

## Curriculum Revision Proposal for Chemistry BS Program

Committee members:  
Analytical – Diep Nguyen  
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Physical – Ben Zion

### Highlights and Rationale for Curriculum Revision

- The revised Chemistry BS curriculum meets the new university policy to reduce the total credit hours from 127 to 120.
- The revised Chemistry BS curriculum also meets all ACS BS Chemistry requirements.
- The revised Chemistry BS curriculum distributes the ACS' required/recommended Macromolecular, Supramolecular, and Nanoscale (MSN) and Green Chemistry topics into the existing courses.
- Change the MATH requirement for CHEM 344 (Physical Chemistry II) from “both MATH 251 (4 credits) **and** MATH 252 (4 credits)” to “MATH 251 **or** MATH 252”. This reduces the required Math credit hours.
- Reduce the credit hours of CHEM 451 (Undergraduate Seminar) from 3 to 2, i.e., “Lecture: 3; Lab: 0; Credits: 3” to “Lecture: 2 Lab: 0 Credits: 2”.
- Reduce the times taking CHEM 485 (Chemistry Colloquium, Lecture: 1; Lab: 0; Credits: 1) from 2 to 1.
- Add CHEM 452 (Cheminformatics) OR MATH 225 (Introductory Statistics) OR DS 151 (Introduction to Data Science) as required (3 credits) to align with the American Chemical Society (ACS) guidelines and enhance students' data analysis skills.
- Remove Chem 434 (Spectroscopic Methods in Identification and Analysis) as a required course. The material being taught is graduate level. Some of the foundations of spectroscopy will be covered in other courses including CHEM 239, CHEM 240, CHEM 247, and CHEM 321. Students can still take Chem 434 as a chemistry elective.
- All chemistry lab courses will satisfy the Communications (C) requirement (See Illinois Tech Core Curriculum, section A) as well as CHEM 451, Undergraduate Seminar, for a total of 12 “C” credit hours in major.
- Convert 3 specialized Chemistry BS programs, i.e., Environmental Chemistry, Forensic Chemistry and Medicinal Chemistry, into 3 Concentrations, i.e., Environmental, Forensic and Medicinal Chemistry, under the current revised Chemistry BS program, under the recent university strategic plan.

- AP Chemistry score of 5 will earn 8 credits – CHEM 122, CHEM 123, CHEM 126, CHEM 140
- AP Chemistry score of 3 will earn 4 credits – CHEM 122 and CHEM 123

## Summary of BS CHEM Curriculum Revision

### Credit hour changes:

Key: (Lecture weekly hours, Lab weekly hours, credits)

Course Name	Course #	Credit hours (current)	Credit hours (Proposed)	Credit hour Change (+/-)
Organic Chemistry Laboratory	CHEM 240	2 (1,4,2)	1 (0,4,1)	-1
Analytical Chemistry	CHEM 247	3 (3,3,3)	4 (3,4,4)	+1
Multivariate and Vector Calculus <b>And</b> Introduction to Differential Equations	MATH 251 and MATH 252	8 (4,1,4) and (4,0,4)	4 (4,1,4) <b>or</b> (4,0,4)	-4
Spectroscopic Methods in Identification and Analysis	CHEM 434	4 (3,4,4)	0	-4
Undergraduate Seminar	CHEM 451	3 (3,0,3)	2 (2,0,2)	-1
Chemistry Colloquium	CHEM 485	2 (0,1,1) and (0,1,1)	1 (1,0,1)	-1
Cheminformatics, or Introductory Statistics, or Introduction to Data Science	CHEM 452, or MATH 225, or DS 151	0	3 (3,0,3) or 3 (3,0,3) or 3 (3,0,3)	+3

### Bachelor Science in Chemistry Program Requirements:

Current		Proposed	
Course Number	Credits	Course Number	Credits
<b>Chemistry Requirements</b>	<b>54</b>	<b>Chemistry Requirements</b>	<b>51</b>
CHEM 100	2	CHEM 100	2
CHEM 124	4	CHEM 124	4
CHEM 125	4	CHEM 125	4
CHEM 237	4	CHEM 237	4
CHEM 239	3	CHEM 239	3
CHEM 240	2	CHEM 240	1
CHEM 247	3	CHEM 247	4
CHEM 321	4	CHEM 321	4
CHEM 343	3	CHEM 343	3
CHEM 344	4	CHEM 344	4
CHEM 415	3	CHEM 415	3
CHEM 416	3	CHEM 416	3
CHEM 434	4		
CHEM 451	3	CHEM 451	2
		CHEM 452 (or MATH 225 or DS 151)	3
CHEM 485	1	CHEM 485	1
CHEM 485	1		
Select two CHEM electives <sup>1</sup>	6	Select two CHEM electives <sup>1</sup>	6
<b>Biology Requirements</b>	<b>(6-7)</b>	<b>Biology Requirements</b>	<b>(6-7)</b>
BIOL 107	3	BIOL 107	3
or BIOL 115		or BIOL 115	
BIOL 401	(3-4)	BIOL 401	(3-4)
or BIOL 403		or BIOL 403	
<b>Mathematics Requirements</b>	<b>18</b>	<b>Mathematics Requirements</b>	<b>14</b>

MATH 151	5	MATH 151	5
MATH 152	5	MATH 152	5
MATH 251	4	MATH 251	4
MATH 252	4	or MATH 252	
<b>Physics Requirements</b>	<b>8</b>	<b>Physics Requirements</b>	<b>8</b>
PHYS 123	4	PHYS 123	4
PHYS 221	4	PHYS 221	4
<b>Computer Science Requirement</b>	<b>2</b>	<b>Computer Science Requirement</b>	<b>2</b>
CS 105	2	CS 105	2
or CS 110		or CS 110	
<b>Humanities and Social Sciences Requirements</b>	<b>21</b>	<b>Humanities and Social Sciences Requirements</b>	<b>21</b>
See Illinois Tech Core Curriculum, sections B and C	21	See Illinois Tech Core Curriculum, sections B and C	21
<b>Interprofessional Projects (IPRO)</b>	<b>6</b>	<b>Interprofessional Projects (IPRO)</b>	<b>6</b>
See Illinois Tech Core Curriculum, section E	6	See Illinois Tech Core Curriculum, section E	6
<b>Free Electives</b>	<b>12</b>	<b>Free Electives</b>	<b>12</b>
Select 12 credit hours	12	Select 12 credit hours	12
<b>Total Credit Hours</b>	<b>127-128</b>	<b>Total Credit Hours</b>	<b>120 - 121</b>

<sup>1</sup>Students may choose from CHEM 400+ and CHEM 500+ level courses. Students planning take CHEM 487 must complete CHEM 450 in a previous semester and are required to take one semester of CHEM 485.

## Bachelor Science in Chemistry Sample Curriculum

YEAR 1			
SEMESTER 1	CREDIT HOURS	SEMESTER 2	CREDIT HOURS
CHEM 100	2	CHEM 125	4
CHEM 124	4		
		MATH 152	5
CS 105 or 110	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	<b>16</b>		<b>16</b>
YEAR 2			
SEMESTER 1	CREDIT HOURS	SEMESTER 2	CREDIT HOURS
CHEM 237	4	CHEM 239	3
		CHEM 240	1
CHEM 247	4	BIOL 107 or 115	3
MATH 251 or 252	4	Humanities or Social Sciences Elective	3
PHYS 221	4	Humanities Elective (300+)	3
		Free Elective	3
	<b>16</b>		<b>16</b>
YEAR 3			
SEMESTER 1	CREDIT HOURS	SEMESTER 2	CREDIT HOURS
CHEM 415	3	CHEM 321	4
CHEM 343	3		
		CHEM 344	4
I PRO Elective I	3	Chemistry Elective1	3
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
CHEM 452 or MATH 225 or DS 151	3		
	<b>15</b>		<b>14</b>

YEAR 4			
SEMESTER 1	CREDIT HOURS	SEMESTER 2	CREDIT HOURS
Chemistry Elective1	3	CHEM 416	3
CHEM 485	1	CHEM 451	2
BIOL 401 or 403	(3-4)	IPRO Elective II	3
Free Elective	3	Social Sciences Elective (300+)	3
Free Elective	3	Free Elective	3
	(13-14)		14
<b>Total Credit Hours: 120-121</b>			

### **Curriculum Revision Proposal for Three Concentrations (Environmental, Forensic and Medicinal Chemistry) under Chemistry BS Program**

#### **Highlights and Rationale for Curriculum Revision**

- All three concentrations are in compliance with the new university policy with total 120 credit hours required for a BS degree.
- Meets all ACS BS Chemistry requirements (previous specialized majors did not).
- All Chemistry BS requirements are required for each concentration.

#### ***The following changes are further made based on the revised 120/121-credit-hour Chemistry BS curriculum described above:***

- Add CHEM 463 (Analytical Method Development Laboratory (1,7,3)) to all three concentrations.
- For Environmental Chemistry Concentration: add CHEM 472 (Environmental Chemistry) and CHEM 473 (Environmental Analytical Chemistry).
- For Forensic Chemistry Concentration: add CHEM 475 (Forensic Chemistry) and CHEM 476 (Forensic Chemistry Laboratory).
- For Medicinal Chemistry Concentration: add CHEM 467 (Medicinal Chemistry) and CHEM 456 (Computational Biochemistry and Drug Design).

- The additional requirements for each concentration take up the 6 credits of Chemistry electives and 3 credits of free electives, resulting in 9 hours of free electives.

**Bachelor Science in Chemistry with a concentration in Environmental Chemistry Program Requirements:**

Current		Proposed	
Course Number	Credits	Course Number	Credits
<b>Chemistry Requirements</b>	<b>54</b>	<b>Chemistry Requirements</b>	<b>54</b>
CHEM 100	2	CHEM 100	2
CHEM 124	4	CHEM 124	4
CHEM 125	4	CHEM 125	4
CHEM 237	4	CHEM 237	4
CHEM 239	3	CHEM 239	3
CHEM 240	2	CHEM 240	1
CHEM 247	3	CHEM 247	4
CHEM 321	4	CHEM 321	4
CHEM 343	3	CHEM 343	3
CHEM 344	4	CHEM 344	4
CHEM 415	3	CHEM 415	3
		CHEM 416	3
CHEM 434	4		
		CHEM 451	2
		CHEM 452 (or MATH 225 or DS 151)	3
CHEM 463	3	CHEM 463	3
CHEM 472	3	CHEM 472	3
CHEM 473	3	CHEM 473	3
CHEM 485	1	CHEM 485	1
CHEM 495	1		

Select two ENVIR CHEM electives	6		
<b>Biology Requirements</b>	<b>(6-7)</b>	<b>Biology Requirements</b>	<b>(6-7)</b>
BIOL 107	3	BIOL 107	3
or BIOL 115		or BIOL 115	
BIOL 401	(3-4)	BIOL 401	(3-4)
or BIOL 403		or BIOL 403	
<b>Mathematics Requirements</b>	<b>18</b>	<b>Mathematics Requirements</b>	<b>14</b>
MATH 151	5	MATH 151	5
MATH 152	5	MATH 152	5
MATH 251	4	MATH 251	4
MATH 252	4	or MATH 252	
<b>Physics Requirements</b>	<b>8</b>	<b>Physics Requirements</b>	<b>8</b>
PHYS 123	4	PHYS 123	4
PHYS 221	4	PHYS 221	4
<b>Computer Science Requirement</b>	<b>2</b>	<b>Computer Science Requirement</b>	<b>2</b>
CS 105	2	CS 105	2
or CS 110		or CS 110	
<b>Humanities and Social Sciences Requirements</b>	<b>21</b>	<b>Humanities and Social Sciences Requirements</b>	<b>21</b>
See Illinois Tech Core Curriculum, sections B and C	21	See Illinois Tech Core Curriculum, sections B and C	21
<b>Interprofessional Projects (IPRO)</b>	<b>6</b>	<b>Interprofessional Projects (IPRO)</b>	<b>6</b>
See Illinois Tech Core Curriculum, section E	6	See Illinois Tech Core Curriculum, section E	6
<b>Free Electives</b>	<b>12</b>	<b>Free Electives</b>	<b>9</b>
Select 12 credit hours	12	Select 9 credit hours	9
<b>Total Credit Hours</b>	<b>127-128</b>	<b>Total Credit Hours</b>	<b>120 - 121</b>



**Bachelor Science in Chemistry with a concentration in Environmental Chemistry**  
**Sample Curriculum**

<b>YEAR 1</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 100	2	CHEM 125	4
CHEM 124	4		
		MATH 152	5
CS 105 or 110	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	<b>16</b>		<b>16</b>
<b>YEAR 2</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 237	4	CHEM 239	3
		CHEM 240	1
CHEM 247	4	BIOL 107 or 115	3
		Free Elective	3
MATH 251 or 252	4	Humanities or Social Sciences Elective	3
PHYS 221	4	Humanities Elective (300+)	3
	<b>16</b>		<b>16</b>
<b>YEAR 3</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 415	3	CHEM 321	4
CHEM 343	3		
CHEM 452, or MATH 225, or DS 151	3	CHEM 344	4
I PRO Elective I	3		
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
		CHEM 473	3
	<b>15</b>		<b>14</b>
<b>YEAR 4</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>

CHEM 463	3	CHEM 416	3
CHEM 485	1	CHEM 451	2
BIOL 401 or 403	(3-4)	IPro Elective II	3
Free Elective	3	Social Sciences Elective (300+)	3
CHEM 472	3	Free Elective	3
	(13-14)		14
<b>Total Credit Hours: 120-121</b>			

**Bachelor Science in Chemistry with a concentration in Forensic Chemistry Program Requirements:**

Current		Proposed	
Course Number	Credits	Course Number	Credits
<b>Chemistry Requirements</b>	<b>54</b>	<b>Chemistry Requirements</b>	<b>54</b>
CHEM 100	2	CHEM 100	2
CHEM 124	4	CHEM 124	4
CHEM 125	4	CHEM 125	4
CHEM 237	4	CHEM 237	4
CHEM 239	3	CHEM 239	3
CHEM 240	2	CHEM 240	1
CHEM 247	3	CHEM 247	4
CHEM 321	4	CHEM 321	4
CHEM 343	3	CHEM 343	3
CHEM 344	4	CHEM 344	4
CHEM 415	3	CHEM 415	3
		CHEM 416	3
CHEM 434	4		
		CHEM 451	2
		CHEM 452 (or MATH 225 or DS 151)	3

CHEM 463	3	CHEM 463	3
CHEM 475	3	CHEM 475	3
CHEM 476	3	CHEM 476	3
CHEM 485	1	CHEM 485	1
CHEM 495	1		
Select two FOREN CHEM electives	6		
<b>Biology Requirements</b>	<b>(6-7)</b>	<b>Biology Requirements</b>	<b>(6-7)</b>
BIOL 107	3	BIOL 107	3
or BIOL 115		or BIOL 115	
BIOL 401	(3-4)	BIOL 401	(3-4)
or BIOL 403		or BIOL 403	
<b>Mathematics Requirements</b>	<b>18</b>	<b>Mathematics Requirements</b>	<b>14</b>
MATH 151	5	MATH 151	5
MATH 152	5	MATH 152	5
MATH 251	4	MATH 251	4
MATH 252	4	or MATH 252	
<b>Physics Requirements</b>	<b>8</b>	<b>Physics Requirements</b>	<b>8</b>
PHYS 123	4	PHYS 123	4
PHYS 221	4	PHYS 221	4
<b>Computer Science Requirement</b>	<b>2</b>	<b>Computer Science Requirement</b>	<b>2</b>
CS 105	2	CS 105	2
or CS 110		or CS 110	
<b>Humanities and Social Sciences Requirements</b>	<b>21</b>	<b>Humanities and Social Sciences Requirements</b>	<b>21</b>
See Illinois Tech Core Curriculum, sections B and C	21	See Illinois Tech Core Curriculum, sections B and C	21
<b>Interprofessional Projects (IPRO)</b>	<b>6</b>	<b>Interprofessional Projects (IPRO)</b>	<b>6</b>
See Illinois Tech Core Curriculum, section E	6	See Illinois Tech Core Curriculum, section E	6
<b>Free Electives</b>	<b>12</b>	<b>Free Electives</b>	<b>9</b>
Select 12 credit hours	12	Select 9 credit hours	9
<b>Total Credit Hours</b>	<b>127-128</b>	<b>Total Credit Hours</b>	<b>120 - 121</b>

**Bachelor Science in Chemistry with a concentration in Forensic Chemistry Sample Curriculum**

<b>YEAR 1</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 100	2	CHEM 125	4
CHEM 124	4		
		MATH 152	5
CS 105 or 110	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	<b>16</b>		<b>16</b>
<b>YEAR 2</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 237	4	CHEM 239	3
		CHEM 240	1
CHEM 247	4	BIOL 107 or 115	3
		Free Elective	3
MATH 251 or 252	4	Humanities or Social Sciences Elective	3
PHYS 221	4	Humanities Elective (300+)	3
	<b>16</b>		<b>16</b>
<b>YEAR 3</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 415	3	CHEM 321	4
CHEM 343	3		
CHEM 452, or MATH 225, or DS 151	3	CHEM 344	4
I PRO Elective I	3		
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
		Free Elective	3
	<b>15</b>		<b>14</b>
<b>YEAR 4</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>

CHEM 463	3	CHEM 416	3
CHEM 485	1	CHEM 451	2
BIOL 401 or 403	(3-4)	IPro Elective II	3
CHEM 475	3	Social Sciences Elective (300+)	3
CHEM 476	3	Free Elective	3
	<b>(13-14)</b>		<b>14</b>
<b>Total Credit Hours: 120-121</b>			

**Bachelor Science in Chemistry with a concentration in Medicinal Chemistry Program Requirements:**

Current		Proposed	
Course Number	Credits	Course Number	Credits
<b>Chemistry Requirements</b>	<b>54</b>	<b>Chemistry Requirements</b>	<b>54</b>
CHEM 100	2	CHEM 100	2
CHEM 124	4	CHEM 124	4
CHEM 125	4	CHEM 125	4
CHEM 237	4	CHEM 237	4
CHEM 239	3	CHEM 239	3
CHEM 240	2	CHEM 240	1
CHEM 247	3	CHEM 247	4
CHEM 321	4	CHEM 321	4
CHEM 343	3	CHEM 343	3
CHEM 344	4	CHEM 344	4
CHEM 415	3	CHEM 415	3

		CHEM 416	3
CHEM 434	4		
		CHEM 451	2
		CHEM 452 (or MATH 225 or DS 151)	3
CHEM 456	3	CHEM 456	3
CHEM 463	3	CHEM 463	3
CHEM 467	3	CHEM 467	3
CHEM 485	1	CHEM 485	1
CHEM 495	1		
Select two MED CHEM electives	6		
<b>Biology Requirements</b>	<b>(6-7)</b>	<b>Biology Requirements</b>	<b>(6-7)</b>
BIOL 107	3	BIOL 107	3
or BIOL 115		or BIOL 115	
BIOL 401	(3-4)	BIOL 401	(3-4)
or BIOL 403		or BIOL 403	
<b>Mathematics Requirements</b>	<b>18</b>	<b>Mathematics Requirements</b>	<b>14</b>
MATH 151	5	MATH 151	5
MATH 152	5	MATH 152	5
MATH 251	4	MATH 251	4
MATH 252	4	or MATH 252	
<b>Physics Requirements</b>	<b>8</b>	<b>Physics Requirements</b>	<b>8</b>
PHYS 123	4	PHYS 123	4
PHYS 221	4	PHYS 221	4
<b>Computer Science Requirement</b>	<b>2</b>	<b>Computer Science Requirement</b>	<b>2</b>
CS 105	2	CS 105	2
or CS 110		or CS 110	
<b>Humanities and Social Sciences Requirements</b>	<b>21</b>	<b>Humanities and Social Sciences Requirements</b>	<b>21</b>
See Illinois Tech Core Curriculum, sections B and C	21	See Illinois Tech Core Curriculum, sections B and C	21
<b>Interprofessional Projects (IPRO)</b>	<b>6</b>	<b>Interprofessional Projects (IPRO)</b>	<b>6</b>
See Illinois Tech Core Curriculum, section E	6	See Illinois Tech Core Curriculum, section E	6

<b>Free Electives</b>	<b>12</b>	<b>Free Electives</b>	<b>9</b>
Select 12 credit hours	12	Select 9 credit hours	9
<b>Total Credit Hours</b>	<b>127-128</b>	<b>Total Credit Hours</b>	<b>120 - 121</b>

**Bachelor Science in Chemistry with a concentration in Medicinal Chemistry Sample Curriculum**

<b>YEAR 1</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 100	2	CHEM 125	4
CHEM 124	4		
		MATH 152	5
CS 105 or 110	2	PHYS 123	4
MATH 151	5	Social Sciences Elective	3
Humanities 200-level Course	3		
	<b>16</b>		<b>16</b>
<b>YEAR 2</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 237	4	CHEM 239	3
		CHEM 240	1
CHEM 247	4	BIOL 107 or 115	3
		Free Elective	3
MATH 251 or 252	4	Humanities or Social Sciences Elective	3
PHYS 221	4	Humanities Elective (300+)	3
	<b>16</b>		<b>16</b>
<b>YEAR 3</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 415	3	CHEM 321	4
CHEM 343	3		
CHEM 452, or MATH 225, or DS 151	3	CHEM 344	4
I PRO Elective I	3		
Social Sciences Elective (300+)	3	Humanities Elective (300+)	3
		Free Elective	3

	15		14
<b>YEAR 4</b>			
<b>SEMESTER 1</b>	<b>CREDIT HOURS</b>	<b>SEMESTER 2</b>	<b>CREDIT HOURS</b>
CHEM 463	3	CHEM 416	3
CHEM 485	1	CHEM 451	2
BIOL 401 or 403	(3-4)	IPRO Elective II	3
CHEM 456	3	Social Sciences Elective (300+)	3
CHEM 467	3	Free Elective	3
	<b>(13-14)</b>		<b>14</b>
<b>Total Credit Hours: 120-121</b>			

### Chemistry Undergraduate Course Description

Only courses that are being edited are listed. Changes are highlighted.

#### CHEM 100

Introduction to the Profession

Introduction to the chemical sciences, scientific method, computing tools, green chemistry, and interrelations of chemical sciences with biology, physics and other professions.

Lecture: 2 Lab: 0 Credits: 2

Satisfies: Communications (C)

#### CHEM 240

Organic Chemistry Laboratory

Basic techniques for advanced organic preparations. Interpretation of scientific results including percent yield, melting point, boiling point, IR, and NMR spectra.

Prerequisite(s): CHEM 239\*, An asterisk (\*) designates a course which may be taken concurrently.

Lecture: 10 Lab: 4 Credits: 21

Satisfies: Communications (C)



## CHEM 247

### Analytical Chemistry

This course introduces students to the theory and applications of quantitative analytical chemistry. Topics covered include: statistical data analysis; equilibrium constants expressions; acid-base reactions; volumetric analysis; and fundamentals of spectroscopy, electrochemistry, and of separations science. Laboratory experiments include learning about analytical process, calibration of glassware and equipment, wet chemical analysis, electrochemistry, spectroscopy, and chromatography.

Prerequisite(s): CHEM 125

Lecture: 3 Lab: 34 Credits: 4

Satisfies: Communications (C)

## CHEM 434

### Spectroscopic Methods in Identification and Analysis

Characterization and analysis by mass, vibrational, nuclear magnetic resonance, and electronic spectroscopy. Structure-spectra correlations applied to organic and inorganic compounds with examples drawn from diverse areas, e.g., pollutants, toxic materials, polymers, etc. The laboratory work includes characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.

Prerequisite(s): CHEM 247 and CHEM 240

Lecture: 3 Lab: 40 Credits: 43

## CHEM 435

### Spectroscopic Methods in Identification and Analysis Laboratory

The laboratory portion to CHEM 434. The laboratory work includes characterization of prepared or separated organic compounds by chromatographic, chemical, and spectroscopic methods.

Prerequisite(s): CHEM 434\* An asterisk (\*) designates a course which may be taken concurrently.

Lecture: 0 Lab: 4 Credits: 1

Satisfies: Communications (C)

## **CHEM 451**

Undergraduate Seminar

An overview of a variety of chemical information tools and major scientific databases for navigating primary scientific literature. There will be a focus on the written and oral presentation of scientific research and the critical evaluation of the same types of scientific communication. Professional development with discussions of behavior, ethics, and career paths.

Prerequisite(s): CHEM 125-126

Lecture: 32 Lab: 0 Credits: 32

Satisfies: Communications (C)

Date Submitted: 02/10/25 4:03 pm

Viewing: **BS-CHEM-4** ~~BS-CHEM-3~~ : Bachelor  
of Science in Chemistry

Last approved: 07/01/22 10:29 am

Last edit: 02/11/25 12:20 am

Changes proposed by: kleight1

Catalog Pages  
Using this Program  
[Bachelor of Science in Chemistry](#)

### In Workflow

1. CHEM Curriculum Committee Chair
2. CHEM Chair
3. Academic Affairs
4. Undergraduate Academic Affairs
5. LS Dean
6. Undergraduate Studies Committee Chair
7. Faculty Council Chair
8. Academic Affairs

Program Status	Active		
Requestor	Name	<a href="#">Shamiah Okhai</a> <del>Patty Johnson</del> <del>Winston</del>	E-mail
Origination Date	<a href="#">2025-2-10</a> <del>2022-7-1</del>		
Is this an interdisciplinary program?	No		
Academic Unit	Chemical Sciences		
College	Lewis College of Science and Letters		
Program Title	Bachelor of Science in Chemistry		
Effective Academic Year	<a href="#">2025</a> <del>2022</del> - <a href="#">2026</a> <del>2023</del>	Effective Term	Fall 2025
Academic Level	Undergraduate		

### Approval Path

1. 05/08/24 7:41 am mandal: Approved for CHEM Curriculum Committee Chair
2. 05/15/24 5:22 pm Yuanbing Mao (ymao17): Approved for CHEM Chair
3. 05/21/24 2:05 pm Ayesha Qamer (aqamer): Rollback to Initiator
4. 05/29/24 12:47 pm mandal: Approved for CHEM Curriculum Committee Chair
5. 05/29/24 12:54 pm Yuanbing Mao (ymao17): Approved for CHEM Chair
6. 06/13/24 12:44 pm Ayesha Qamer (aqamer): Approved for Academic Affairs

7. 06/13/24 12:53 pm  
Joseph Gorzkowski  
(jgorzkow): Rollback  
to Initiator
8. 06/20/24 2:56 pm  
mandal: Approved  
for CHEM  
Curriculum  
Committee Chair
9. 06/20/24 11:37 pm  
Yuanbing Mao  
(ymao17): Approved  
for CHEM Chair
10. 08/08/24 7:06 pm  
Ayesha Qamer  
(aqamer): Approved  
for Academic Affairs
11. 08/09/24 9:04 am  
Joseph Gorzkowski  
(jgorzkow):  
Approved for  
Undergraduate  
Academic Affairs
12. 08/09/24 9:21 am  
Jennifer deWinter  
(jdewinter):  
Approved for LS  
Dean
13. 02/06/25 8:50 pm  
Kathiravan  
Krishnamurthy  
(kkrishn2): Rollback  
to Initiator
14. 02/10/25 4:03 pm  
Katherine Leight  
(kleight1): Approved  
for CHEM  
Curriculum  
Committee Chair
15. 02/10/25 4:05 pm  
Yuanbing Mao  
(ymao17): Approved  
for CHEM Chair
16. 02/11/25 12:21 am  
Ayesha Qamer  
(aqamer): Approved  
for Academic Affairs

17. 02/11/25 8:48 am  
Joseph Gorzkowski  
(jgorzkow):  
Approved for  
Undergraduate  
Academic Affairs

## History

1. Oct 25, 2017 by  
clmig-jwehrheim
2. Nov 8, 2017 by  
Sarah Pariseau  
(sparisea)
3. Nov 20, 2017 by  
Sarah Pariseau  
(sparisea)
4. Apr 27, 2018 by  
Sarah Pariseau  
(sparisea)
5. May 20, 2019 by  
Sarah Pariseau  
(sparisea)
6. Oct 23, 2020 by  
Holli Pryor-Harris  
(pryor)
7. Mar 26, 2021 by  
Katherine Leight  
(kleight1)
8. Apr 14, 2021 by  
Patty Johnson  
Winston (winston)
9. May 5, 2021 by  
Patty Johnson  
Winston (winston)
10. Jul 1, 2022 by Patty  
Johnson Winston  
(winston)

*If all courses in a subject in your department are required, please enter each subject followed by the number ranges in the "Quick Add" field in the pop up box when you click the green plus button below. For example: ARCH 100-499.*

What courses will  
factor the major  
GPA?

Program Type

Degree

Degree Type Bachelor of Science (BS)

CIP Code

40.0501 - Chemistry, General.

Is there more than one Academic Unit proposer?

No

Program Code

BS-CHEM-4 ~~BS-~~

~~CHEM-3~~

Program Attribute

Total Program

120 ~~127~~

Credit Hours

Rationale for

change in program

credit hours.

We trying to make the program more achievable, and complying with university strategic initiatives to lover the total program credits to 120. We are also updating the curriculum to follow ACS guidance.

Please provide a

summary and

rationale for the

requested program

revision.

02/08/2025, KRL: Concentrations/Specializations added, program credit hours reduced.

02/13/2024 SLO: Concentrations Added.

07/01/2022, PJW: Corrected bulletin spacing issues in source code.

New courses in the chemistry department are being offered for the new chemistry majors.

These new courses are appropriate for the regular chemistry major as well but have not been added. This will increase enrollment in the new courses.

10/23/2020 Updated program iteration code and effective CAT year/term for College Reorg.

HPH

## **Program Narrative and Justification**

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Narrative description of how the institution determined the need for the program. For example, describe what need this program will address and how the institution became aware of that need. If the program is replacing a current program(s), identify the current program(s) that is being replaced by the new program(s) and provide details describing the benefits of the new program(s). If the program will be offered in connection with, or in response to, an initiative by a governmental entity, provide details of that initiative.

This is an existing program

Incorporation of three small programs as specializations/concentrations is in line with university initiatives to reduce the number of small enrollment programs.

Total enrollment numbers:

CHEM, COMC, ENCH, FORC, MEDC, Total

F 24: 15, 1, 3, 12, 4, 35

F 23: 12, 1, 2, 5, 4, 24

F 22: 20, 2, 3, 5, 8, 38

F 21: 24, 1, 3, 4, 5, 37

F 20: 24, 1, 3, 4, 5, 37

F 19: 24, 1, 3, 4, 5, 37

Narrative description of how the program was designed to meet local market needs, or for an online program, regional or national market needs. For example, indicate if Bureau of Labor Statistics data or State labor data systems information was used, and/or if State, regional, or local workforce agencies were consulted. Include how the course content, program length, academic level, admission requirements, and prerequisites were decided; including information received from potential employers about course content; and information regarding the target students and employers.

Narrative description of any wage analysis the institution may have performed, including any consideration of Bureau of Labor Statistics wage data related to the new program.

Narrative description of how the program was reviewed or approved by, or developed in conjunction with, one or more of the following: a) business advisory committees; b) program integrity boards; c) public or private oversight or regulatory agencies (not including the state licensing/authorization agency and accrediting agency); and d) businesses that would likely employ graduates of the program. For example, describe the steps taken to develop the program, identify when and with whom discussions were held, provide relevant details of any proposals or correspondence generated, and/or describe any process used to evaluate the program.

On November 20, 2024, during the chemistry faculty meeting, the chemistry faculty voted on a new framework for the upcoming chemistry curriculum revision to reduce the number of credit hours, add concentrations/specializations, and update curriculum to ACS standards. The department nominated one faculty member from each subdivision to be on the curriculum committee (Analytical – Diep Nguyen, Inorganic – Adam Hock, Organic – Katie Leight, Physical – Ben Zion). The committee developed the proposal over winter break and the department voted to approve the proposal on January 15, 2025.

## Admission Entry Details

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What are the enrollment estimates?

Year 1 35

Year 2 40

Year 3 45

Attach Additional  
Program  
Justification  
Document(s)

## Academic Information

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### Advising

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Since quality advising is a key component of good retention, graduation, and career placement, how will students be mentored? What student professional organizations will be formed? How will the department work with the Career Services office to develop industry connections?

Advising will continue how it is currently being done.

### Program Resources

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Which program  
resources are  
necessary to offer  
this program?

## Proposed Catalog Entry

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Admission  
Requirements

Course Requirements

### Required Courses

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Chemistry Requirements (51)

Select minimum 51 credit hours from Chemistry Requirements 51

CHEM 100 Introduction to the Profession 2

CHEM 124 Principles of Chemistry I with Laboratory 4

CHEM 125 Principles of Chemistry II with Laboratory 4

CHEM 237 Organic Chemistry I 4

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<a href="#">CHEM 239</a>	Organic Chemistry II	3
<a href="#">CHEM 240</a>	Organic Chemistry Laboratory	1
<a href="#">CHEM 247</a>	Analytical Chemistry	4
<a href="#">CHEM 321</a>	Instrumental Analysis	4
<a href="#">CHEM 343</a>	Physical Chemistry I	3
<a href="#">CHEM 344</a>	Physical Chemistry II	4
<a href="#">CHEM 415</a>	Inorganic Chemistry	3
<a href="#">CHEM 416</a>	Advanced Chemistry Laboratory	3
<del>CHEM 434</del>	<del>Spectroscopic Methods in Identification and Analysis</del>	<del>4</del>
<a href="#">CHEM 451</a>	Undergraduate Seminar	2
<a href="#">CHEM 452</a>	<a href="#">Cheminformatics</a>	<u>3</u>
<a href="#">or MATH 225</a>	<a href="#">Introductory Statistics</a>	
<a href="#">or DS 151</a>	<a href="#">Introduction to Data Science</a>	
<a href="#">CHEM 485</a>	Chemistry Colloquium	1
<del>CHEM 485</del>	<del>Chemistry Colloquium</del>	<del>1</del>
Select two CHEM electives <sup>1</sup>		6
<b>Biology Requirements</b>		<b>(6-7)</b>
<a href="#">BIOL 107</a>	General Biology Lectures	3
<a href="#">or BIOL 115</a>	Human Biology	
<a href="#">BIOL 401</a>	Introductory Biochemistry	3-4
<a href="#">or BIOL 403</a>	Biochemistry	
<b>Mathematics Requirements</b>		<b>(14)</b>
<a href="#">MATH 151</a>	Calculus I	5
<a href="#">MATH 152</a>	Calculus II	5
<a href="#">MATH 251</a>	Multivariate and Vector Calculus	4
<a href="#">or MATH 252</a>	Introduction to Differential Equations	
<del>MATH 252</del>	<del>Introduction to Differential Equations</del>	<del>4</del>
<b>Physics Requirements</b>		<b>(8)</b>
<a href="#">PHYS 123</a>	General Physics I: Mechanics	4
<a href="#">PHYS 221</a>	General Physics II: Electricity and Magnetism	4
<b>Computer Science Requirement</b>		<b>(2)</b>
<a href="#">CS 105</a>	Introduction to Computer Programming	2

or <a href="#">CS 110</a>	Computing Principles	
Humanities and Social Sciences Requirements		(21)
<a href="#">See Illinois Tech Core Curriculum, sections B and C</a>		21
Interprofessional Projects (IPRO)		(6)
<a href="#">See Illinois Tech Core Curriculum, section E</a>		6
Free Electives		(12)
Select 12 credit hours		12
Total Credit Hours		120-121

<sup>1</sup> Students may choose from CHEM 400+ and CHEM 500+ level courses. Students planning to take CHEM 487 must complete CHEM 450 in a previous semester and are required to take one semester of CHEM 485.

Sample  
Curriculum/Program  
Requirements

Bachelor of Science in [General](#) Chemistry Curriculum ([without a Concentration](#))

~~Students may choose from CHEM 400+ and CHEM 500+ level courses. Students planning take CHEM 487%7C must complete CHEM 450%7C in a previous semester and are required to take one semester of CHEM 485%7C.~~

			Year 1
Semester 1	Credit Hours	Semester 2	Credit Hours
<a href="#">CHEM 100</a>	<u>2</u>	<del>CHEM 100</del>	<del>2</del>
<a href="#">CHEM 124</a>	4	<del>CHEM 125</del>	4
<a href="#">CS 105</a> or <a href="#">110</a>	2	<del>MATH 152</del>	5
<a href="#">MATH 151</a>	5	<del>PHYS 123</del>	4
Humanities 200-level Course	3	Social Sciences Elective	3
	16		16

			Year 2
Semester 1	Credit Hours	Semester 2	Credit Hours
<a href="#">CHEM 237</a>	4	<del>CHEM 239</del>	3
<del>BIOL 107 or 115</del>	<del>3</del>	<a href="#">CHEM 240</a>	<u>1</u>
<a href="#">CHEM 247</a>	<u>4</u>	<del>CHEM 247</del>	<del>3</del>
<a href="#">MATH 251</a> or <a href="#">252</a>	<u>4</u>	<del>MATH 252</del>	<del>4</del>
<a href="#">PHYS 221</a>	4	<a href="#">BIOL 107 or 115</a>	<u>3</u>
<del>Humanities or Social Sciences Elective</del>	<del>3</del>	<a href="#">Humanities or Social Sciences Elective</a>	<u>3</u>
		<a href="#">Humanities Elective (300+)</a>	<u>3</u>
		<a href="#">Free Elective</a>	<u>3</u>
	16		16

			Year 3
Semester 1	Credit Hours	Semester 2	Credit Hours
<del>CHEM 321</del> <sup>2</sup>	<del>4</del>	<a href="#">CHEM 321</a>	<u>4</u>

<u>CHEM 343</u>	3	<u>CHEM 344</u>	4
Chemistry Elective <sup>1</sup>	3	<del>CHEM 434</del> <sup>2</sup>	4
<u>CHEM 415</u>	<u>3</u>	<del>CHEM 485</del>	4
<u>CHEM 452, MATH 225, or DS 151</u>	<u>3</u>	Chemistry Elective	3
IPRO Elective I	3	Humanities Elective (300+)	3
Social Sciences Elective (300+)	3		
	15		14
			Year 4
Semester 1	Credit	Semester 2	Credit
	Hours		Hours
<del>CHEM 415</del> <sup>2</sup>	3	<u>CHEM 416</u>	3
<del>CHEM 451</del> <sup>2</sup>	<span style="border: 1px solid red; padding: 2px;">3</span>	<del>CHEM 485</del>	4
<u>CHEM 485</u>	<u>1</u>	Chemistry Elective <sup>1</sup>	3
Chemistry Elective	<u>3</u>	<u>CHEM 451</u>	<u>2</u>
<u>BIOL 401</u> or <u>403</u>	3-4	IPRO Elective II	3
Free Elective	3	Social Sciences Elective (300+)	3
Free Elective	3	Free Elective	3
	13-14		14
Total Credit Hours: 120-121			

<sup>2</sup>  
-  
CHEM 321%7C, CHEM 434%7C, CHEM 415%7C, and CHEM 451%7C are not offered every semester. The curriculum may differ in semesters five through eight depending on course offerings.

=  
=  
Specialization  
Requirements

## Environmental Chemistry CONCENTRATION

Chemistry Requirements		(54)
<u>CHEM 100</u>	<u>Introduction to the Profession</u>	<u>2</u>
<u>CHEM 124</u>	<u>Principles of Chemistry I with Laboratory</u>	<u>4</u>
<u>CHEM 125</u>	<u>Principles of Chemistry II with Laboratory</u>	<u>4</u>
<u>CHEM 237</u>	<u>Organic Chemistry I</u>	<u>4</u>
<u>CHEM 239</u>	<u>Organic Chemistry II</u>	<u>3</u>
<u>CHEM 240</u>	<u>Organic Chemistry Laboratory</u>	<u>1</u>
<u>CHEM 247</u>	<u>Analytical Chemistry</u>	<u>4</u>
<u>CHEM 321</u>	<u>Instrumental Analysis</u>	<u>4</u>
<u>CHEM 343</u>	<u>Physical Chemistry I</u>	<u>3</u>
<u>CHEM 344</u>	<u>Physical Chemistry II</u>	<u>4</u>

<u>CHEM 415</u>	<u>Inorganic Chemistry</u>	<u>3</u>
<u>CHEM 416</u>	<u>Advanced Chemistry Laboratory</u>	<u>3</u>
<u>CHEM 451</u>	<u>Undergraduate Seminar</u>	<u>2</u>
<u>CHEM 452</u>	<u>Cheminformatics</u>	<u>3</u>
<u>or MATH 225</u>	<u>Introductory Statistics</u>	
<u>or DS 151</u>	<u>Introduction to Data Science</u>	
<u>CHEM 463</u>	<u>Analytical Method Development Laboratory</u>	<u>3</u>
<u>CHEM 472</u>	<u>Environmental Chemistry</u>	<u>3</u>
<u>CHEM 473</u>	<u>Environmental Analytical Chemistry</u>	<u>3</u>
<u>CHEM 485</u>	<u>Chemistry Colloquium</u>	<u>1</u>
<b><u>Biology Requirements</u></b>		<b><u>(6-7)</u></b>
<u>BIOL 107</u>	<u>General Biology Lectures</u>	<u>3</u>
<u>or BIOL 115</u>	<u>Human Biology</u>	
<u>BIOL 401</u>	<u>Introductory Biochemistry</u>	<u>3-4</u>
<u>or BIOL 403</u>	<u>Biochemistry</u>	
<b><u>Mathematics Requirements</u></b>		<b><u>(14)</u></b>
<u>MATH 151</u>	<u>Calculus I</u>	<u>5</u>
<u>MATH 152</u>	<u>Calculus II</u>	<u>5</u>
<u>MATH 251</u>	<u>Multivariate and Vector Calculus</u>	<u>4</u>
<u>or MATH 252</u>	<u>Introduction to Differential Equations</u>	
<b><u>Physics Requirements</u></b>		<b><u>(8)</u></b>
<u>PHYS 123</u>	<u>General Physics I: Mechanics</u>	<u>4</u>
<u>PHYS 221</u>	<u>General Physics II: Electricity and Magnetism</u>	<u>4</u>
<b><u>Computer Science Requirement</u></b>		<b><u>(2)</u></b>
<u>CS 105</u>	<u>Introduction to Computer Programming</u>	<u>2</u>
<u>or CS 110</u>	<u>Computing Principles</u>	
<b><u>Humanities and Social Sciences Requirements</u></b>		<b><u>(21)</u></b>
<u>See Illinois Tech Core Curriculum, sections B and C</u>		<u>21</u>
<b><u>Interprofessional Projects (IPRO)</u></b>		<b><u>(6)</u></b>
<u>See Illinois Tech Core Curriculum, section E</u>		<u>6</u>
<b><u>Free Electives</u></b>		<b><u>(9)</u></b>
<u>Select 9 credit hours</u>		<u>9</u>

## Forensic Chemistry Concentration

### Chemistry Requirements (54)

<u>CHEM 100</u>	<u>Introduction to the Profession</u>	<u>2</u>
<u>CHEM 124</u>	<u>Principles of Chemistry I with Laboratory</u>	<u>4</u>
<u>CHEM 125</u>	<u>Principles of Chemistry II with Laboratory</u>	<u>4</u>
<u>CHEM 237</u>	<u>Organic Chemistry I</u>	<u>4</u>
<u>CHEM 239</u>	<u>Organic Chemistry II</u>	<u>3</u>
<u>CHEM 240</u>	<u>Organic Chemistry Laboratory</u>	<u>1</u>
<u>CHEM 247</u>	<u>Analytical Chemistry</u>	<u>4</u>
<u>CHEM 321</u>	<u>Instrumental Analysis</u>	<u>4</u>
<u>CHEM 343</u>	<u>Physical Chemistry I</u>	<u>3</u>
<u>CHEM 344</u>	<u>Physical Chemistry II</u>	<u>4</u>
<u>CHEM 415</u>	<u>Inorganic Chemistry</u>	<u>3</u>
<u>CHEM 416</u>	<u>Advanced Chemistry Laboratory</u>	<u>3</u>
<u>CHEM 451</u>	<u>Undergraduate Seminar</u>	<u>2</u>
<u>CHEM 452</u>	<u>Cheminformatics</u>	<u>3</u>
<u>or MATH 225</u>	<u>Introductory Statistics</u>	
<u>or DS 151</u>	<u>Introduction to Data Science</u>	
<u>CHEM 463</u>	<u>Analytical Method Development Laboratory</u>	<u>3</u>
<u>CHEM 475</u>	<u>Forensic Chemistry</u>	<u>3</u>
<u>CHEM 476</u>	<u>Forensic Chemistry Laboratory</u>	<u>3</u>
<u>CHEM 485</u>	<u>Chemistry Colloquium</u>	<u>1</u>

### Biology Requirements (6-7)

<u>BIOL 107</u>	<u>General Biology Lectures</u>	<u>3</u>
<u>or BIOL 115</u>	<u>Human Biology</u>	
<u>BIOL 401</u>	<u>Introductory Biochemistry</u>	<u>3-4</u>
<u>or BIOL 403</u>	<u>Biochemistry</u>	

### Mathematics Requirements (14)

<u>MATH 151</u>	<u>Calculus I</u>	<u>5</u>
<u>MATH 152</u>	<u>Calculus II</u>	<u>5</u>

<u>MATH 251</u>	<u>Multivariate and Vector Calculus</u>	<u>4</u>
<u>or MATH 252</u>	<u>Introduction to Differential Equations</u>	
<b><u>Physics Requirements</u></b>		<b><u>(8)</u></b>
<u>PHYS 123</u>	<u>General Physics I: Mechanics</u>	<u>4</u>
<u>PHYS 221</u>	<u>General Physics II: Electricity and Magnetism</u>	<u>4</u>
<b><u>Computer Science Requirement</u></b>		<b><u>(2)</u></b>
<u>CS 105</u>	<u>Introduction to Computer Programming</u>	<u>2</u>
<u>or CS 110</u>	<u>Computing Principles</u>	
<b><u>Humanities and Social Sciences Requirements</u></b>		<b><u>(21)</u></b>
<u>See Illinois Tech Core Curriculum, sections B and C</u>		<u>21</u>
<b><u>Interprofessional Projects (IPRO)</u></b>		<b><u>(6)</u></b>
<u>See Illinois Tech Core Curriculum, section E</u>		<u>6</u>
<b><u>Free Electives</u></b>		<b><u>(9)</u></b>
<u>Select 9 credit hours</u>		<u>9</u>
Total Credit Hours		120-121

## **Medicinal Chemistry Concentration**

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<b><u>Chemistry Requirements</u></b>		<b><u>(54)</u></b>
<u>CHEM 100</u>	<u>Introduction to the Profession</u>	<u>2</u>
<u>CHEM 124</u>	<u>Principles of Chemistry I with Laboratory</u>	<u>4</u>
<u>CHEM 125</u>	<u>Principles of Chemistry II with Laboratory</u>	<u>4</u>
<u>CHEM 237</u>	<u>Organic Chemistry I</u>	<u>4</u>
<u>CHEM 239</u>	<u>Organic Chemistry II</u>	<u>3</u>
<u>CHEM 240</u>	<u>Organic Chemistry Laboratory</u>	<u>1</u>
<u>CHEM 247</u>	<u>Analytical Chemistry</u>	<u>4</u>
<u>CHEM 321</u>	<u>Instrumental Analysis</u>	<u>4</u>
<u>CHEM 343</u>	<u>Physical Chemistry I</u>	<u>3</u>
<u>CHEM 344</u>	<u>Physical Chemistry II</u>	<u>4</u>
<u>CHEM 415</u>	<u>Inorganic Chemistry</u>	<u>3</u>
<u>CHEM 416</u>	<u>Advanced Chemistry Laboratory</u>	<u>3</u>
<u>CHEM 451</u>	<u>Undergraduate Seminar</u>	<u>2</u>
<u>CHEM 452</u>	<u>Cheminformatics</u>	<u>3</u>

<u>or MATH 225</u>	<u>Introductory Statistics</u>	
<u>or DS 151</u>	<u>Introduction to Data Science</u>	
<u>CHEM 456</u>	<u>Computational Biochemistry and Drug Design</u>	<u>3</u>
<u>CHEM 463</u>	<u>Analytical Method Development Laboratory</u>	<u>3</u>
<u>CHEM 467</u>	<u>Medicinal Chemistry</u>	<u>3</u>
<u>CHEM 485</u>	<u>Chemistry Colloquium</u>	<u>1</u>
<b><u>Biology Requirements</u></b>		<b><u>(6-7)</u></b>
<u>BIOL 107</u>	<u>General Biology Lectures</u>	<u>3</u>
<u>or BIOL 115</u>	<u>Human Biology</u>	
<u>BIOL 401</u>	<u>Introductory Biochemistry</u>	<u>3-4</u>
<u>or BIOL 403</u>	<u>Biochemistry</u>	
<b><u>Mathematics Requirements</u></b>		<b><u>(14)</u></b>
<u>MATH 151</u>	<u>Calculus I</u>	<u>5</u>
<u>MATH 152</u>	<u>Calculus II</u>	<u>5</u>
<u>MATH 251</u>	<u>Multivariate and Vector Calculus</u>	<u>4</u>
<u>or MATH 252</u>	<u>Introduction to Differential Equations</u>	
<b><u>Physics Requirements</u></b>		<b><u>(8)</u></b>
<u>PHYS 123</u>	<u>General Physics I: Mechanics</u>	<u>4</u>
<u>PHYS 221</u>	<u>General Physics II: Electricity and Magnetism</u>	<u>4</u>
<b><u>Computer Science Requirement</u></b>		<b><u>(2)</u></b>
<u>CS 105</u>	<u>Introduction to Computer Programming</u>	<u>2</u>
<u>or CS 110</u>	<u>Computing Principles</u>	
<b><u>Humanities and Social Sciences Requirements</u></b>		<b><u>(21)</u></b>
<u>See Illinois Tech Core Curriculum, sections B and C</u>		<u>21</u>
<b><u>Interprofessional Projects (IPRO)</u></b>		<b><u>(6)</u></b>
<u>See Illinois Tech Core Curriculum, section E</u>		<u>6</u>
<b><u>Free Electives</u></b>		<b><u>(9)</u></b>
<u>Select 9 credit hours</u>		<u>9</u>
Total Credit Hours		120-121

## **Program Outcomes and Assessment Process**

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What are your learning objectives in this program? Please list each learning objective in the boxes below:

*Note: These should be the same as described in your assessment plan at the bottom of this form.*

Students will have:

1) Foundational technical knowledge. They will be able to critically analyze and respond to chemical questions in relevant areas:

a) Analytical chemistry

b) Biochemistry

c) Organic chemistry

d) Inorganic chemistry

e) Physical chemistry

For students in the concentrations, they will additionally have foundational technical knowledge in:

f) Environmental chemistry (Environmental Chemistry Concentration)

g) Forensic chemistry (Forensic Chemistry Concentration)

h) Medicinal chemistry (Medicinal Chemistry Concentration)

Students will have:

2) Problem-solving skills. They will be able to:

a) Explain the rationale behind chemistry experiments

b) Demonstrate technical skills to carry out experiments in the laboratory or computer and to record results

c) Analyze data using qualitative and quantitative methods, including computer software, and apply critical reasoning to draw appropriate conclusions

Students will have:

3) Safety skills. They will be able to:

a) Describe and apply safe laboratory practices, including proper disposal techniques.

b) Recognize and minimize potential hazards in the laboratory.

Students will have:

4) Chemical literature skills. They will be able to:

a) Retrieve information from the chemical literature using on-line, interactive database-searching tools, including SciFinder

b) Explain and critically evaluate technical articles

Students will have:

5) Communication skills. They will be able to clearly communicate scientific ideas in both oral and written forms.

Students will have:

6) Broader awareness. Students will be able to explain the role of chemistry in contemporary societal and global issues.



Upload your  
assessment plan  
here:

[Program Assessment Plan.docx](#)

## Undergraduate Program Requirements

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What courses will  
factor the major  
GPA?

[CHEM 100 - Introduction to the Profession](#)  
[CHEM 124 - Principles of Chemistry I with Laboratory](#)  
[CHEM 125 - Principles of Chemistry II with Laboratory](#)  
[CHEM 237 - Organic Chemistry I](#)  
[CHEM 239 - Organic Chemistry II](#)  
[CHEM 240 - Organic Chemistry Laboratory](#)  
[CHEM 247 - Analytical Chemistry](#)  
[CHEM 321 - Instrumental Analysis](#)  
[CHEM 343 - Physical Chemistry I](#)  
[CHEM 344 - Physical Chemistry II](#)  
[CHEM 415 - Inorganic Chemistry](#)  
[CHEM 416 - Advanced Chemistry Laboratory](#)  
[CHEM 451 - Undergraduate Seminar](#)  
[CHEM 122 - Principles of Chemistry I](#)  
[CHEM 123 - General Chemistry Laboratory](#)  
[CHEM 126 - Principles of Chemistry II Without Laboratory](#)  
[CHEM 127 - Principles of Chemistry II Lab](#)  
[CHEM 140 - Principles of Chemistry II Lab](#)  
[CHEM 235 - Organic Chemistry I](#)  
[CHEM 236 - Organic Chemistry I-Lab](#)  
[CHEM 248 - Analytical Chemistry Laboratory](#)  
[CHEM 410 - Science of Climate Change](#)  
[CHEM 434 - Spectroscopic Methods in Identification and Analysis](#)  
[CHEM 438 - Physical Biochemistry](#)  
[CHEM 450 - Introduction to Research](#)  
[CHEM 452 - Cheminformatics](#)  
[CHEM 454 - Computational Quantum Chemistry](#)  
[CHEM 455 - Advanced Organic Chemistry](#)  
[CHEM 456 - Computational Biochemistry and Drug Design](#)  
[CHEM 460 - Bioanalytical Chemistry](#)  
[CHEM 461 - Bioanalytical Chemistry Laboratory](#)  
[CHEM 463 - Analytical Method Development Laboratory](#)  
[CHEM 467 - Medicinal Chemistry](#)  
[CHEM 470 - Introduction to Polymers](#)  
[CHEM 472 - Environmental Chemistry](#)  
[CHEM 473 - Environmental Analytical Chemistry](#)

[CHEM 475 - Forensic Chemistry](#)  
[CHEM 476 - Forensic Chemistry Laboratory](#)  
[CHEM 485 - Chemistry Colloquium](#)  
[CHEM 487 - Senior Thesis in Chemistry](#)  
[CHEM 491 - Undergraduate Research](#)  
[CHEM 495 - Seminar in Special Topics](#)  
[CHEM 497 - Special Projects](#)  
[CHEM 500 - Advanced Analytical Chemistry](#)  
[CHEM 501 - Capstone Project](#)  
[CHEM 503 - Survey of Analytical Chemistry](#)  
[CHEM 505 - Spectroscopic Methods I](#)  
[CHEM 506 - Sampling and Sample Preparation](#)  
[CHEM 508 - Analytical Methods Development](#)  
[CHEM 509 - Physical Methods of Characterization](#)  
[CHEM 510 - Electronics and Interfacing](#)  
[CHEM 512 - Spectroscopic Methods II](#)  
[CHEM 513 - Statistics for Analytical Chemists](#)  
[CHEM 515 - Gas Chromatography -- Theory and Practice](#)  
[CHEM 516 - Liquid Chromatography -- Theory and Practice](#)  
[CHEM 518 - Understanding the International Conference on Harmonization Guidelines](#)  
[CHEM 519 - Good Manufacturing Practices](#)  
[CHEM 520 - Advanced Inorganic Chemistry](#)  
[CHEM 521 - Structural Inorganic and Materials Chemistry](#)  
[CHEM 522 - Efficient Chemical and Materials Synthesis](#)  
[CHEM 524 - Synthesis and Intellectual Property Management](#)  
[CHEM 526 - Graduate Chemistry Laboratory](#)  
[CHEM 530 - Organic Reaction Mechanisms](#)  
[CHEM 531 - Tactics in Organic Synthesis](#)  
[CHEM 534 - Advanced Spectroscopic Methods](#)  
[CHEM 535 - Polymer Synthesis](#)  
[CHEM 537 - Polymer Chemistry Laboratory](#)  
[CHEM 538 - Physical Biochemistry](#)  
[CHEM 539 - Introduction to Pharmaceutical Chemistry](#)  
[CHEM 542 - Polymer Characterization and Analysis](#)  
[CHEM 543 - Analytical Chemistry in Pharmaceutical Laboratories](#)  
[CHEM 544 - Colloids and Colloid Analysis](#)  
[CHEM 545 - Sensor Science and Technology](#)  
[CHEM 546 - Project in Sensor Science and Technology](#)  
[CHEM 548 - Electrochemical Methods](#)  
[CHEM 550 - Theoretical and Computational Quantum Chemistry](#)  
[CHEM 552 - Chemical Kinetics](#)  
[CHEM 553 - Chemical Statistical Thermodynamics and Molecular Simulation](#)  
[CHEM 560 - Advanced Chemistry Projects](#)  
[CHEM 561 - Laboratory Rotations](#)  
[CHEM 584 - Graduate Seminar in Chemistry](#)

[CHEM 585 - Chemistry Colloquium](#)

[CHEM 591 - Research and Thesis](#)

[CHEM 594 - Special Problems](#)

[CHEM 596 - Chemistry for Teachers-Elementary](#)

[CHEM 597 - Reading and Special Problems](#)

[CHEM 598 - Chemistry for High School Teachers](#)

[CHEM 150 - Introductory Special Topics in Astrochemistry](#)

## Undergraduate Degree Requirements

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Minimum credit hours 120 ~~127~~

Specialization required?

~~No~~

Optional

Notes about specialization requirement

Minor required?  
No

## Proposed General Curriculum

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Degree credit hours required

Specialization credit hour requirement 9

List Major Course Requirements

List Mathematics Requirements

List Science Requirements

List Computer Science Requirements

List Humanities and Social Sciences

## Requirements

List

Interprofessional

Project (IPRO)

Requirements

List Technical

Elective Course

Options

List Free Elective      **12**  
Credit Hours (if  
applicable)

Semester-by-  
semester plan of  
study for the  
degree program

## Specialization

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To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Environmental Chemistry

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

These fit into the chemistry electives and free electives.

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CHEM 463, CHEM 472, and CHEM 473

---

To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Forensic Chemistry

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

These can contribute to chemistry electives and free electives.

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CHEM 463, CHEM 475, and CHEM 476

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To which degree does this specialization / concentration apply?

Title of Specialization / Concentration

Medicinal Chemistry

How many credit hours are required for this specialization / concentration?

9

Can credit hours be shared between specialization / concentration and major requirements?

Yes

Explain:

These contribute to Chemistry electives and Free electives.

List specialization/concentration courses, including any required choices from formal course groups. Please include the credit hour minimums for all course categories.

CHEM 456, CHEM 463, and CHEM 467

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## Program Assessment Plan

BS in Chemistry

2/3/2025

Learning Objectives:

Students will have:

- 1) Foundational technical knowledge. They will be able to critically analyze and respond to chemical questions in relevant areas:
  - a) Analytical chemistry
  - b) Biochemistry
  - c) Organic chemistry
  - d) Inorganic chemistry
  - e) Physical chemistry

For students in the concentrations, they will additionally have foundational technical knowledge in:

- f) Environmental chemistry (Environmental Chemistry Concentration)
  - g) Forensic chemistry (Forensic Chemistry Concentration)
  - h) Medicinal chemistry (Medicinal Chemistry Concentration)
- 2) Problem-solving skills. They will be able to:
  - a) Explain the rationale behind chemistry experiments
  - b) Demonstrate technical skills to carry out experiments in the laboratory or computer and to record results
  - c) Analyze data using qualitative and quantitative methods, including computer software, and apply critical reasoning to draw appropriate conclusions
- 3) Safety skills. They will be able to:
  - a) Describe and apply safe laboratory practices, including proper disposal techniques.
  - b) Recognize and minimize potential hazards in the laboratory.
- 4) Chemical literature skills. They will be able to:
  - a) Retrieve information from the chemical literature using on-line, interactive database-searching tools, including SciFinder
  - b) Explain and critically evaluate technical articles
- 5) Communication skills. They will be able to clearly communicate scientific ideas in both oral and written forms.
- 6) Broader awareness. Students will be able to explain the role of chemistry in contemporary societal and global issues.

## Curriculum map

required class	LO 1 a	LO 1 b	LO 1 c	LO 1 d	LO 1 e	LO 1 f	LO 1 g	LO 1 h	LO 2	LO 3	LO 4	LO 5	LO 6
CHEM 100											I	I	I
CHEM 124	I		I	I	I				I	I		X	
CHEM 125	D		X	X	X				D	D		X	
CHEM 237		X	I						D	D		X	
CHEM 239		X	A										
CHEM 240			A						D	D		X	
CHEM 247	D								D	D		X	
CHEM 321	A								A	A		X	
CHEM 343					D								
CHEM 344					A				A	A		X	
CHEM 415				A									
CHEM 416				A					A	A			
CHEM 451											A	A	A
CHEM 452 or MATH 225 or DS 151													
CHEM 456								A					
CHEM 463	A												
CHEM 467								A					
CHEM 472						A							
CHEM 473						A							
CHEM 475							A						
CHEM 476							A						
CHEM 485													A
CHEM XXX													
CHEM XXX													
BIOL 107 or BIOL 115		I											
BIOL 401 or BIOL 403		A											
MATH 151													
MATH 152													
MATH 251 or MATH 252													
PHYS 123													
PHYS 221													

### Yearly Assessment Plans

AY F24/S25 – We will assess LO 1 c, 1 f, and 2

AY F25/S26 – We will assess LO 1 a, 1 g, and 4

AY F26/S27 – We will assess LO 1 d, 1 h, and 3

AY F27/S28 – We will assess LO 1 b, 1 e, 5, and 6

(repeat every 4 years)

#### Describe Assessment Report Dissemination and Continuous Improvement Plans

Faculty who teach courses that are being assessed that academic year will collect articles to be assessed (ex: final exam, final presentation rubric). They will turn the articles into the assessment committee. The assessment committee will collect articles by 1 month prior to the deadline. Assessment committee will determine cutoff for students who do not meet expectations of the LO, meet expectations of the LO, and those who are proficient in the LO.

Example:

	Does not meet expectations (D or 1)	Meets Expectations (M or 3)	Proficient (P or 5)
LO 1 c) Foundational Organic Chemistry	Students are unable to answer more than 60% of foundational organic chemistry questions	Students are able to answer more than 60% of foundational organic chemistry but no more are missing a couple key concepts	Students are able to answer over 90% of foundational organic chemistry questions, demonstrating a thorough understanding of foundational organic chemistry

Assessment committee will then produce the report.