Chemistry, B.S. *major*
Environmental Chemistry Emphasis

A total of 120 semester credits are needed for the **Chemistry, Environmental Chemistry emphasis B.S.** degree and include the following:

- 40 upper division credits (level 3000/4000)
- 69 required major core credits
- Completion of Core Curriculum credits (Minnesota Transfer Curriculum [MnTC] Goal Areas 1-10) - required for all baccalaureate degrees
- Completion of BSU Focus and Nisidotaading Course Requirements

Dual Degrees
Students wishing to complete two degrees concurrently, (example: Bachelor of Science and Bachelor of Arts) must complete a minimum of an additional 30 credits above the required 120 credits.

Multiple Credentials
Any additional major, minor or certificate in a degree must have at least 6 credits of course work not used to meet the requirements of another major, minor or certificate in the degree.

Required Credits: 69
Required GPA: 2.25

I REQUIRED COURSES

SELECT 1 OF THE FOLLOWING COURSES:

- CHEM 1111 General Chemistry I (4 credits)
- CHEM 2211 Principles of Chemistry I (4 credits)

COMPLETE THE FOLLOWING COURSES:

- CHEM 2212 Principles of Chemistry II (4 credits)
- CHEM 3100 Journal Club (1 credit)
- CHEM 3311 Organic Chemistry I (3 credits)
- CHEM 3312 Organic Chemistry II (3 credits)
- CHEM 3371 Organic Chemistry Laboratory I (1 credit)
- CHEM 3372 Organic Chemistry Laboratory II (1 credit)
- CHEM 3507 Analytical Chemistry (3 credits)
- CHEM 3570 Analytical Chemistry Laboratory (1 credit)
- CHEM 4510 Instrumental Methods of Analysis (3 credits)
- CHEM 4571 Instrumental Analysis Laboratory I (1 credit)
- CHEM 4572 Instrumental Analysis Laboratory II (1 credit)
- MATH 2471 Calculus I (5 credits)
- PHYS 2101 University Physics I (4 credits)

II REQUIRED EMPHASIS

COMPLETE ONE OF THE FOLLOWING COURSES:

- CHEM 4110 Environmental Chemistry (3 credits)
  or ENVR 4110 Environmental Chemistry (3 credits)

COMPLETE 4 SEMESTER CREDITS FROM THE FOLLOWING COURSE:

- CHEM 4970 Internship (3-4 credits)

II REQUIRED EMPHASIS

Select 3 semester credits of electives from CHEM 3100 or above. (CHEM 3100 may be repeated with 1 credit applying to this area.)

SELECT 24 SEMESTER CREDITS FROM THE FOLLOWING COURSES:

- BIOL 2610 General Ecology (3 credits)
- BIOL 3361 Limnology (4 credits)
- CHEM 3140 Chemical Toxicology (3 credits)
- CHEM 3150 Standard Methods of Water Analysis (3 credits)
  or ENVR 4220 Sampling and Analysis (4 credits)
- CHEM 4411 Biochemistry I (3 credits)
- CHEM 4412 Biochemistry II (3 credits)
- CHEM 4471 Biochemistry Laboratory I (1 credit)
- ENVR 4050 Geochemistry (3 credits)
- ENVR 4200 Wastewater Treatment (3 credits)
- ENVR 4240 Waste Management (4 credits)
- ENVR 4260 Risk, Resilience and Sustainable Community Development (3 credits)
- ENVR 4400 Environmental Microbiology (3 credits)
- ENVR 4500 Environmental Toxicology (4 credits)
- GEOL 3211 Environmental Hydrology (3 credits)

Program Learning Outcomes | Chemistry, B.S.

1. Use the structure of atoms and their subatomic particles to explain chemical and physical properties.

2. Explain how atoms interact via chemical bonds and the energy changes associated with making and breaking bonds.

3. Relate the three dimensional geometric structures of chemical compounds to their chemical and physical behaviors.

4. Evaluate how intermolecular forces dictate the physical behavior of matter.

5. Categorize and analyze the chemical reactions involved in transforming matter into products with new chemical and physical properties.

6. Evaluate the energy changes that accompany chemical reactions.

7. Assess the various ways that affect how reaction rates vary with time.

8. Analyze the various factors that affect the equilibrium of chemical reactions.

9. Perform laboratory experiments that involve collecting and analyzing data and practicing chemical safety.

10. Evaluate chemical constructs at the particulate and macroscopic levels using models, graphs to visualize data, and mathematical equations.

11. Develop written reports and oral presentations that effectively communicate scientific principles and processes.