CHEMISTRY BACHELOR OF SCIENCE DEGREE

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Recall and combine factual knowledge from across the five principal areas of chemistry (organic, inorganic, physical, biochemistry and analytical) and be able to interpret and translate scientific data to solve chemical problems with industrial and academic applications.
- Apply laboratory techniques (including modern instrumentation) and laboratory safety protocols to design and conduct experiments to test chemical hypothesis.
- Demonstrate the ability to discuss (written and oral) scientific information with chemists and non-chemists.

Required Courses

Code	Title	Credits
General Education Requirements (https://catalog.msubillings.edu/undergraduate/general-education-requirements/)		**31**
Students should consult with an academic advisor before registering for General Education courses in order to minimize the number of courses needed to satisfy the requirements of the major. [1]		
Note: 7 credits will be filled with requirements below, leaving 24 credits needed in General Education.		
Chemistry		
CHMY 141 & CHMY 142	College Chemistry I and College Chemistry I Lab *	5
CHMY 143 & CHMY 144	College Chemistry II and College Chemistry II Lab	5
CHMY 311 & CHMY 312	Analytical Chem-Quant Analysis and Analyticl Chm Lab-Quant Anlsys	4
CHMY 321 & CHMY 322	Organic Chemistry I and Organic Chemistry Lab I	4
CHMY 323 & CHMY 324	Organic Chemistry II and Organic Chemistry Lab II	4
CHMY 371 & CHMY 372	Phys Chem-Qntm Chm & Spctrscpy and Physical Chemistry Lab I	4
CHMY 373 & CHMY 374	Phys Chem-Kntcs & Thrmdynmcs and Physical Chemistry Lab II	4
CHMY 401 & CHMY 402	Advanced Inorganic Chemistry and Advanced Inorganic Chem Lab	4
CHMY 411 & CHMY 412	Advanced Organic Chemistry and Advanced Organic Chemistry Lab	4
CHMY 421 & CHMY 422	Advanced Instrument Analysis and Adv Instrument Analysis Lab	5
CHMY 490	Undergraduate Research	2
CHMY 498	Internship/Cooperative Educ	2
CHMY 499	Senior Thesis/Capstone	1
BCH 380 & BCH 381	Biochemistry and Biochemistry Lab	4
BCH 480 & BCH 481	Advanced Biochemistry I and Advanced Biochemistry I Lab	4
Subtotal		56
Mathematics		
STAT 216	Introduction to Statistics *	4
M 171	Calculus I *	4
M 172	Calculus II	4
Subtotal		12
Physics		
PHSX 220 & PHSX 221	Physics I and Physics I Lab	4
PHSX 232 & PHSX 233	Physics II & Thermo and Physics II & Thermo Lab	4
Subtotal		8
Science and Math Electives		**16**
Selected with advisor approval		
Electives		**4**
Electives should be chosen in consultation with an academic advisor.		
Total Minimum Credits		**120**

[1] The following General Education courses also satisfy requirements in the major: CHMY 141/CHMY 142, M 171, and STAT 216.

* May satisfy General Education requirements.

Certain courses in this program have prerequisites; students should check the course descriptions for required prerequisites.

Suggested Plan of Study

Starting in the Fall of Even Year

Code	Title	Credits
First Year		
Fall		
CHMY 141 & CHMY 142	College Chemistry I and College Chemistry I Lab	5
BIOB 160 & BIOB 161	Principles of Living Systems and Principles Living Systems Lab	4
M 171	Calculus I	4
General Education		3
Total		16
Spring		
CHMY 143 & CHMY 144	College Chemistry II and College Chemistry II Lab	5
M 172	Calculus II	4
STAT 216	Introduction to Statistics	4
General Education		3
Total		16
Second Year		
Fall		
CHMY 321 & CHMY 322	Organic Chemistry I and Organic Chemistry Lab I	4
PHSX 220 & PHSX 221	Physics I and Physics I Lab	4
General Education		6
Total		14
Spring		
CHMY 323 & CHMY 324	Organic Chemistry II and Organic Chemistry Lab II	4

PHSX 232 & PHSX 233	Physics II & Thermo and Physics II & Thermo Lab	4
General Education		6
Electives		1
Total		15
Third Year		
Fall		
BCH 380 & BCH 381	Biochemistry and Biochemistry Lab	4
CHMY 311 & CHMY 312	Analytical Chem-Quant Analysis and Analyticl Chm Lab-Quant Anlsys	4
CHMY 371 & CHMY 372	Phys Chem-Qntm Chm & Spctrscpy and Physical Chemistry Lab I	4
General Education		3
Total		15
Spring		
BCH 480 & BCH 481	Advanced Biochemistry I and Advanced Biochemistry I Lab	4
CHMY 421 & CHMY 422	Advanced Instrument Analysis and Adv Instrument Analysis Lab	5
CHMY 373 & CHMY 374	Phys Chem-Kntcs & Thrmdynmcs and Physical Chemistry Lab II	4
Science/Math Electives		3
Total		16
Fourth Year		
Fall		
CHMY 411 & CHMY 412	Advanced Organic Chemistry and Advanced Organic Chemistry Lab	4
CHMY 490	Undergraduate Research	1
CHMY 498	Internship/Cooperative Educ	1
Science/Math Electives		9
Total		15
Spring		
CHMY 401 & CHMY 402	Advanced Inorganic Chemistry and Advanced Inorganic Chem Lab	4
CHMY 490	Undergraduate Research	1
CHMY 498	Internship/Cooperative Educ	1
CHMY 499	Senior Thesis/Capstone	1
Science/Math Electives		4
Elective		2
Total		13

Starting in the Fall of Odd Year

Code	Title	Credits
First Year		
Fall		
CHMY 141 & CHMY 142	College Chemistry I and College Chemistry I Lab	5
BIOB 160 & BIOB 161	Principles of Living Systems and Principles Living Systems Lab	4
M 171	Calculus I	4
General Education		3
Total		16
Spring		
CHMY 143 & CHMY 144	College Chemistry II and College Chemistry II Lab	5
M 172	Calculus II	4
STAT 216	Introduction to Statistics	4
General Education		3
Total		16
Second Year		
Fall		
CHMY 321 & CHMY 322	Organic Chemistry I and Organic Chemistry Lab I	4
CHMY 311 & CHMY 312	Analytical Chem-Quant Analysis and Analyticl Chm Lab-Quant Anlsys	4
PHSX 220 & PHSX 221	Physics I and Physics I Lab	4
General Education		3
Total		15
Spring		
CHMY 323 & CHMY 324	Organic Chemistry II and Organic Chemistry Lab II	4
PHSX 232 & PHSX 233	Physics II & Thermo and Physics II & Thermo Lab	4
General Education		6
Total		14
Third Year		
Fall		
CHMY 411 & CHMY 412	Advanced Organic Chemistry and Advanced Organic Chemistry Lab	4
CHMY 498	Internship/Cooperative Educ	1
General Education		6
Science/Math Electives		4
Total		15
Spring		
CHMY 401 & CHMY 402	Advanced Inorganic Chemistry and Advanced Inorganic Chem Lab	4
Science/Math Electives		9
Elective		1
Total		14
Fourth Year		
Fall		
BCH 380 & BCH 381	Biochemistry and Biochemistry Lab	4
CHMY 371 & CHMY 372	Phys Chem-Qntm Chm & Spctrscpy and Physical Chemistry Lab I	4
CHMY 490	Undergraduate Research	1
CHMY 498	Internship/Cooperative Educ	1
Science/Math Electives		3
Electives		2
Total		15
Spring		
BCH 480 & BCH 481	Advanced Biochemistry I and Advanced Biochemistry I Lab	4
CHMY 421 & CHMY 422	Advanced Instrument Analysis and Adv Instrument Analysis Lab	5

CHMY 373 & CHMY 374	Phys Chem-Kntcs & Thrmdynmcs and Physical Chemistry Lab II	4
CHMY 490	Undergraduate Research	1
CHMY 499	Senior Thesis/Capstone	1
Total		15