Major in Chemistry

Chemistry is a physical science with far-reaching applications that touch virtually every aspect of our day-to-day existence. The Department of Chemistry offers an ACS-certified Bachelor's of Science degree in Chemistry with two major concentrations to choose from. An accelerated B.S./M.S. concentration is also offered for students interested in obtaining a master's degree. Each concentration requires core courses in chemistry along with courses in calculus and physics.

The Biochemistry Concentration requires courses in general biology, cell biology, and biochemistry in addition to the core chemistry courses. The biochemical training that students receive will prepare them to enter professional degree programs such as medicine, dentistry, pharmacy, nursing, and other health fields. The Biochemistry Concentration is also recommended for students who want to obtain graduate degrees in biochemistry, or work in the biomedical industry.

The Chemistry Concentration gives students a strong foundation in organic, analytical, inorganic, and physical chemistry. Hands-on laboratory and research skills are emphasized. This concentration is recommended for students who want to have careers in chemical industry and those who plan to enter a chemistry M.S. or Ph.D. program.

The Accelerated Concentration of the Chemistry major provides a pathway for qualified students to move seamlessly into the M.S. in Chemistry graduate program while sharing up to 12 credits between the two.

The undergraduate curriculum prepares students to succeed in graduate programs and professional schools, or to enter careers in chemical industry. Our majors have been accepted at many prestigious institutions for advanced degrees, or are quickly placed in the workforce after graduation. The Department of Chemistry is proud of the success of all of our graduates and strives to continue designing new coursework and programs to help NEIU students achieve their educational and career goals.

To apply to the Accelerated Concentration of the Chemistry major, students must have a cumulative GPA of at least 3.0 and have earned at least 60 credit hours toward their bachelor's degree; at least 12 of those credit hours must have been earned at NEIU. In addition, students must complete the online application for the M.S. in Chemistry graduate program and meet all admission requirements for that program. Accepted students may begin the graduate-level shared coursework once they have earned 72 undergraduate credits, at least 12 of which were at NEIU.

University Core Curriculum Requirements

General Education Distribution Area	Cr. Hrs.
Fine Arts (FA)* 2 courses, from at least two of the following areas of study: Art, CMT (Mass Media or Theatre), Music (includes Dance).	6
Humanities (HU)* 3 courses, from at least two of the following areas of study: CMT (Communication), English, Linguistics. Philosophy, Women's and Gender Studies, World Languages and Cultures, (Note: No more than two foreign language courses may be used to fulfill this requirement.)	9
Behavioral/Social Sciences (SB)* 3 courses, from at least two of the following areas of study: African & African American Studies, Anthropology, Computer Science, Economics, Geography & Environmental Studies, History, Justice Studies, Latino & Latin American Studies, Political Science, Psychology, Sociology, Social Work	9
Natural Sciences (NS and NSL)** 3 courses, from at least two of the following areas of study; one course must have a laboratory component (NSL): Biology, Chemistry, Earth Science, Environmental Science, Physics (Note: If an FYE ANTH that counts as Natural Science is taken, only one Biology course may be used for Natural Science).	9
Engaged Learning Experiences Students must complete, at Northeastern, three courses designated as Engaged Learning Experiences courses. One of the Engaged Learning Experiences courses must be at the 300-level, and one Engaged Learning Experiences course must be designated as "Boundary Crossing".	

Discipline Specific (ELE-DS)
These courses have pre-requisites that are specific courses within a program of study. Discipline Specific courses give students a deeper understanding of how knowledge is created and applied in their field.

Boundary Crossing (ELE-X)
These are courses that cross disciplinary boundaries and/or cross boundaries through engagements outside the classroom or University allowing students to see how knowledge gained in one field might inform other fields or other aspects of society.

Math/Quantitative Reasoning (MA)
1 Math course, that has intermediate Algebra as prerequisite OR is a course listed on the General Education Distributive Learning List of Approved Courses. Any 3 hour college level math course, beyond Intermediate Algebra, meets this requirement.

* Majors in Fine Arts, Humanities or Social/Behavioral Sciences, may waive up to 6 credit hours of General Education requirements in the corresponding distribution area.

** Majors in Natural Sciences may waive up to 9 credit hours of General Education requirements in the Natural Sciences distribution area.

Students should also be aware of all other university requirements to obtain a degree - NEIU requirements (http://catalog.neiu.edu/graduation-requirements/bachelors-degree/)

MAJOR IN CHEMISTRY FOR THE BACHELOR OF SCIENCE DEGREE

Chemistry Concentration

Code	Title	Hours
Required Courses (42 cr.)		
CHEM-211	General Chemistry I [1]	5
CHEM-212	General Chemistry II [1]	4
CHEM-213	Writing Intensive Program: Quantitative Analysis	5
CHEM-231	Organic Chemistry I [2]	4
CHEM-232	Organic Chemistry II [2]	4
CHEM-311	Physical Chemistry I [3]	4
CHEM-312	Physical Chemistry II [3]	4
CHEM-316	Inorganic Chemistry	4
CHEM-330	Instrumental Analysis: Spectroscopy	5
or CHEM-331	Instrumental Analysis: Quantitative Methods	
CHEM-391	Chemistry Capstone Seminar	3
Select two electives from the following:		**6-8**
CHEM-319	Chemical Aspects Of Environmental Chemistry	
CHEM-320	Industrial Aspects Of Environmental Chemistry	
CHEM-321	Environmental Chemistry In The City	
CHEM-330	Instrumental Analysis: Spectroscopy [4]	
CHEM-331	Instrumental Analysis: Quantitative Methods [4]	
CHEM-333	Introduction To Polymer Chemistry	
CHEM-347	Advanced Organic Chemistry: Polyfunctional Compounds	
CHEM-348	Advanced Organic Chemistry: Bio-Organic Compounds	
CHEM-349	Organic Synthesis	
CHEM-350	Principles Of Toxicology	
CHEM-353	Principles of Pharmacology	
CHEM-355	Principles Of Medicinal Chemistry	
CHEM-356	Bioorganic Chemistry Laboratory	
CHEM-357	Chemical Kinetics	

Any other 300-level chemistry course approved by the department.

Total Hours	**48-50**

Code	Title	Hours
Required Courses in a Related Field (18 cr.)		
MATH-187	Calculus I	4
or MATH-187W	Calculus I & Math Enrichment Workshop	
MATH-202	Calculus II	4
or MATH-202W	Calculus II & Math Enrichment Workshop	
PHYS-206L	University Physics I With Lab [5]	5
or PHYS-201L	College Physics I With Lab	
PHYS-207L	University Physics II With Lab [5]	5
or PHYS-202L	College Physics II With Lab	
Total Hours		**18**

1 CHEM-211C and CHEM-212C are strongly recommended to be taken concurrently with CHEM-211 and CHEM-212, respectively.
2 CHEM-231C and CHEM-232C are strongly recommended to be taken concurrently with CHEM-231 and CHEM-232, respectively.
3 CHEM-311C and CHEM-312C are strongly recommended to be taken concurrently with CHEM-311 and CHEM-312 respectively.
4 Major elective credit is given only if the course is not used to count towards the required courses in the major.
5 PHYS-206L and PHYS-207L are strongly recommended for all Chemistry majors and are required for the ACS certified degree.

Biochemistry Concentration

Code	Title	Hours
Required Courses (45 cr.)		
CHEM-211	General Chemistry I [1]	5
CHEM-212	General Chemistry II [1]	4
CHEM-213	Writing Intensive Program: Quantitative Analysis	5
CHEM-231	Organic Chemistry I [2]	4
CHEM-232	Organic Chemistry II [2]	4
CHEM-311	Physical Chemistry I [3]	4
or CHEM-312	Physical Chemistry II	
CHEM-316	Inorganic Chemistry	4
CHEM-330	Instrumental Analysis: Spectroscopy	5
or CHEM-331	Instrumental Analysis: Quantitative Methods	
CHEM-362	Biochemistry [4]	4
CHEM-372	Biochemistry Of Metabolism [4]	3
CHEM-391	Chemistry Capstone Seminar	3
Select two electives from the following:		**6-8**
BIO-303	General Genetics	
BIO-340	Molecular Biology	
BIO-341	General Microbiology	
BIO-368	Genomics and Proteomics	
CHEM-312	Physical Chemistry II [5]	
or CHEM-311	Physical Chemistry I	
CHEM-331	Instrumental Analysis: Quantitative Methods [5]	
or CHEM-330	Instrumental Analysis: Spectroscopy	
CHEM-347	Advanced Organic Chemistry: Polyfunctional Compounds	
CHEM-348	Advanced Organic Chemistry: Bio-Organic Compounds	
CHEM-349	Organic Synthesis	
CHEM-350	Principles Of Toxicology	
CHEM-353	Principles of Pharmacology	
CHEM-355	Principles Of Medicinal Chemistry	
CHEM-356	Bioorganic Chemistry Laboratory	

CHEM-357	Chemical Kinetics	
Any other 300-level chemistry course approved by the department		
Total Hours		**51-53**

Code	Title	Hours
Required Courses in a Related Field (32 cr.)		
MATH-187	Calculus I	4
or MATH-187W	Calculus I & Math Enrichment Workshop	
MATH-202	Calculus II	4
or MATH-202W	Calculus II & Math Enrichment Workshop	
PHYS-206L	University Physics I With Lab [6]	5
or PHYS-201L	College Physics I With Lab	
PHYS-207L	University Physics II With Lab [6]	5
or PHYS-202L	College Physics II With Lab	
BIO-201	General Biology I	4
BIO-202	General Biology II	4
BIO-250	Essential Skills For Biologists	2
BIO-301	Cell Biology	4
Total Hours		**32**

1 CHEM-211C and CHEM-212C are strongly recommended to be taken concurrently with CHEM-211 and CHEM-212, respectively.
2 CHEM-231C and CHEM-232C are strongly recommended to be taken concurrently with CHEM-231 and CHEM-232, respectively.
3 CHEM-311C and CHEM-312C are strongly recommended to be taken concurrently with CHEM-311 and CHEM-312 respectively.
4 CHEM-362 Biochemistry is cross-listed with BIO-362 Biochemistry.
CHEM-372 Biochemistry of Metabolism is cross-listed with BIO-372 Biochemistry of Metabolism.
5 Major elective credit is given only if the course is not used to count towards the required courses in the major.
6 PHYS-206L and PHYS-207L are strongly recommended for all Chemistry majors and are required for the ACS certified degree.

Accelerated CONCENTRATION

Students in the Accelerated Concentration must maintain a 3.0 cumulative undergraduate GPA and earn at least a "B" in all graduate-level courses taken for shared credit. The undergraduate degree must be completed within four (4) semesters of the start of the shared graduate-level courses, not including Summer semesters.

Code	Title	Hours
Required Courses (53 cr.)		
CHEM-211	General Chemistry I [1]	5
CHEM-212	General Chemistry II [1]	4
CHEM-213	Writing Intensive Program: Quantitative Analysis	5
CHEM-231	Organic Chemistry I [2]	4
CHEM-232	Organic Chemistry II [2]	4
CHEM-311	Physical Chemistry I [3]	4
CHEM-312	Physical Chemistry II [3]	4
CHEM-331	Instrumental Analysis: Quantitative Methods	5
or CHEM-330	Instrumental Analysis: Spectroscopy	
CHEM-417	Inorganic Chemistry [4]	4
CHEM-391	Chemistry Capstone Seminar	3
CHEM-418	Instrumental Analysis: Spectroscopy [5]	5
or CHEM-419	Instrumental Analysis: Quantitative Methods	
Select one 300-level elective:		**3-4**
CHEM-319	Chemical Aspects Of Environmental Chemistry	
CHEM-347	Advanced Organic Chemistry: Polyfunctional Compounds	
CHEM-348	Advanced Organic Chemistry: Bio-Organic Compounds	
CHEM-350	Principles Of Toxicology	
CHEM-353	Principles of Pharmacology	

CHEM-355	Principles Of Medicinal Chemistry	
CHEM-356	Bioorganic Chemistry Laboratory	
Or other 300-level chemistry course approved by the department		
Select one 400-level elective		**3**
Organic Chemistry		
CHEM-403	Physical Methods Of Organic Chemistry	
CHEM-411	Organic Reaction Mechanisms	
CHEM-433	Introduction to Polymer Chemistry	
Physical Chemistry		
CHEM-404	Chemical Thermodynamics	
CHEM-405	Quantum Chemistry	
CHEM-412	Reaction Kinetics	
CHEM-416	Nanoscience	
Or other 400-level chemistry course approved by the department		
Total Hours		**53-54**

Code	Title	Hours
Required Courses in a Related Field (18 cr.)		
MATH-187	Calculus I	4
or MATH-187W	Calculus I & Math Enrichment Workshop	
MATH-202	Calculus II	4
or MATH-202W	Calculus II & Math Enrichment Workshop	
PHYS-206L	University Physics I With Lab [6]	5
or PHYS-201L	College Physics I With Lab	
PHYS-207L	University Physics II With Lab [6]	5
or PHYS-202L	College Physics II With Lab	
Total Hours		**18**

1 CHEM-211C and CHEM-212C are strongly recommended to be taken concurrently with CHEM-211 and CHEM-212, respectively.
2 CHEM-231C and CHEM-232C are strongly recommended to be taken concurrently with CHEM-231 and CHEM-232, respectively.
3 CHEM-311C and CHEM-312C are strongly recommended to be taken concurrently with CHEM-311 and CHEM-312 respectively.
4 Students intending to complete the Accelerated Concentration should take CHEM-417 in place of CHEM-316 in order to receive graduate credit.
5 Students intending to complete the Accelerated Concentration should take one of either CHEM-418 or CHEM-419 after they have completed either CHEM-330 or CHEM-331.
6 PHYS-206L and PHYS-207L are strongly recommended for all Chemistry majors and are required for the ACS certified degree.

Students with foreign credentials are evaluated by the Office of Admissions as having 90 credit hours must take as a minimum the following six courses:

Code	Title	Hours
CHEM-213	Writing Intensive Program: Quantitative Analysis	5
CHEM-232	Organic Chemistry II	4
CHEM-311	Physical Chemistry I	4
CHEM-312	Physical Chemistry II	4
CHEM-330	Instrumental Analysis: Spectroscopy	4
or CHEM-331	Instrumental Analysis: Quantitative Methods	
CHEM-391	Chemistry Capstone Seminar	3
Additional courses may be required in chemistry, physics or mathematics. Students should see their advisor.		
Total Hours		**24**

American Chemical Society (ACS) approved program in Chemistry:

Graduating majors may receive a certificate stating that they have completed a program which meets the ACS standards for Professional Training if they fulfill the following requirements:

1. Take PHYS-206L as prerequisite for CHEM-311.
2. Take PHYS-207L as prerequisite for CHEM-312.
3. Take CHEM-311 and CHEM-312 during the junior year.

CHEM-316, CHEM-330, CHEM-331, CHEM-347 and CHEM-348 are required. Two additional 300-level electives must then be selected.

Completion of this program requires a minimum of 50 cr. in chemistry with a minimum grade point average of 3.0 and no chemistry grades below C in any required course.

This sample curricular map is provided to guide you in the planning of your progression for this major. **This guide should not replace regular consultations with your program advisor**. For specific recommendations of courses not identified, please consult your program advisor.

First Year		
Term 1		**Hours**
CHEM-211	General Chemistry I	5
MATH-187	Calculus I	4
General Education Course		3
General Education Course		3
	Term Hours	**15**
Term 2		
CHEM-212	General Chemistry II	4
MATH-202	Calculus II	4
General Education Course		3
General Education Course		3
Elective course		3
	Term Hours	**17**
Second Year		
Term 1		
CHEM-213	Writing Intensive Program: Quantitative Analysis	5
CHEM-231	Organic Chemistry I	4
PHYS-201L or 206L	College Physics I With Lab	5
	Term Hours	**14**
Term 2		
CHEM-232	Organic Chemistry II	4
PHYS-202L or 207L	College Physics II With Lab	5
General Education Course		3
Elective course		3
	Term Hours	**15**
Third Year		
Term 1		
CHEM-311	Physical Chemistry I	4
CHEM-331 or 330	Instrumental Analysis: Quantitative Methods	4
CHEM Elective		3
General Education Course		3
	Term Hours	**14**
Term 2		
CHEM-312	Physical Chemistry II	4
General Education Course		3
General Education Course		3
CHEM Elective		3
Elective course		3
	Term Hours	**16**
Fourth Year		
Term 1		
CHEM-391	Chemistry Capstone Seminar	3
300-Level CHEM Course		3
General Education Course		3

300-Level CHEM Course		3
Elective course		3
	Term Hours	**15**
Term 2		
300-Level CHEM Course		3
General Education Course		3
Elective course		3
Elective course		3
Elective course		3
	Term Hours	**15**
	Total Hours:	**121**