEM 2210	Organic Chemistry I	3
CHEM 2220	Organic Chemistry II	3
CHEM 2230	Organic Chemistry Laboratory	2
CHEM 2320	Chemical Analysis	3
CHEM 2330	Chemical Analysis Laboratory	2
CHEM 4310/5310	Instrumental Analysis	3
CHEM 4420/5420	Physical Chemistry I	3
CHEM 4430/5430	Physical Chemistry II	3
Elective: 3000/4000 level Chemistry course		1-3
Physics:		
Select one of the following:		
PHYSICS 1511 & PHYSICS 1512 or PHYSICS 1701 & PHYSICS 1702	General Physics I and General Physics II Physics I for Science and Engineering and Physics II for Science and Engineering	8
<b>Total Hours</b>		<b>50-55</b>

\* Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

## Chemistry B.S. Major

The B.S. Chemistry major requires a minimum of 120 total hours to graduate. This total includes UNIFI/General Education requirements and the following specified major requirements, plus electives to complete the minimum of 120 hours.

The Bachelor of Science Chemistry major is accredited by the American Chemical Society. This program is recommended for students who wish to prepare for careers as professional chemists. It also provides the most complete preparation for post-graduate study in the field of chemistry.

### Required

Mathematics:		
MATH 1420	Calculus I *	4
MATH 1421	Calculus II	4
Chemistry and Biochemistry:		
CHEM 1110 & CHEM 1120 or CHEM 1130	General Chemistry I and General Chemistry II (*) General Chemistry I-II	5-8
CHEM 1610	Careers In Chemistry	1
CHEM 2010	Chemical Safety Seminar	1
CHEM 2110	Descriptive Inorganic Chemistry	4
CHEM 2210	Organic Chemistry I	3
CHEM 2220	Organic Chemistry II	3
CHEM 2230	Organic Chemistry Laboratory	2
CHEM 2320	Chemical Analysis	3
CHEM 2330	Chemical Analysis Laboratory	2
CHEM 3600	Undergraduate Research in Chemistry @	2
CHEM 4110/5110	Inorganic Chemistry	3
CHEM 4310/5310	Instrumental Analysis	3
CHEM 4420/5420	Physical Chemistry I	3
CHEM 4430/5430	Physical Chemistry II	3
CHEM 4440/5440	Physical Chemistry Laboratory	2
CHEM 4510/5510	Biochemistry I	3
Physics:		
PHYSICS 1701 & PHYSICS 1702 or PHYSICS 1512 & PHYSICS 1511	Physics I for Science and Engineering and Physics II for Science and Engineering General Physics II and General Physics I	8
<b>Elective</b>		<b>3</b>
A 3000-level or higher chemistry content course.		
<b>Total Hours</b>		<b>62-65</b>

\* Has prerequisite of satisfactory score on ALEKS exam or subsequent remediation.

## Chemistry B.A. or B.S.

@This course meets the Bachelor of Science degree undergraduate research course requirement.

### Notes:

- To satisfy American Chemical Society guidelines for certification of the Chemistry major, the two hours of CHEM 3600 Undergraduate Research required for this program must include completion of a final written report.
- The elective course should be chosen with the help of the major advisor. This is particularly important for students wishing to earn a certified degree, to assure consistency with the certification guidelines of the American Chemical Society. An appropriate advanced course in another science may be substituted with department head approval.
- Students wishing to earn a non-certified Bachelor of Science degree may omit CHEM 4110/5110, and CHEM 4510/5510, but must include six additional elective hours in chemistry at the 4000-level or higher.

## Honors Research

This emphasis is available to qualified students pursuing the Bachelor of Science program by invitation at the beginning of their junior year. Completion of Honors Research requires 5 credit hours in CHEM 3600 Undergraduate Research and the writing of a senior research thesis. The research credit may be applied to the elective hours of the B.S. degree.

## Four-Year Plan Chemistry, B.A.

This is a sample plan of study with a suggested sequencing of classes for the major. University electives may be applied to earn additional academic majors, minors, or certificates. Students should regularly meet with their academic advisor to plan their specific semester schedule to include UNIFI/General Education program and/or university elective hours required.

Course	Title	Hour
<b>Freshman</b>		
<b>Fall</b>		
CHEM 1110	General Chemistry I	4
MATH 1140	Precalculus	4
UNIFI/General Education or University Electives		6
<b>Hours</b>		<b>14</b>
<b>Spring</b>		
CHEM 1120	General Chemistry II	4
MATH 1420	Calculus I	4
UNIFI/General Education or University Electives		6
<b>Hours</b>		<b>14</b>
<b>Sophomore</b>		
<b>Fall</b>		
CHEM 2210	Organic Chemistry I	3
CHEM 2320	Chemical Analysis	3
CHEM 2330	Chemical Analysis Laboratory	2
MATH 1421	Calculus II	4
PHYSICS 1701	Physics I for Science and Engineering	4
<b>Hours</b>		<b>16</b>

<b>Spring</b>		
CHEM 2010	Chemical Safety Seminar	1
CHEM 2110	Descriptive Inorganic Chemistry	4
CHEM 2220	Organic Chemistry II	3
CHEM 2230	Organic Chemistry Laboratory	2
PHYSICS 1702	Physics II for Science and Engineering	4
UNIFI/General Education or University Electives		3
<b>Hours</b>		<b>17</b>
<b>Junior</b>		
<b>Fall</b>		
CHEM 4420/5420	Physical Chemistry I	3
UNIFI/General Education or University Electives		12
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
CHEM 4430/5430	Physical Chemistry II	3
UNIFI/General Education or University Electives		12
<b>Hours</b>		<b>15</b>
<b>Senior</b>		
<b>Fall</b>		
CHEM 4310/5310	Instrumental Analysis	3
UNIFI/General Education or University Electives		11
<b>Hours</b>		<b>14</b>
<b>Spring</b>		
UNIFI/General Education or University Electives		15
<b>Hours</b>		<b>15</b>
<b>Total Hours</b>		<b>120</b>

## Chemistry, B.S.

This is a sample plan of study with a suggested sequencing of classes for the major. University electives may be applied to earn additional academic majors, minors, or certificates. Students should regularly meet with their academic advisor to plan their specific semester schedule to include UNIFI/General Education program and/or university elective hours required.

Course	Title	Hour
<b>Freshman</b>		
<b>Fall</b>		
CHEM 1110	General Chemistry I	4
MATH 1420	Calculus I	4
UNIFI/General Education or University Electives		6
<b>Hours</b>		<b>14</b>
<b>Spring</b>		
CHEM 1120	General Chemistry II	4
MATH 1421	Calculus II	4
UNIFI/General Education or University Electives		6
<b>Hours</b>		<b>14</b>
<b>Sophomore</b>		
<b>Fall</b>		
CHEM 2210	Organic Chemistry I	3
CHEM 2320	Chemical Analysis	3
CHEM 2330	Chemical Analysis Laboratory	2
PHYSICS 1701	Physics I for Science and Engineering	4
UNIFI/General Education or University Electives		3
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
CHEM 2010	Chemical Safety Seminar	1

CHEM 2110	Descriptive Inorganic Chemistry	4
CHEM 2220	Organic Chemistry II	3
CHEM 2230	Organic Chemistry Laboratory	2
PHYSICS 1702	Physics II for Science and Engineering	4
UNIFI/General Education or University Electives		3
<b>Hours</b>		<b>17</b>
<b>Junior</b>		
<b>Fall</b>		
CHEM 4310/5310	Instrumental Analysis	3
CHEM 4420/5420	Physical Chemistry I	3
CHEM 4510/5510	Biochemistry I	3
UNIFI/General Education or University Electives		6
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
CHEM 4110/5110	Inorganic Chemistry	3
CHEM 4430/5430	Physical Chemistry II	3
CHEM 4440/5440	Physical Chemistry Laboratory	2
UNIFI/General Education or University Electives		7
<b>Hours</b>		<b>15</b>
<b>Senior</b>		
<b>Fall</b>		
CHEM 3600	Undergraduate Research in Chemistry	1
CHEM 4610/5610	Advanced Synthesis Laboratory	2
UNIFI/General Education or University Electives		12
<b>Hours</b>		<b>15</b>
<b>Spring</b>		
CHEM 3600	Undergraduate Research in Chemistry	1
Chemistry Elective (3000/4000 level)		3
UNIFI/General Education or University Electives		11
<b>Hours</b>		<b>15</b>
<b>Total Hours</b>		<b>120</b>

## Learning Outcomes

### Chemistry, B.A.

#### University Goal: Communication

- **Program Goal 1:** Students will be able to effectively communicate chemical information to colleagues and the public.
  - **Outcome 1:** Students will be able to prepare and produce scientific written communications using standard chemistry style and format.
  - **Outcome 2:** Students will be able to prepare and deliver an oral presentation on chemical topics.

#### University Goal: Content Knowledge

- **Program Goal 2:** Students will apply chemical knowledge.
  - **Outcome 3:** Students will demonstrate proficient knowledge and application of chemistry content.

#### University Goal: Critical Thinking

- **Program Goal 3:** Students will be able to think critically about chemistry.
  - **Outcome 4:** Students will be able to plan the collection of the data needed to test a hypothesis in chemistry.

- **Program Goal 4:** Students will demonstrate the skills needed to successfully conduct experiments and analyze data.
  - **Outcome 5:** Students will conduct experimental measurements and evaluate the accuracy and reliability of data.

## Chemistry, B.S.

#### University Goal: Communication

- **Program Goal 1:** Students will be able to effectively communicate chemical information to colleagues and the public.
  - **Outcome 1:** Students will be able to prepare and produce scientific written communications using standard chemistry style and format.
  - **Outcome 2:** Students will be able to prepare and deliver an oral presentation on chemical topics.

#### University Goal: Content Knowledge

- **Program Goal 2:** Students will apply chemical knowledge.
  - **Outcome 3:** Students will demonstrate proficient knowledge and application of chemistry content.

#### University Goal: Critical Thinking

- **Program Goal 3:** Students will be able to think critically about chemistry.
  - **Outcome 4:** Students will be able to plan the collection of the data needed to test a hypothesis in chemistry.
- **Program Goal 4:** Students will demonstrate the skills needed to successfully conduct experiments and analyze data.
  - **Outcome 5:** Students will conduct experimental measurements and evaluate the accuracy and reliability of data.

## Policies

1. Students considering a baccalaureate chemistry major should complete two semesters of general chemistry, CHEM 1110 and CHEM 1120, in the freshman year. Well-prepared students may be permitted to take CHEM 1130, an accelerated course in general chemistry, during their first semester. It is strongly recommended that chemistry majors complete requirements in mathematics and physics within the first two years.
2. Prior to enrollment in a chemistry course, all pre-requisite courses must be completed with a grade of C- or higher.
3. A student enrolled in a chemistry course during fall or spring semester and who wishes to enroll in the same course in the subsequent spring or fall semester should contact the department. The student will be allowed to register only if space remains after all advance registrations are completed.
4. A student cannot declare a Chemistry minor if they are pursuing any B.A. or B.S. major in the Department of Chemistry and Biochemistry. Two majors cannot be earned within the department except for the combination of the B.A. Chemistry Teaching major and either the B.S. Chemistry or the B.S. Biochemistry major.

## Related Programs

- Biology B.A. or B.S.
- Biology Minor