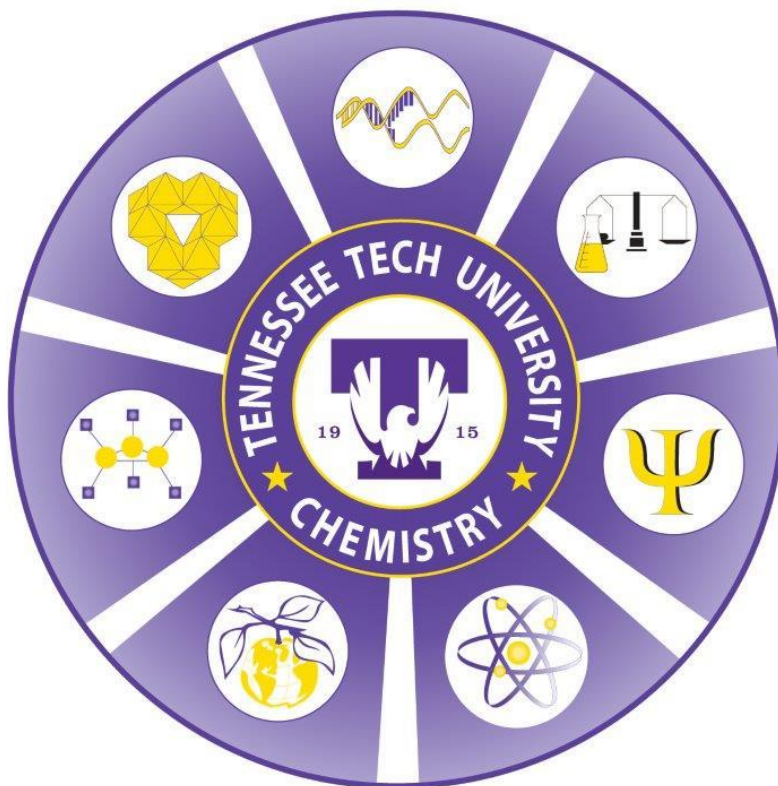


# Undergraduate Programs of Study



## Department of Chemistry

### Tennessee Tech University

Fall 2025



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## Chemistry Advisors



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# Undergraduate Degree Programs

Chemistry students have a variety of goals for their future. Some wish to prepare for graduate study and future research careers, while others plan to seek immediate employment or advanced study in other scientific or technical fields. Recognizing this, we offer eight concentration areas leading to the Bachelor of Science degree in chemistry:

<p><b><u>Pure Chemistry</u></b></p> <p>B.S. in chemistry for students preparing for a career as a professional chemist, including preparation for graduate study in chemistry. The curriculum focuses on chemistry, mathematics and physics. This curriculum exceeds the standards for certification set by the American Chemical Society.</p>	<p><b><u>Biochemistry</u></b></p> <p>B.S. in chemistry for students whose interests lie in careers at the biology/chemistry interface. This curriculum is designed to prepare for graduate study in biochemistry or a related field. It is also often preferred by students pursuing a pre-health program.</p>
<p><b><u>Environmental Chemistry</u></b></p> <p>B.S. in chemistry for students interested in the study of chemical and biochemical phenomena in natural places. It is an inter-disciplinary field that includes atmospheric, aquatic and soil chemistry. Opportunities in this area include entry level positions as well as graduate study.</p>	<p><b><u>Forensic Chemistry</u></b></p> <p>B.S. in chemistry for students interested in the application of chemistry in a legal or criminal setting. A forensic chemist can assist in the identification of unknown materials found at a crime scene. Opportunities are available in government or private laboratories, or in graduate study.</p>
<p><b><u>Health Science Chemistry</u></b></p> <p>B.S. in chemistry for students pursuing pre-health career studies. This curriculum meets the requirements for entry into professional school programs in medicine, dentistry, pharmacy or optometry. A "3+1" option is available for pharmacy or med tech career track students.</p>	<p><b><u>Business Chemistry</u></b></p> <p>B.S. in chemistry for students interested in an entry-level position as a chemist in industry. Requirements for this concentration also include completion of a minor in business for the student that may seek a later management position.</p>
<p><b><u>Industrial Chemistry</u></b></p> <p>B.S. in chemistry for students interested in an entry-level position as a chemist in industry. This curriculum focuses more on the necessary skills for success in a laboratory environment.</p>	<p><b><u>Custom Chemistry</u></b></p> <p>B.S. in chemistry that lies outside of the preceding established fields. A student, with the aid of their advisor, can construct a personalized program of study. Examples of past such curricula include food science or cosmetic chemistry.</p>
<p><b><u>A.C.S. Certification</u></b></p> <p>A student in any chemistry concentration may attain certification by the American Chemical Society as determined by the chemistry faculty. The Department of Chemistry defines specific areas of ACS certification including, but not restricted to, Pure Chemistry, Biochemistry, Environmental Chemistry, Health Science Chemistry and Forensic Chemistry. While Pure Chemistry exceeds these requirements, certification requirements for all other areas are above and beyond the curricular requirements of the concentrations.</p>	

# Student Organizations in the Chemistry Department

## **Student Members of the American Chemical Society (SMACS)**

Do you love chemistry? Learn why chemistry is called the central science, how you can get involved in undergraduate research, and get to know others who share your love of chemistry. The ACS student members are not only a cohesive group of chemistry majors, but we have members from all different majors across campus. We are active in outreach because we want to inspire others to see the value chemistry brings to their lives. As a member of SMACS, you'll also have the opportunity to become a national member of the ACS, the largest organization in the world dedicated to a single discipline. National members receive a subscription of the weekly magazine Chemical and Engineering News and other valuable member benefits. Our chapter is ranked as an Outstanding chapter which places us in the top level of student chapters both domestically and internationally. We achieve this awards status due to our number, diversity and quality of outreach, professional development and social activities. The many other benefits of membership (as well as a lot of great chemistry resources) can be found at the **ACS** website: [www.acs.org/education/student-communities](http://www.acs.org/education/student-communities).

Contact the faculty advisor **Dr. Amanda Carroll** (acarroll@tntech.edu) for more information.

## **Student Chapter of the American Society of Biochemistry and Molecular Biology (ASBMB)**

Are you interested in the cross-disciplinary field of biochemistry and molecular biology? If so, then this club may be just for you! ASBMB is a club that brings together students in chemistry, chemical engineering, biology and any other majors with interests in the molecular biosciences. Local and regional speakers provide career advisement through the presentation of symposia, the offering of plant tours and academic curricular decision-making. Plus, it brings students together with similar interests and career goals. Student members receive an online subscription to the Journal of Biological Chemistry and many more opportunities as an ASBMB member. More information can be found at the **ASBMB** website: [www.asbmb.org/education/student-chapters](http://www.asbmb.org/education/student-chapters).

Contact the faculty advisor **Dr. Derek Cashman** (dcashman@tntech.edu) for more information.

## **Chemical-Medical Sciences Club**

Are you interested in a professional career in health sciences? Do you aspire to become a physician, a dentist or dental hygienist, an optometrist or pharmacist or one of many other medical professionals? If this is your goal, then you simply must be a member of the Chem-Med Club. This club puts you in touch with the professionals you need to know if you are interested in a career in healthcare. Medical professionals visit the Chem-Med Club meetings and share the ins and outs of their profession and help you understand what it takes to be successful and what it takes to get into a professional graduate program as well! The club meets every first and third Tuesday of the month at 11 a.m. in the Lab Science Commons Room 126.

Contact the faculty advisor **Ms. Ann Marie Carrick** (acarrick@tntech.edu) for more information.

You can find more information about all of the Chemistry Department Student Organizations at [www.tntech.edu/cas/chemistry/student-organizations](http://www.tntech.edu/cas/chemistry/student-organizations).

# 41-Hour General Education Core

## **Communication – 9 hours**

### **6 hours in English composition**

ENGL 1010	English Composition I	3
ENGL 1020	English Composition II	3

### **3 hours in English oral presentational communication**

COMM 2025	Fundamentals of Communication	3
PC 2500	Communicating in the Professions	3

## **Mathematics – 3 hours**

MATH 1010	Math for General Studies	3
MATH 1420	Geometry Concepts for Teachers	3
MATH 1530	Introductory Statistics	3
MATH 1630	Finite Mathematics	3
MATH 1710	Pre-Calculus Algebra	3
MATH 1720	Pre-Calculus Trigonometry	3
MATH 1730	Pre-Calculus Mathematics	5
MATH 1830	Applied Calculus	3
MAH 1904	Extended Calculus IA	3
MATH 1910	Calculus I	4

## **History – 6 hours**

HIST 2010	Early United States History	3
HIST 2020	Modern United States History	3

## **Humanities and/or Fine Arts – 9 hours**

**At least one literature course, selected from those marked with an asterisk (\*) must be included in the 9 hours**

ART 1035	Introduction to Art	3
ART 2000	Art History Survey I	3
ART 2020	Art History Survey II	3
*ENGL 2130	Topics in American Literature	3
*ENGL 2235	Topics in British Literature	3
*ENGL 2330	Topics in World Literature	3
FLST 2520 (3520)	The Cultures and Peoples of North Africa	3
FREN 2510	French Culture and Civilization	3
GERM 2520	German Culture and Civilization	3
HIST 2210	Early Western Civilization	3
HIST 2220	Modern Western Civilization	3
HIST 2310	Early World History	3
HIST 2320	Modern World History	3
HIST 1310	Science and World Cultures	3
MUS 1030	Music Appreciation	3
PHIL1030	Introduction to Philosophy	3
PHIL 2250	Introduction to Ethics	3
RELS 2010	Introduction to Religious Studies	3
SPAN 2510	Spanish Culture and Civilization	3

SPAN 2550	Latin American Culture and Civilization	3
THEA 1030	Introduction to Theater	3

### **Social/Behavioral Sciences – 6 hours**

AGBE 2010	World Food and Society	3
ANTH 1100	Introduction to Anthropology	3
ECON 2010	Microeconomics	3
ECON 2020	Macroeconomics	3
ESS 1100	Introduction to Environmental Studies	3
EXPW 2015	Concepts of Health and Wellness	3
GEOG 1012	Cultural Geography	3
GEOG 1130	Geography of Natural Hazards	3
JOUR 1110	Media and Social Institutions	3
POLS 1030	American Government	3
PSY 1030	Introduction to Psychology	3
SOC 1010	Introduction to Sociology	3
WGS 2010	Women and Gender Studies	3

### **Natural Sciences – 8 hours**

ASTR 1010	Introduction to Modern Astronomy I	4
ASTR 1020	Introduction to Modern Astronomy II	4
BIOL 1010	Introduction to Biology	4
BIOL 1020	Diversity of Life	4
BIOL 1090	Concepts of Biology	4
BIOL 1113	General Biology I	4
BIOL 1123	General Biology II	4
BIOL 2010	Human Anatomy and Physiology I	4
BIOL 2020	Human Anatomy and Physiology II	4
BIOL 2310	General Botany	4
CHEM 1010	Introductory Chemistry I	4
CHEM 1090	Concepts of Chemistry	4
CHEM 1020	Introductory Chemistry II	4
CHEM 1110	General Chemistry I	4
CHEM 1120	General Chemistry II	4
CHEM 1710	Culinary Chemistry	4
GEOG 2100	Weather and Climate Systems	4
GEOL 1040	Physical Geology	4
GEOL 1045	Earth, Environment, Resources and Society	4
GEOL 1090	Concepts of Geology	4
PHYS 1090	Concepts of Physics	4
PHYS 2010	Algebra-based Physics I	4
PHYS 2020	Algebra-based Physics II	4
PHYS 2110	Calculus-based Physics I	4
PHYS 2120	Calculus-based Physics II	4

## TENNESSEE TECH MATH PLACEMENT by Tenn. Tech Mathematics Department

ACT Math	OLD SAT Math Before 3/2016	NEW SAT Math	DSPM	Next Gen. ACCUPLACER Test		Course
				QAS (C34)	AAF (C35)	
<15	<350	<380	1	≤224	N/A	Receive Tutoring/Retest
15-16	350-390	380-450	2	225-237	N/A	L section 1010, 1530, 1710
17-18	400-450	460-500	3	238-249	N/A	L section 1010, 1530, 1710
SAILS (May need permit.)	N/A	N/A	4	N/A	N/A	Equiv. to ACT 19 1010, 1410, 1530, 1630, 1710
19	460-470	510	4	250-300	N/A	1010, 1410, 1530, 1630, 1710
<b>Branch to AAF at QAS score of 255</b>						
				≤230	Place by QAS Score	
22 or SAILS+	520-530	540	N/A	N/A	231-250	1720
25	570-580	590-600	N/A	N/A	251-259	1730, 1830, 1845
27+	610+	630+	N/A	N/A	260-300	1910

**QAS** – Quantitative Reasoning, Algebra, and Statistics

**AAF** - Advanced Algebra and Function

Revised 2-14-2022

### **No ACT or SAT Scores**

- High School GPA 3.6 or higher (considered equivalent to 19 ACT)
  - MATH 1010, 1410, 1530, 1630, 1710
- SAILS or SAILS+ See Chart for placement
  - SAILS – Satisfies learning support math requirement for college-level math (equivalent to 19 ACT score)
  - SAILS+ - Completed all of TBR learning support math competencies. Is prepared for College Algebra or equivalent math.
- AP Scores – See AP Chart (If a student gets credit for MATH 1910 and/or 1920 and they choose to take the classes for credit, they will lose their AP credit and it will not be given back.
- Statewide Dual Credit – See Credit by Exam: Dual Credit Chart
- Credit by Exam: IB (International Baccalaureate) – see Credit by Exam: IB Chart
- Credit by Exam: Cambridge International – see Credit by Exam: Cambridge International Chart

**MATH 1130 is the same as MATH 1710.** If a student has credit for MATH 1130 and wants to take MATH 1710 or 1730, they will need a Mutual Exclusion Permit.

**Repeating a course with a grade of “B” or better:** If a student has a grade of “B” or better in a class and wants to retake it, they will need to fill out paperwork found on the Registrar’s website. The grade they make in the class will replace the grade they had, possibly causing them to lose the “B” or better.

### **Rules for Auditing a Class:**

- Must be enrolled full-time in 12 hours of classes for credit.
- Will be charged same amount for audited course as would be for a course bearing credits.
- Can’t drop any of classes bearing credits, as they will go below full-time and will lose any scholarships they may have.

### **MATH 0800 and 0850**

- C or better in 0800 places a student into an L section of MATH 1010, 1530 or 1710 depending on ACT or SAT math score.
- C or better in 0850 places a student into a regular section of MATH 1010, 1530, 1410, 1630 or 1710.

### **COMPASS Scores**

- If a student has COMPASS scores, ask them to take the ACCUPLACER test.

**Bachelor of Science, Chemistry Major  
Pure Chemistry Concentration**

<b>CHEMISTRY (57 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Interactions	1
2010 Intro Inorganic Chem	3
2910 Undergr. Research Methods	1
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3510 Physical Chemistry I	4
3520 Physical Chemistry II	4
4110 Inorganic Chemistry	3
4150 Inorganic Laboratory	1
4210 Chemistry of Polymers	3
4520 Instrumental Analysis	4
4610 General Biochemistry I	3
4920 Chemistry Seminar	3
4991 Undergraduate Research	1
Advanced Chemistry Courses	6

<b>MATHEMATICS (14-15 hrs)</b>	
1910 Calculus I	4
1920 Calculus II	4
2110 Calculus III	4
Elective	2-3

<b>PHYSICS (8 hrs)</b>	
2110 Calculus-Based Physics I	4
2120 Calculus-Based Physics II	4

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>ELECTIVES (10-11 hrs)</b>	

<b>TOTAL</b>	<b>120</b>
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Course	Cr. Hrs.	Course	Cr. Hrs.		
FIRST YEAR					
Semester: Fall	Total Credit Hours:	15	Semester: Spring	Total Credit Hours:	14
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4		
CHEM 1500 First Year Interactions and Advisement	1	MATH 1920 Calculus II	4		
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3		
ENGL 1010 English Composition I	3	Social Science General Education Credit	3		
Social Science General Education Credit	3				

Course	Cr. Hrs.	Course	Cr. Hrs.		
SOPHOMORE YEAR					
Semester: Fall	Total Credit Hours:	16	Semester: Spring	Total Credit Hours:	17
CHEM 2010 Intro to Inorganic	3	CHEM 3020 Organic Chemistry II	4		
CHEM 2910 Undergraduate Research Methods I	1	MATH/PHYS Elective*	3		
CHEM 3010 Organic Chemistry I	4	PHYS 2120 Calculus-based Physics II	4		
MATH 2110 Calculus III	4	ENGL 2130/2235/2330 Literature	3		
PHYS 2110 Calculus-based Physics I	4	Humanities General Education Credit	3		

Course		Cr. Hrs.	Course		Cr. Hrs.
JUNIOR YEAR					
Semester: Fall	Total Credit Hours:	14	Semester: Spring	Total Credit Hours:	15
CHEM 3410 Quantitative Analysis		4	CHEM 3520 Physical Chemistry II		4
CHEM 3510 Physical Chemistry I		4	HIST 2020 Modern US History		3
HIST 2010 Early US History		3	COMM 2025/PC 2500 Oral Communication		3
Humanities General Education Credit		3	Elective		5

Course	Cr. Hrs.	Course	Cr. Hrs.		
SENIOR YEAR					
Semester: Fall	Total Credit Hours:	16	Semester: Spring	Total Credit Hours:	13
CHEM 4210 Chemistry of Polymers	3	CHEM 4110 Inorganic Chemistry	3		
CHEM 4520 Instrumental Analysis	4	CHEM 4150 Inorganic Chemistry Lab	1		
CHEM 4610 General Biochemistry I	3	Advanced Chemistry Electives**	6		
CHEM 4920 Chemistry Seminar	3	CHEM 4991 Undergraduate Research	1		
Electives	3	Electives	2		

\*Chosen from: MATH 2010, 2120, 3070 or PHYS 2920

\*\*Chosen from: CHEM 4310, 4320, 4410, 4620, 4650, 4710, 4720, 4980, 4991/4992/4993  
total hours from CHEM 4991/4992/4993 cannot exceed 4 hours

## Bachelor of Science, Chemistry Major Biochemistry Concentration

<b>CHEMISTRY (38 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3420 Analytical Applications	3
3500 Elements of Physical Chem.	3
4610 General Biochemistry I	3
4620 General Biochemistry II	3
4650 Biochemistry Lab	2
4920 Chemistry Seminar	3

<b>BIOLOGY (26 hrs)</b>	
1113 General Biology I	4
1123 General Biology II	4
3140 Cell Biology	4
3230 Microbiology	4
3810 General Genetics	4
4150 Molecular Genetics	3
4040 or 4060	3

<b>MATHEMATICS (7 hrs)</b>	
1910 Calculus I	4
3070 Statistical Methods	3

<b>PHYSICS (8 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>ELECTIVES (12 hrs)</b>	

<b>TOTAL</b>	<b>120</b>
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Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	ENGL 1020 English Composition II	3
MATH 1910 Calculus I	4	BIOL 1123 General Biology II	4
ENGL 1010 English Composition I	3	Social Science General Education Credit	3
BIOL 1113 General Biology I	4		

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3410 Quantitative Analysis	4	CHEM 3420 Analytical Applications	3
PHYS 2010/2110 Physics I	4	PHYS 2020/2120 Physics II	4
BIOL 3230 Health Science Microbiology	4	BIOL 3140 Cellular Biology	4
Humanities General Education Credit	3	Humanities General Education Credit	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
HIST 2010 Early US History	3	CHEM 3500 Elements of Physical Chemistry	3
COMM 2025/PC 2500 Oral Communication	3	HIST 2020 Modern US History	3
BIOL 3810 General Genetics	4	ENGL 2130/2235/2330 Literature	3
		Social Science General Education Credit	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 4610 General Biochemistry I	3	CHEM 4620 General Biochemistry II	3
CHEM 4920 Chemistry Seminar	3	CHEM 4650 General Biochemistry Lab	2
MATH 3070 Statistical Methods	3	BIOL 4150 Molecular Genetics	3
Electives	7	BIOL 4040/4060	3
		Electives	4

## Bachelor of Science, Chemistry Major Environmental Chemistry Concentration

<b>CHEMISTRY (43 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3500 Elements of Physical Chem.	3
4520 Instrumental Analysis	4
4920 Chemistry Seminar	3
4710 Environmental Chemistry	3
4720 Advanced Environmental Chem	3
4XXX CHEM Elective	3

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113- General Biology I (4)	
BIOL 1123- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Intro to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (15 hrs)</b>	
BIOL 3120 General Ecology	3
Chosen from:	12
AGRN 3230, 4220	
BIOL 3200/3230, 4130, 4840	
GEOG 4510	
GEOL 4300, 4711	

<b>ELECTIVES (8-10 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4		

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3500 Elements of Physical Chemistry	3
CHEM 3410 Quantitative Analysis	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	COMM 2025/PC 2500 Oral Communication	3
BIOL 3120 Ecology	3	BIOL/MATH Elective*	3
Social Science General Education Credit	3	Technical Requirement***	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
CHEM 4520 Instrumental Analysis	4	ENGL 2130/2235/2330 Literature	3
HIST 2010 Early US History	3	HIST 2020 Modern US History	3
Technical Requirement***	3	Technical Requirement***	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 4710 Environmental Chemistry	3	CHEM 4720 Advanced Environmental Chemistry	3
CHEM 4920 Chemistry Seminar	3	Advanced Chemistry**	3
Social Science General Education Credit	3	Humanities General Education Credit	3
Elective	6	Technical Requirement***	3
		Elective	3

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080

\*\*Choose from: CHEM 3520, 4110, 4150, 4210, 4310, 4320, 4410, 4520, 4610, 4620, 4650, 4980, 4991/4992/4993  
(total hours from CHEM 4991/4992/4993 cannot exceed 4 hours)

\*\*\*12 hours from: AGRN 3230, 4220; BIOL 3200/3230, 4130, 4840; GEOG 4510; GEOL 4300, 4711

## Bachelor of Science, Chemistry Major Forensic Chemistry Concentration

<b>CHEMISTRY (42 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3500 Elements of Physical Chem.	3
4520 Instrumental Analysis	3
4920 Chemistry Seminar	3
4410 Forensic Chemistry	4
4610 Biochemistry I	3
4650 Biochemistry Laboratory	2

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113*- General Biology I (4)	
BIOL 1123- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Intro to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

\*Recommended

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (16 hrs)</b>	
BIOL 3810 General Genetics	4
BIOL 4150 Molecular Genetics	3
CJ 2660 Criminology	3
CJ 4250 Drugs & Behav. Phar.	3
BIOL 3330 Entomology OR	
CJ 3640 Cybercrime	3

<b>ELECTIVES (7-9 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4	Social Science General Education Credit	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3500 Elements of Physical Chemistry	3
CHEM 3410 Quantitative Analysis	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	CJ 2660 Criminology	3
BIOL 3810 General Genetics	4	COMM 2025/PC 2500 Oral Communication	3
		BIOL/MATH Elective*	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
CHEM 4520 Instrumental Analysis	4	BIOL 4150 Molecular Genetics	3
HIST 2010 Early US History	3	HIST 2020 Modern US History	3
CJ 4250 Drugs/Behavioral Pharmacology	3	ENGL 2130/2235/2330 Literature	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 4610 General Biochemistry I	3	CHEM 4650 General Biochemistry Lab	2
CHEM 4920 Chemistry Seminar	3	CHEM 4410 Forensic Chemistry	4
Social Science General Education Credit	3	BIOL 3330/CJ 3640 Entomology/Cyber Crime	3
Electives	5	Humanities General Education Credit	3
		Electives	3

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080 (BIOL 1113 recommended)

**Bachelor of Science, Chemistry Major  
Health Science Chemistry Concentration**

<b>CHEMISTRY (42 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3420 Analytical Applications	3
3500 Elements of Physical Chem.	3
4920 Chemistry Seminar	3
4610 Biochemistry I	3
4620 Biochemistry II	3
4XXX CHEM Elective	3

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113*- General Biology I (4)	
BIOL 1123*- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Into to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

\*Recommended

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (15-16 hrs)</b>	
BIOL 2010 Anatomy & Phys. I	4
BIOL 2020 Anatomy & Phys. II	4
BIOL 3230 HS Microbiology	4
Chosen from:	3-4
BIOL 3140, 3810, 4040, 4060, 4750	

<b>ELECTIVES (7-10 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4	Social Science General Education Credit	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3020 Organic Chemistry II	4
CHEM 3010 Organic Chemistry I	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	BIOL 2020 A&P II	4
BIOL 2010 A&P I	4	BIOL/MATH Elective*	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3410 Quantitative Analysis	4	CHEM 3420 Analytical Applications	3
BIOL 3230 Health Science Microbiology	4	CHEM 3500 Elements of Physical Chemistry	3
HIST 2010 Early US History	3	Humanities General Education Credit	3
ENGL 2130/2235/2330 Literature	3	HIST 2020 Modern US History	3
		Social Science General Education Credit	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 4610 General Biochemistry I	3	CHEM 4620 General Biochemistry II	3
CHEM 4920 Chemistry Seminar	3	Advanced Chemistry**	3
Technical Requirement***	4	COMM 2025/PC 2500 Oral Communication	3
Electives	6	Electives	3

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080 (BIOL 1113/1123 recommended)

\*\*Choose from: CHEM 3520, 4110, 4150, 4210, 4310, 4320, 4410, 4520, 4650, 4710, 4720, 4980, 4991/4992/4993  
(total hours from CHEM 4991/4992/4993 cannot exceed 4 hours)

\*\*\*Choose from: BIOL 3140, 3810, 4040, 4060, 4750

**Bachelor of Science, Chemistry Major  
Business Chemistry Concentration**

<b>CHEMISTRY (42 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3420 Analytical Applications	3
3500 Elements of Physical Chem.	3
4920 Chemistry Seminar	3
Advanced Chemistry Courses	9
(Approved by advisor)	

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113- General Biology I (4)	
BIOL 1123- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Intro to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
ECON 2010 Microeconomics	3
ECON 2020 Macroeconomics	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (15 hrs)</b>	
ACCT 3720 Surv. of Account.	3
BMGT 3510 Management	3
FIN 3210 Prin. of Finance	3
MKT 3400 Prin. of Marketing	3
DS 3620 or LAW 2810	3

<b>ELECTIVES (8-10 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4		

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3420 Analytical Applications	3
CHEM 3410 Quantitative Analysis	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	BIOL/MATH Elective*	3
ECON 2010 Microeconomics	3	COMM 2025/PC 2500 Oral Communication	3
Technical Requirement	3	ECON 2020 Macroeconomics	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
Technical Requirement	3	CHEM 3500 Elements of Physical Chemistry	3
HIST 2010 Early US History	3	Technical Requirement	3
ENGL 2130/2235/2330 Literature	3	HIST 2020 Modern US History	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
Advanced Chemistry**	3	Advanced Chemistry**	6
CHEM 4920 Chemistry Seminar	3	Technical Requirement	3
Technical Requirement	3	Humanities General Education Credit	3
Electives	5	Electives	5

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080

\*\*Choose from: CHEM 3520, 4110, 4150, 4210, 4310, 4320, 4410, 4520, 4610, 4620, 4650, 4710, 4720, 4980, 4991/4992/4993 (total hours from CHEM 4991/4992/4993 cannot exceed 4 hours)

**Bachelor of Science, Chemistry Major  
Industrial Chemistry Concentration**

<b>CHEMISTRY (42 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3420 Analytical Applications	3
3500 Elements of Physical Chem.	3
4920 Chemistry Seminar	2
Advanced Chemistry Courses	9

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113- General Biology I (4)	
BIOL 1123- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Intro to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (15-16 hrs)</b>	
MET 1100 Intro to MET	2
MET 2000 Occupational Safety	2
MET 2400 Statics & Strengths	3
PC 3250 Professional Comm.	3
COOP 2010, 2020, 2030	3
ACCT 3720, MET 3100,3740 OR	
COOP 4010, 4020, 4030	2-3

<b>ELECTIVES (6-9 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4	MET 1100 Intro to Manufacturing/Engineering	2

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3420 Analytical Applications	3
CHEM 3410 Quantitative Analysis	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	COMM 2025/PC 2500 Oral Communication	3
Social Science General Education Credit	3	MET 2000 Occupational Safety	2
MET 2400 Statics & Strengths of Materials	3	BIOL/MATH Elective*	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
Advanced Chemistry**	3	CHEM 3500 Elements of Physical Chemistry	3
HIST 2010 Early US History	3	HIST 2020 Modern US History	3
ENGL 2130/2235/2330 Literature	3	PC 3520 Professional Communications	3

COOP 2010-2030 After junior year (3 semesters) 3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
Advanced Chemistry**	3	Advanced Chemistry**	3
CHEM 4920 Chemistry Seminar	3	Humanities General Education Credit	3
Social Science General Education Credit	3	Technical Requirement***	3
Electives	6	Electives	3

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080

\*\*Choose from: CHEM 3520, 4110, 4150, 4210, 4310, 4320, 4410, 4520, 4610, 4620, 4650, 4710, 4720, 4980  
4991/4992/4993 (total hours from CHEM 4991/4992/4993 cannot exceed 4 hours)

\*\*\*Choose from: AACT 3720; MET 3100, 3740; COOP 4010, 4020, 4030

**Bachelor of Science, Chemistry Major**  
**Custom Chemistry Concentration**

<b>CHEMISTRY (42 hrs)</b>	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 First-Year Connections	1
2010 Intro Inorganic Chemistry	3
3010 Organic Chemistry I	4
3020 Organic Chemistry II	4
3410 Quantitative Analysis	4
3420 Analytical Applications	3
3500 Elements of Physical Chem.	3
4920 Chemistry Seminar	3
Advanced Chemistry Courses	9
(Approved by advisor)	

<b>PHYSICS &amp; CALCULUS (12 hrs)</b>	
2010 Algebra-Based Physics I	4
2020 Algebra-Based Physics II	4
1910 Calculus I	4

<b>BIOLOGY &amp; MATH ELECTIVES (select 11-12 hrs)</b>	
BIOL 1113- General Biology I (4)	
BIOL 1123- General Biology II (4)	
MATH 1530- Intro Stats (3)	
MATH 1920- Calculus II (4)	
MATH 2010- Intro to Linear Algebra (3)	
MATH 2110- Calculus III (4)	
MATH 2120- Differential Equations (3)	
MATH 3070- Statistical Methods I (3)	
MATH 3080- Statistical Methods II (3)	

<b>ENGLISH (6 hrs)</b>	
1010 English Composition I	3
1020 English Composition II	3

<b>HUMANITIES (9 hrs)</b>	
Literature	3
	3
	3

<b>HISTORY (6 hrs)</b>	
2010 Early US History	3
2020 Modern US History	3

<b>SOCIAL/BEHAVIORAL SCIENCE (6 hrs)</b>	
	3
	3

<b>COMMUNICATION (3 hrs)</b>	
	3

<b>TECHNICAL REQUIREMENTS (14 hrs)</b>	
(Approved by advisor)	

<b>ELECTIVES (8-10 hrs)</b>	
<b>TOTAL</b>	<b>120</b>

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>FIRST YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 1110 General Chemistry I	4	CHEM 1120 General Chemistry II	4
CHEM 1500 First Year Interactions and Advisement	1	BIOL/MATH Elective*	4
MATH 1910 Calculus I	4	ENGL 1020 English Composition II	3
ENGL 1010 English Composition I	3	Humanities General Education Credit	3
BIOL/MATH Elective*	4		

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SOPHOMORE YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 2010 Intro to Inorganic	3	CHEM 3420 Analytical Applications	3
CHEM 3410 Quantitative Analysis	4	PHYS 2020/2120 Physics II	4
PHYS 2010/2110 Physics I	4	Social Science General Education Credit	3
Social Science General Education Credit	3	COMM 2025/PC 2500 Oral Communication	3
		BIOL/MATH Elective*	3

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>JUNIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
CHEM 3010 Organic Chemistry I	4	CHEM 3020 Organic Chemistry II	4
Technical Requirement***	3	CHEM 3500 Elements of Physical Chemistry	3
HIST 2010 Early US History	3	HIST 2020 Modern US History	3
ENGL 2130/2235/2330 Literature	3	Technical Requirement***	4

Course	Cr. Hrs.	Course	Cr. Hrs.
<b>SENIOR YEAR</b>			
Semester: Fall	Total Credit Hours:	Semester: Spring	Total Credit Hours:
Advanced Chemistry**	3	Advanced Chemistry Courses**	6
CHEM 4920 Chemistry Seminar	3	Technical Requirement***	4
Technical Requirement***	3	Electives	3
Elective	8	Humanities General Education Credit	3

\*Choose from: BIOL 1113, 1123, MATH 1530, 1920, 2010, 2110, 2120, 3070, 3080

\*\*Choose from: CHEM 3520, 4110, 4150, 4210, 4310, 4320, 4410, 4520, 4610, 4620, 4650, 4710, 4720, 4980  
4991/4992/4993 (total hours from CHEM 4991/4992/4993 cannot exceed 4 hours)

\*\*\*Advisor approved

These requirements apply only to ACS certification. The student must still meet the requirements specified for their particular concentration. Note that the **Pure Chemistry** concentration already meets ACS requirements.

<b>Introductory Chemistry</b>			
<b>Class</b>	<b>Title</b>	<b>Hrs</b>	<b>Lab</b>
1110	General Chemistry I	4	1
1120	General Chemistry II	4	1
1500	First-Year Conn.	1	
2910	UG Research Methods	1	

<b>Foundation Courses</b>			
<b>Class</b>	<b>Title</b>	<b>Hrs</b>	<b>Lab</b>
2010	Intro. to Inorganic	3	0
3010	Organic Chemistry I	4	1
3410	Quantitative Anal.	4	2
3510	Physical Chem. I *	4	1
4610	Biochemistry I	3	0

<b>Required In-Depth Courses</b>			
<b>Class</b>	<b>Title</b>	<b>Hrs</b>	<b>Lab</b>
3020	Organic Chemistry II	4	1
4210	Chem. of Polymers	3	0
4520	Instrumental Anal. *	4	1
4920	Chemistry Seminar	3	0
4991	Intro. to Research	1	1

<b>Mathematics</b>			
1910	Calculus I	4	
1920	Calculus II	4	

<b>Physics</b>			
2110 or 2010		4	1
2120 or 2020		4	1

<b>In-Depth Courses/Specific Areas</b>			
<b>Class</b>	<b>Title</b>	<b>Hrs</b>	<b>Lab</b>
<b>Biochemistry</b>			
4620	Biochemistry II	3	0
4650	Biochemistry Lab	2	2
4xxx	Elective	3	1

<b>Environmental Chemistry</b>			
4710	Environmental Chem.	3	0
4720	Adv. Env. Chem.	3	1
4650	Biochemistry Lab	2	2

<b>Health Sciences Chemistry</b>			
4620	Biochemistry II	3	0
4650	Biochemistry Lab	2	2
4xxx	Elective	3	1

<b>Forensic Chemistry</b>			
4410	Forensic Chem.	4	1
4650	Biochemistry Lab	2	2
4xxx	Elective	3	0

\* CHEM 3510 & 4520 replace 3500 & 3420, respectively in all curricula except Pure Chemistry.

# Reading a Course Schedule

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CHEM	1110	001	80498	General Chemistry I	LEC	4	MWF	08:00 AM	08:50 AM	SLH 126	40	40	80	K Rust
CHEM	1110	002	80499	General Chemistry I	LEC	4	MWF	10:00 AM	10:50 AM	SLH 126	90	-10	80	A Carroll
CHEM	1110	003	80500	General Chemistry I	LEC	4	MWF	11:00 AM	11:50 AM	SLH 126	90	-10	80	A Carroll
CHEM	1110	101	80505	General Chemistry I	LAB	0	M	09:00 AM	11:50 AM	LSC 1305	45	3	48	STAFF
CHEM	1110	102	80506	General Chemistry I	LAB	0	M	10:00 AM	12:50 PM	LSC 1327	24	24	48	STAFF
CHEM	1110	103	80507	General Chemistry I	LAB	0	M	12:00 PM	2:50 PM	LSC 1305	27	21	48	STAFF

- A. **SUBJECT** – This three or four-letter term describes the general subject or department that houses the course.
- B. **COURSE NUMBER** – This four-digit number represent a specific course. Courses with 1000 numbers are typically freshman or introductory courses. Increasing numbers represent higher level courses, 2000 (sophomore), 3000 (junior) and 4000 (senior).
- C. **SECTION** – This three-digit number designates a particular class for the course indicated. Most courses offer multiple sections, representing different times and places. Numbers beginning with “0” indicate a lecture section. Those starting with “1” are laboratory sections. Most science classes require enrollment in one lecture and one lab. Other section types are “5” TN Tech online lectures, “6” off-campus classes, “8” honors classes, and “R” TN eCampus courses.
- D. **CRN** – Course registration number. This five-digit number correlates to the course and section. It is entered into Eagle Online when enrolling in the designated class.
- E. **TITLE** – This title describes the course and correlates to the “Course Number.”
- F. **TYPE** – This indicates the primary activity for the given section. Possible values are lecture (LEC), laboratory (LAB), recitation (REC), seminar (SEM) and independent study (IND).
- G. **CREDIT HRS** – The number of credit hours assigned for the course in question. Values can usually range from 1-5 hours, depending upon the nature of the course. Lecture courses account for the largest credit hours, with the value roughly corresponding to the amount of meeting time per week. The most common value is “3”, which would be typical of a course that meets for 50 minutes/period, three periods/week. A lab section displaying 2-4 actual “clock hours” would be equivalent to 1 credit hour, since it is an activity. The credit is usually incorporated into the corresponding lecture and the lab is assigned “0” credit hours.
- H. **DAYS** – The days when the class actually meets. Abbreviations are Monday (M), Tuesday (T), Wednesday (W), Thursday (R) and Friday (F).
- I. **BEGIN TIME** – The time at which the section starts. Most lecture classes run 50 minutes. With a 10-minute break between classes, the next period usually begins on the next hour. Exceptions are two-day courses that may begin on the half-hour and run 75 minutes.
- J. **END TIME** – The time when the class should end. This assumes a 50-minute period for a 3-credit class occurring three days/week. Some classes may be MW or TR and run for 75 minutes per period, but for only 2 days/week.
- K. **LOCATION** - The building and room where the class meets. Consult the campus map for the meaning of the abbreviations.
- L. **ENROLLMENT** – The number of students enrolled in the given section.
- M. **AVAILABLE SEATS** – The number of open seats in the section. If this number is 0 or (-), then the section is considered closed.
- N. **MAX SEATS** - The total number of seats allowed for a given section.
- O. **INSTRUCTOR** – The faculty member responsible for the given section. Sections listed as STAFF are typically assigned an instructor at a later date.

## Course Listing

### **CHEM 1000. Chemistry Problem Solving.** Lec. 3. Credit 3.

An introductory course for students without sufficient high school background in chemistry. Topics include metric system, atomic structure, bonding stoichiometry, solutions and some descriptive chemistry. Not degree credit as chemistry course. May be used for elective credit in some programs.

### **CHEM 1010-20. Introductory Chemistry.** Lec. 3. Lab. 3. Credit 4.

Prerequisites: CHEM 1010 is a prerequisite to 1020. Overview of chemical principles and applications. Laboratories emphasize general principles of chemistry.

### **CHEM 1050. Foundations of Chemistry Laboratory.** Lab. 2. Credit 1.

Corequisite: CHEM 1000. Selected experiments to complement lecture material in CHEM 1000.

### **CHEM 1090. Concepts of Chemistry.** Lec. 3. Lab. 3. Credit 4.

Prerequisite: None. Concepts of Chemistry is an activity-driven, integrated lecture/laboratory course covering the fundamental chemical principles of the structure of matter, the evidence and behavior chemical structure determines, as well as the real-world applications of chemical principles.

### **CHEM 1110. General Chemistry I.** Lec. 3. Lab. 3. Credit 4.

Prerequisite: ACT Math score of 19 or higher; or SAT Math score of 530 or higher; or B or higher in CHEM 1000; or C or higher in MATH 1710; or Accuplacer AQS score of 250-300; or AAF 231 or greater. General chemistry course for students pursuing a degree in a STEM-related field. Topics include atomic and molecular level structure and properties, stoichiometry, aqueous reactions, thermochemistry and properties of gases. Associated laboratory supports lecture content and incorporates elements of atomic emission spectroscopy and stoichiometric calculations. Meets Tennessee Technological University general education requirement (Natural Sciences).

### **CHEM 1120. General Chemistry II.** Lec. 3. Lab. 3. Credit 4.

Prerequisite: CHEM 1110, with a grade of C or better. General chemistry course for students pursuing a degree in a STEM-related field. Topics include properties of liquids and solids, solutions, kinetics, thermodynamics, equilibrium and electrochemistry. Associated laboratory supports lecture content and incorporates elements of molecular absorption spectroscopy and equilibrium calculations. Meets Tennessee Technological University general education requirement (Natural Sciences). Chemistry majors may not earn credit in both CHEM 1010 and 1110 or both 1020 and 1120. Credit will not be given for both CHEM 1210, 1310 and any of the above courses.

### **CHEM 1111. General Chemistry I Honors Recitation.** Rec. 1. Credit 0.

Corequisite: CHEM 1110. An ACT score of 30 or higher is also recommended. Selected topics to add depth to the understanding of the material in CHEM 1110. Honors students can receive honors credit for CHEM 1110 by satisfactorily completing both CHEM 1110 and CHEM 1111.

**CHEM 1121. General Chemistry II Honors Recitation.** Rec. 1. Credit 0.

Co-requisite: CHEM 1120. Selected topics to add depth to the understanding of the material in CHEM 1120. Honors students can receive honors credit for CHEM 1120 by satisfactorily completing both CHEM 1120 and CHEM 1121.

**CHEM 1210. Chemistry for the Life Sciences.** Fall. Lec. 4. Lab. 0. Credit 4.

Introduction to chemical principles and their applications to health and disease, which will include chemical structures, moles, organic chemistry and biochemistry. A knowledge of general mathematics is needed for the use of conversion factors, making of solutions, calculation of dosages and dilutions. This course will not count as part of a chemistry sequence. (This course is specifically designed for nursing students.)

**CHEM 1500. First-Year Interactions and Advisement.** Fall. Lec. 1. Act. 1. Credit 1.

This course engages the student in meaningful classroom and out-of-the classroom activities. This is intended for chemistry majors and emphasizes information, activities and requirements important to becoming an active and competent chemist.

**CHEM 1710. Culinary Chemistry.** Lec. 3. Lab 3. Credit 4.

Prerequisite: None. Culinary chemistry explores the chemical basis of many of our foods. Through this 4-credit hour, general education, integrated lab/lecture course, students will learn basic principles of chemistry including scientific thought, measurement, dimensional analysis, atomic theory, atomic structure, chemical bonding, chemical reactions, basic stoichiometry and kinetic theory while they experiment with food to learn what it is made of, how it is processed to get to our table, how is it preserved and how we change it to make it more enjoyable.

**CHEM 1971, 1972, 1973. Special Topics in General Chemistry.** Lec. 0-3.

Lab. 0-3. Credit 1, 2, 3. Prerequisites: Consent of chair and instructor. Timely topics in chemistry. Course may be taken for credit more than once.

**CHEM 2010. Introduction to Inorganic Chemistry.** Fall. Lec. 3. Credit 3.

Prerequisite: CHEM 1120. Introduction to the basic principles of inorganic chemistry including bonding, nomenclature, coordination chemistry, molecular orbital theory and basic transition metal organometallic chemistry.

**CHEM 2720. Clinical Pharmacology.** Fall. Lec. 2. Credit 2.

Prerequisite: CHEM 3010. Principles of pharmacology including chemical structures, actions and reactions of drugs. Does not count as technical elective in chemistry.

**CHEM 2910. Undergraduate Research Methods.** Fall. Lec. 1. Credit 1.

Prerequisite: Permission of the instructor. This course is designed to introduce undergraduate students to the methods used in conducting research. The course is designed to teach students key skills utilized in a research setting, methods of data analysis, as well as how to disseminate information obtained through research. Upon completion of this course, students will be prepared to work effectively in a chemistry department research lab.

**CHEM 2920. Undergraduate Research Methods II.** Spring. Lec. 1. Lab 3. Credit 2.  
Prerequisite: Successful completion of CHEM 2910 with a B or better. CHEM 2920 is designed to apply and utilize the skills obtained in Undergraduate Research Methods (CHEM 2910) in a laboratory setting. Students will work with a faculty mentor on the research project that was assigned to them in CHEM 2910. Work on this project will allow students to build practical research skills that can be transferred to other research projects. Students will also disseminate the findings of their project at Research and Creative Inquiry Day.

**CHEM 3005. Elementary Organic Chemistry.** Lec. 3. Lab. 3. Credit 4.  
Prerequisite: CHEM 1020 or 1120, or (CHEM 1010 or 1110, and ESS 3710). Aliphatic and aromatic organic chemistry for students in agriculture, home economics and pre-medical technology. Not for chemistry majors.

**CHEM 3010. Organic Chemistry I.** Lec. 3. Lab. 3. Credit 4.  
Prerequisite: CHEM 1120 with a grade of "C" or better. Study of carbon-containing compounds using the functional group approach and an emphasis in simple mechanisms of aliphatic and aromatic compounds.

**CHEM 3020. Organic Chemistry II.** Lec. 3. Lab. 3. Credit 4.  
Prerequisite: CHEM 3010 with a grade of "C" or better. Study of carbon-containing compounds using the functional group approach and an emphasis in simple mechanisms of aliphatic and aromatic compounds.

**CHEM 3410. Quantitative Analysis.** Fall. Lec. 2. Lab. 6. Credit 4.  
Prerequisite: CHEM 1120. Introduction to chemical analysis including titrimetric and gravimetric methods involving acid-base, oxidation-reduction and complexometric techniques. Application of mass action, equilibria and indicators to chemical analysis. Introduction to instrumental analysis including electrochemical and spectroscopic methods.

**CHEM 3420. Analytical Applications.** Spring. Lec. 2. Lab. 6. Credit 4.  
Prerequisite: CHEM 3410. The application of wet chemical and instrumental methods of analysis to real problems in chemistry, biochemistry and the environment.

**CHEM 3500. Elements of Physical Chemistry.** Spring. Lec. 3. Credit 3.  
Prerequisite: CHEM 1120 and MATH 1830 or 1910. Survey of physical chemistry designed for those desiring the B.S. degree with a major in chemistry, education, pre-professional studies, biology or students in general.

**CHEM 3510. Physical Chemistry I.** Fall. Lec. 3. Lab. 3. Credit 4.  
Prerequisites: CHEM 1120, MATH 1920 and PHYS 2020 or 2110 (2110 may be taken concurrently). Introduction to modern, molecular approach to physical chemistry. A moderately rigorous introduction to quantum chemistry covering symmetry, bonding, molecular spectroscopy and statistical mechanics to set a stage for the molecular treatment of thermodynamics and kinetics in CHEM 3520. Lectures are reinforced by a systematic set of modern spectroscopy laboratory experiments.

**CHEM 3520. Physical Chemistry II.** Spring. Lec. 3. Lab. 3. Credit 4.

Prerequisite: CHEM 3510. Kinetic theory of gases and Boltzmann distribution, classical thermodynamics, adiabatic changes and Maxwell equations, heat capacity and equipartition theorem, thermodynamic and statistical entropy, chemical equilibrium, electrochemistry, phase transitions and thermodynamic aspects of phases, introduction to chemical kinetics and reaction dynamics. Lectures are reinforced by a systematic set of classical experiments in thermodynamics and kinetics.

**CHEM 3990. Special Problems in Chemical Education.** Lab. 1. Credit 1.

Prerequisites: CHEM 1110, 1120, six additional hours of chemistry, and consent of a faculty research mentor and the departmental chairperson. Independent study of special topics in chemical education under the direction of a faculty mentor. Must be taken twice, preferably in consecutive semesters. Restricted to secondary education chemistry majors.

**CHEM 4110/5110. Inorganic Chemistry.** Spring. Lec. 3. Credit 3.

Prerequisites: CHEM 2010 and CHEM 3500 or 3510. Correlation of physical and chemical properties of inorganic compounds and atomic structure.

**CHEM 4150/5150. Inorganic Chemistry Laboratory.** Spring. Lab. 3. Credit 1.

Corequisite: CHEM 4110/5110. Synthesis, isolation, and characterization of inorganic compounds, using conventional as well as microscale and inert gas techniques.

**CHEM 4210/5210. Chemistry of Polymers.** Fall. Lec. 3. Credit 3.

Prerequisites: CHEM 3020. Preparation, structure and physical and chemical properties of organic and inorganic polymers. Experimental determination of average molar mass and its correlation to physical properties. Thermal and viscoelastic behavior.

**CHEM 4310/5310. Nuclear Chemistry and Radiochemistry.** Spring. Lec. 2. Lab. 3.

Credit 3. Prerequisite: CHEM 3410, with a grade of C or better. Introduction to theory of nuclear stability and decay processes. The laboratory emphasizes the detection, safe handling and use of radioisotopes in chemical investigations.

**CHEM 4320/5320. Spectrometric Identification of Organic Compounds.** Spring.

Lec. 2. Lab. 2. Credit 3.

Prerequisites: CHEM 3020 and CHEM 3500 or 3510. The isolation and identification of organic compounds by both chemical and physical means with emphasis on spectroscopic methods.

**CHEM 4410/5410. Forensic Chemistry.** Spring. Lec. 3 Lab. 1. Credit 4.

Prerequisites: CHEM 3020 or 3410. This course will examine the application of chemical concepts and methods to the analysis of crime scene evidence.

**CHEM 4500. Nutritional Biochemistry.** Spring. Lec. 3. Lab. 0. Credit 3.

Prerequisite: CHEM 3005 or 3010. Introductory survey course of the chemistry of proteins, lipids, carbohydrates and nucleic acids as related to the study of metabolism, nutrition and physiological function. Not for chemistry majors.

**CHEM 4520/5520. Instrumental Analysis.** Fall. Lec. 3. Lab. 3. Credit 4.

Prerequisites: CHEM 3410 and CHEM 3500 or 3510 (may be taken concurrently). Theory and practice of atomic spectroscopy, chromatography and electroanalysis; discussion of selected instrumental techniques for analysis of surfaces, molecules and particles.

**CHEM 4610/5610. General Biochemistry I.** Lec. 3. Credit 3.

Prerequisite: CHEM 3010 with a grade of B or better, or CHEM 3020. Chemistry of proteins, lipids, carbohydrates and nucleic acids. Includes study of pH, buffer system and biological separation methods.

**CHEM 4620/5620. General Biochemistry II.** Lec. 3. Credit 3.

Prerequisite: CHEM 4300/4610/5610. Intermediary metabolism and its regulation, bioenergetics and photosynthesis, biosynthesis of proteins and nucleic acids.

**CHEM 4650/5650. General Biochemistry Laboratory.** Lab 6 Credit 2.

Prerequisite: CHEM 4300/4610/5610. Laboratory techniques associated with contemporary general biochemistry to include buffer preparation, pKa determination, amino acid analysis, protein expression, separation and purification techniques, protein determination, Enzymology, equilibrium and binding constant determinations and carbohydrate analysis. CHEM 5650 students will be subjected to more involved procedures in some of the experiments.

**CHEM 4710/5710. Environmental Chemistry.** Fall. Lec. 3. Credit 3.

Prerequisites: CHEM 3005 or 3010, and CHEM 3410 or 3500 or 3510 (courses from the latter group may be taken concurrently). Basic concepts of environmental chemistry.

**CHEM 4720/5720. Advanced Environmental Chemistry.** Spring. Lec. 3. Credit 3.

Prerequisites: CHEM 4710/5710. Advanced topics within environmental chemistry including emphasis on organic, inorganic and analytical environmental chemistry. Case studies and contemporary literature in the field will be discussed.

**CHEM 4920. Chemistry Seminar.** Lec. 3. Credit 3.

Prerequisite: Three semesters of chemistry courses. Seminar course focusing on the use of chemical literature, employment and interviewing skills, computer literacy and the organization and presentation of current topics in chemistry.

**CHEM 4940. Internship in Chemistry.** Credit 6.

Prerequisites: 18 hrs of chemistry, junior-senior standing and consent of the chair. Supervised chemical work experience in a private or public agency that is related to the student's career goals. A minimum equivalent to 10 weeks of half-time employment is required. Cannot be used to replace core or required elective CHEM courses within the major requirements.

**CHEM 4970/5970. Special Topics.** Lec. 1-3. Lab.0-3. Credit 1-4.

Prerequisite: Consent of instructor. Timely topics in chemistry. Course may be taken for credit more than once.

**CHEM 4980. Distinction in Chemistry Research.** Lec. 0. Credit 1.

Dissemination of independent research conducted with a chemistry faculty advisor through participation in meetings (national meetings, state meetings and/or Research and Creative Inquiry Day), departmental seminar and mini-thesis.

**CHEM 4991, 4992, 4993. Undergraduate Research.** Lab. 3,6,9. Credit 1,2,3.

Prerequisite: Consent of the instructor and departmental chairperson. Study in chemical research; to provide experience in methodology of experimental investigation. (Maximum credit toward degree is four hours.) May not be repeated to improve grade.

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