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

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Code	Title	Credits
General Education Requirements (https://catalog.msubillings.edu/		31
undergraduat	e/general-education-requirements/)	

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: 6 credits will be filled with requirements below, leaving 25 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		

CHMY 250	Applied Math for the Sciences	3
M 171	Calculus I *	4
STAT 216	Introduction to Statistics *	4
Subtotal		11
Physics		
PHSX 220	Physics I	5
& PHSX 221	and Physics I Lab	
PHSX 232	Physics II & Thermo	5
& PHSX 233	and Physics II & Thermo Lab	
Subtotal		10
Science and Math Electives		15
Selected with advis	sor approval	
Electives		3
Electives should be	chosen in consultation with an academic advisor.	
Total Minimum Cre	dits	120

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

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
CHMY 250	Applied Math for the Sciences	3
STAT 216	Introduction to Statistics	4
General Education		3
Total		15
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	5
General Education		6
Total		15
Spring		
CHMY 323 & CHMY 324	Organic Chemistry II and Organic Chemistry Lab II	4

^{*} May satisfy General Education requirements.

PHSX 232	Physics II & Thermo	5	CHMY 143	College Chemistry II	5
& PHSX 233	and Physics II & Thermo Lab		& CHMY 144	and College Chemistry II Lab	4
General Education		6	STAT 216	Introduction to Statistics	4
Total		15	General Education	1	6
Third Year			Total		15
Fall	P. 1		Second Year		
BCH 380 & BCH 381	Biochemistry and Biochemistry Lab	4	Fall		
CHMY 311	Analytical Chem-Quant Analysis	4	CHMY 321 & CHMY 322	Organic Chemistry I and Organic Chemistry Lab I	4
& CHMY 312	and Analytici Chm Lab-Quant Anlsys	7	CHMY 311	Analytical Chem-Quant Analysis	4
CHMY 371	Phys Chem-Qntm Chm & Spctrscpy	4	& CHMY 312	and Analytic Chm Lab-Quant Anlsys	4
& CHMY 372	and Physical Chemistry Lab I	·	PHSX 220	Physics I	5
General Education		3	& PHSX 221	and Physics I Lab	
Total		15	General Education	1	3
Spring			Total		16
BCH 480	Advanced Biochemistry I	4	Spring		
& BCH 481	and Advanced Biochemistry I Lab		CHMY 323	Organic Chemistry II	4
CHMY 421	Advanced Instrument Analysis	5	& CHMY 324	and Organic Chemistry Lab II	
& CHMY 422	and Adv Instrument Analysis Lab		PHSX 232	Physics II & Thermo	5
CHMY 373	Phys Chem-Kntcs & Thrmdynmcs	4	& PHSX 233	and Physics II & Thermo Lab	
& CHMY 374	and Physical Chemistry Lab II		CHMY 250	Applied Math for the Sciences	3
Science/Math Electi	ives	3	General Education	1	3
Total		16	Total		15
Fourth Year			Third Year		
Fall			Fall		
CHMY 411	Advanced Organic Chemistry	4	CHMY 411	Advanced Organic Chemistry	4
& CHMY 412	and Advanced Organic Chemistry Lab		& CHMY 412	and Advanced Organic Chemistry Lab	
CHMY 490	Undergraduate Research	1	CHMY 498	Internship/Cooperative Educ	1
CHMY 498	Internship/Cooperative Educ	1	General Education		6
Science/Math Electi	ves	8	Science/Math Electives		4
Total		14	Total		15
Spring	Advanced by any of Objections	4	Spring		
CHMY 401 & CHMY 402	Advanced Inorganic Chemistry and Advanced Inorganic Chem Lab	4	CHMY 401 & CHMY 402	Advanced Inorganic Chemistry and Advanced Inorganic Chem Lab	4
CHMY 490	Undergraduate Research	1	Science/Math Elec	-	8
CHMY 498	Internship/Cooperative Educ	1	Total	buves	12
CHMY 499	Senior Thesis/Capstone	1	Fourth Year		12
Science/Math Electi	·	4	Fall		
Elective		2	BCH 380	Biochemistry	4
Total		13	& BCH 381	and Biochemistry Lab	7
			CHMY 371	Phys Chem-Qntm Chm & Spctrscpy	4
Starting in th	e Fall of Odd Year		& CHMY 372	and Physical Chemistry Lab I	
Code	Title	Credits	CHMY 490	Undergraduate Research	1
First Year			CHMY 498	Internship/Cooperative Educ	1
Fall			Science/Math Elec	ctives	3
CHMY 141	College Chemistry I	5			2
& CHMY 142	and College Chemistry I Lab		Total		15
BIOB 160	Principles of Living Systems	4	Spring		
& BIOB 161	and Principles Living Systems Lab		BCH 480	Advanced Biochemistry I	4
M 171	Calculus I	4	& BCH 481	and Advanced Biochemistry I Lab	
General Education		3	CHMY 421	Advanced Instrument Analysis	5
Total		16	& CHMY 422	and Adv Instrument Analysis Lab	
Spring			CHMY 373	Phys Chem-Kntcs & Thrmdynmcs	4
			& CHMY 374	and Physical Chemistry Lab II	

CHMY 490	Undergraduate Research	1
CHMY 499	Senior Thesis/Capstone	1
Total		15