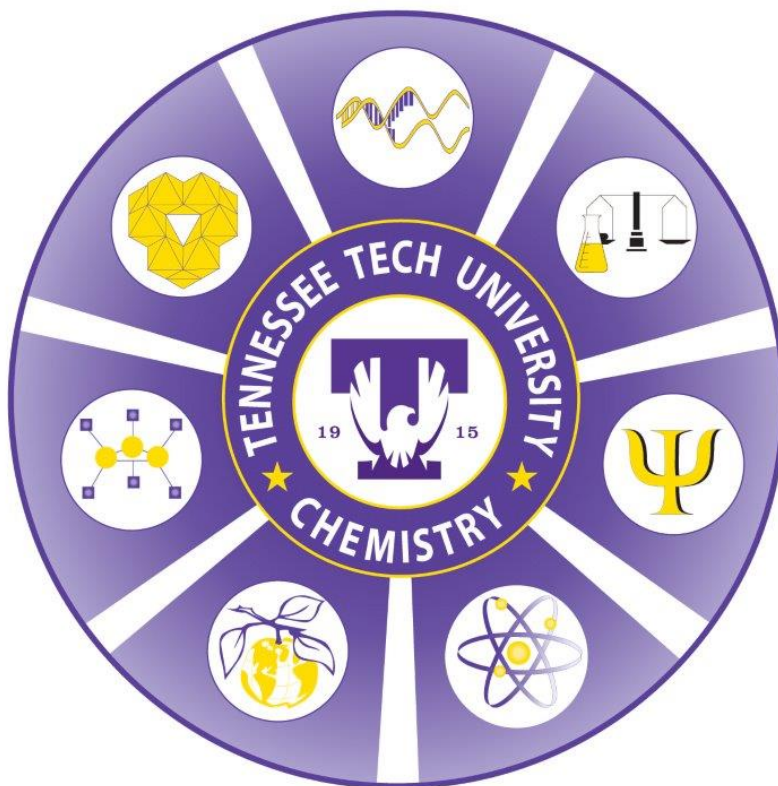


# Undergraduate Programs of Study



## Department of Chemistry

### Tennessee Tech University

Fall '19

# Contents

Undergraduate Degree Programs .....	1
General Education Core .....	3
Mathematics Assignment for STEM Students .....	5
Pure Chemistry Concentration .....	6
Biochemistry Concentration .....	8
Applied Chemistry Concentration .....	10
ACS Certification Check List .....	13
Typical First Year Schedules .....	14
Schedule Worksheet .....	16
Registration Worksheet .....	17
CHEM Course Listings .....	19
Universal Release Form .....	25

## Chemistry Advisors



**Amanda Carroll**  
931-372-6324  
acarroll@tntech.edu  
FOST 123



**David Crouse**  
931-372-3515  
dcrouse@tntech.edu  
FOST 313



**Daniel Swartling**  
931-372-3431  
dswart@tntech.edu  
FOST 404



# Three 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 three paths leading to the bachelor of science degree:

## **Pure Chemistry Concentration**

B. S. in chemistry for students preparing for graduate school or a career as a professional chemist. This curriculum exceeds the standards for certification set by the American Chemical Society.

## **Applied Chemistry Concentration**

B. S. with a major in chemistry for students requiring the application of chemical knowledge to fields outside the mainstream of chemistry. It includes options in Business Chemistry, Environmental Chemistry, Forensic Chemistry, Health Sciences, and Industrial Chemistry, as well as a generic Chemistry option that possesses the flexibility to adapt to unique and unexpected student career goals.

## **Biochemistry Concentration**

B. S. with a major in biochemistry for students whose interests lie in careers at the biology/chemistry interface.

## **A.C.S. Certification**

A student in any chemistry concentration may attain certification by the American Chemical Society as determined by the Chemistry faculty. The Chemistry Department defines specific areas of certification including, but not restricted to, pure chemistry, biochemistry and environmental chemistry. The requirements for certification in these areas are outside the curricular requirements of the three major concentrations.



# 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 1130	College Algebra	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
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
*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

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
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 I	4
BIOL 1020	Diversity of Life	4
BIOL 1080	Concepts of Biology	3
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 1020	Introductory Chemistry II	4
CHEM 1110	General Chemistry I	4
CHEM 1120	General Chemistry II	4
CHEM 1310	Concepts of Chemistry	3
GEOG 2100	Introduction to Meteorology	4
GEOL 1040	Physical Geology	4
GEOL 1045	Earth, Environment, Resources and Society	4
GEOL 1070	Concepts of Geology	3
PHYS 1310	Concepts of Physics	3
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

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

**AAF** - Advanced Algebra and Function

Revised 12-13-18

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	Remedial/Retest
15-16 <b>Engr. must take Math 1000-L</b>	350-390	380-450	2	225-237	N/A	Math 1000-L 1010-L, 1530-L
<b>Non-Engr.</b> 17-18	400-450	460-490	3	238-249	N/A	Math 1000, 1010-L, 1530-L
<b>Non-Engr.</b> SAILS	N/A	N/A	4	N/A	N/A	Math 1010, 1410, 1530
<b>Non-Engr. (by discretion of Math Dept.)</b> 17-18 or SAILS	400-450	460-490	3	238-249	N/A	Math 1130-L
<b>Non-Engr.</b> 19+ or SAILS+	460+	510+	4	250-300	N/A	Math 1010, 1130, 1410, 1530, 1630
<b>Engineering</b> 17-21 or SAILS	400-510	460-530	3/4	238-300	N/A	Math 1000
<b>Branch to AAF at QAS score of 255</b>				<b>≤230</b>	<b>Place by QAS Score</b>	
22-24 or SAILS+	520-560	540-580	N/A	N/A	231-250	Math 1710 & 1720
25-26	570-600	590-620	N/A	N/A	251-259	Math 1730
<b>Non-Engr.</b> 25	570-580	590-600	N/A	N/A	251	Math 1830
27+	610+	630+	N/A	N/A	260-300	Math 1910



## Bachelor of Science, Chemistry Major Pure Chemistry Concentration (CHMP)

<b>CHEMISTRY</b> (55 hrs)	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 1st Year Interactions	1
2010 Intro Inorganic Chem	3
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
4910 Chemistry Seminar	2
4991 Undergraduate Research	1
<b>ADVANCED CHEMISTRY</b> (6 hrs)	

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

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

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

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

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

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

<b>Social Science</b> (6 hrs)	
	3
	3

<b>ELECTIVES</b> (12-13 hrs)	
<b>TOTAL</b>	120

## Bachelor of Science, Chemistry Major Pure Chemistry Concentration (CHMP)

<b>FRESHMAN YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	1110,1120	General Chemistry I,II	8
CHEM	1500	First-Year Connections/Advisement	1
MATH	1910,1920	Calculus I,II	8
ENGL	1010,1020	English Composition I,II	6
SS	-----	Social Science (Gen Ed)	6
		<b>TOTAL</b>	29

<b>SOPHOMORE YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	2010	Introduction to Inorganic Chemistry	3
CHEM	3010,3020	Organic Chemistry I,II	8
MATH	2110	Calculus III	4
MATH	-----	Mathematics Elective*	3
PHYS	2110,2120	Calculus-Based Physics I,II	8
HUM	-----	Humanities (Gen Ed)	6
		<b>TOTAL</b>	32

<b>JUNIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	3410	Quantitative Analysis	4
CHEM	3510,3520	Physical Chemistry I,II	8
HIST	2010,2020	Early and Modern US History	6
COM	-----	Communication (Gen Ed)	3
HUM	-----	Humanities (Gen Ed)	3
ELEC	-----	Elective	6
		<b>TOTAL</b>	30

<b>SENIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	4110,4150	Inorganic Chemistry & Laboratory	4
CHEM	4210	Chemistry of Polymers	3
CHEM	4520	Instrumental Analysis	4
CHEM	4610	General Biochemistry	3
CHEM	4910	Chemistry Seminar	2
CHEM	4991	Undergraduate Research	1
CHEM	-----	Chemistry Electives**	6
ELEC	-----	Elective	6
		<b>TOTAL</b>	29

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

\*\*Chosen from CHEM 4310,4320,4410,4620,4650,4710,4720.

## Bachelor of Science, Chemistry Major Biochemistry Concentration (CHMB)

<b>CHEMISTRY (37 hrs)</b>		
1110	General Chemistry I	4
1120	General Chemistry II	4
1500	1st 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
4910	Chemistry Seminar	2

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

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

<b>ELECTIVES (12 hrs)</b>		
<b>TOTAL</b>		120

## Bachelor of Science, Chemistry Major Biochemistry Concentration (CHMB)

<b>FRESHMAN YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	1110,1120	General Chemistry I,II	8
CHEM	1500	First-Year Connections/Advisement	1
BIOL	1113,1123	General Biology I,II	8
MATH	1910	Calculus I	4
ENGL	1010,1020	English Composition I,II	6
SS	-----	Social Science (Gen Ed)	3
		<b>TOTAL</b>	30
<b>SOPHOMORE YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	3410,3420	Quant.Analysis, Analytical Appl'ns	7
BIOL	3810	General Genetics	4
BIOL	3230	Health Science Microbiology	4
PHYS	2010,2020	Algebra-Based Physics I,II	8
HUM	-----	Humanities (Gen Ed)	6
SS	-----	Social Science (Gen Ed)	3
		<b>TOTAL</b>	32
<b>JUNIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	3010,3020	Organic Chemistry I,II	8
CHEM	3500	Elements of Physical Chemistry	3
BIOL	3140	Cell Biology	4
HIST	2010,2020	Early and Modern US History	6
COM	-----	Communication (Gen Ed)	3
HUM	-----	Humanities (Gen Ed)	3
ELEC	-----	Elective	3
		<b>TOTAL</b>	30
<b>SENIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	4610,4620	General Biochemistry	6
CHEM	4650	Biochemistry Laboratory	2
CHEM	4910	Chemistry Seminar	2
BIOL	4150	Molecular Genetics	3
BIOL	4040 or 4060	Immunology or Hormones	3
MATH	3070	Statistical Methods I	3
ELEC	-----	Elective	9
		<b>TOTAL</b>	28

## Bachelor of Science, Chemistry Major Applied Chemistry Concentration (CHMN)

<b>CHEMISTRY</b> (41 hrs)	
1110 General Chemistry I	4
1120 General Chemistry II	4
1500 1st 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
4910 Chemistry Seminar	2
Approved Chemistry Courses*	9

<b>BIOLOGY</b> (8 hrs)	
1113 General Biology I	4
1123 General Biology II	4

<b>MATHEMATICS</b> (7 hrs)	
1530 Introductory Statistics	3
1910 Calculus I	4

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

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

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

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

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

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

<b>Technical Requirements*</b> (14-16 hrs)	
<b>Electives</b> (10-12 hrs)	
<b>TOTAL</b>	120

\*See Options table on page 12.

## Bachelor of Science, Chemistry Major Applied Chemistry Concentration (CHMN)

<b>FRESHMAN YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	1110,1120	General Chemistry I,II	8
CHEM	1500	First-Year Connections/Advisement	1
BIOL	1113,1123	General Biology I,II	8
MATH	1530	Introductory Statistics	3
ENGL	1010,1020	English Composition I,II	6
HUM	-----	Humanities (Gen Ed)	3
		<b>TOTAL</b>	29
<b>SOPHOMORE YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	2010	Introduction to Inorganic Chemistry	3
CHEM	3410,3420	Quant.Analysis, Analytical Appl'ns	7
DTR	-----	Technical Requirement*	3
PHYS	2010,2020	Algebra-Based Physics I,II	8
MATH	1910	Calculus I	4
SS	-----	Social Science (Gen Ed)*	6
		<b>TOTAL</b>	31
<b>JUNIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	3010,3020	Organic Chemistry I,II	8
CHEM	3500	Elements of Physical Chemistry	3
COM	-----	Communication (Gen Ed)	3
HIST	2010,2020	Early and Modern US History	6
HUM	-----	Humanities (Gen Ed)	3
DTR	-----	Technical Requirements*	7
		<b>TOTAL</b>	30
<b>SENIOR YEAR</b>			
<b>DISC</b>	<b>NUMBER</b>	<b>SUBJECT</b>	<b>HOURS</b>
CHEM	4910	Chemistry Seminar	2
CHEM	-----	Advanced CHEM courses*	9
HUM	-----	Humanities (Gen Ed)	3
DTR	-----	Technical Requirements*	4-6
ELEC	-----	Elective	10-12
		<b>TOTAL</b>	30

\*See Options table on page 12.

<b>Specific Requirements for Applied Chemistry Options</b>			
<b>Option</b>	<b>Social Science</b> (6 hrs)	<b>Advanced Chemistry</b> (9 hrs)	<b>Directed Technical Requirements</b> (14-17 hrs)
Business Chemistry	ECON 2010 ECON 2020	9 hours approved by advisor	ACCT 3720 BMGT 3510 FIN 3210 MKT 3400 DS 3620 or LAW 3810
Environmental Chemistry	See Gen Ed List	CHEM 4710 CHEM 4720 3 hours approved by advisor	BIOL 3120 12 hours chosen from AGRN 3230, 4220, BIOL 4130, 4840, GEOG 4510, GEOL 4300, 4711
Forensic Chemistry	See Gen Ed List	CHEM 4410 CHEM 4610 CHEM 4650	CJ 2660 CJ 4250 BIOL 3330 BIOL 3810 BIOL 4150
Health Sciences	See Gen Ed List	CHEM 4610 CHEM 4620 3 hours approved by advisor	BIOL 2010, 2020 BIOL 3230 3 hours chosen from BIOL 3810, 4040, 4060, 4150
Industrial Chemistry	See Gen Ed List	CHEM 4210 CHEM 4520 CHEM 4710	COOP 2010, 2020, 2030 MET 1100, 2000, 3730 PC 3250 3 hours chosen from ACCT 3720, COOP 4010, 4020, 4030, ME 3110, MET 3080
Chemistry	See Gen Ed List	9 hours approved by advisor	Minimum 14 hours of complementary courses approved by advisor

## ACS Certification Check List

Effective Fall 2019

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.

Introductory Chemistry				In-Depth Courses/Specific Areas			
Class	Title	Hrs	Lab	Class	Title	Hrs	Lab
1110	General Chem I	4	(1)	<b>Biochemistry</b>			
1120	General Chem II	4	(1)	4620	Biochemistry II	3	0
1500	First Year	1		4650	Biochemistry Lab	2	2
				4xxx	Elective	3	1
<b>Foundation Courses</b>							
Class	Title	Hrs	Lab				
2010	Intro to Inorganic	3	0				
3010	Organic Chem I	4	1				
3410	Quantitative Anal.	4	2	<b>Environmental Chemistry</b>			
3510	Physical Chem I *	4	1	4710	Environ'l Chem	3	0
4610	Biochemistry I	3	0	4720	Adv. Env. Chem	3	1
				4650	Biochemistry Lab	2	2
<b>Required In-Depth Courses</b>							
Class	Title	Hrs	Lab	<b>Health Sciences Chemistry</b>			
3020	Organic Chem II	4	1	4620	Biochemistry II	3	0
4210	Chem of Polymers	3	0	4650	Biochemistry Lab	2	2
4520	Instrumental Anal. *	4	1	4xxx	Elective	3	1
4910	Seminar	2	0				
4991	Intro to Research	1	1	<b>Forensic Chemistry</b>			
				4410	Forensic Chem	4	1
<b>Mathematics</b>				4650	Biochemistry Lab	2	2
1910	Calculus I	4		4xxx	Elective	3	0
1920	Calculus II	4					
<b>Physics</b>							
2110 or 2010		4					
2120 or 2020		4					
* CHEM 3510 & 4520 replace 3500 & 3420 in Applied & Biochemistry curricula.							



# Typical First Year Schedules

## Pure Chemistry Curriculum

CHEM 1110	4	CHEM 1120	4
CHEM 1500	1	MATH 1920	4
MATH 1910	4	ENGL 1020	3
ENGL 1010	3	General Education	3
General Education	3	General Education	3
TOTAL	15*	TOTAL	17

## Biochemistry Curriculum

CHEM 1110	4	CHEM 1120	4
CHEM 1500	1	BIOL 1123	4
BIOL 1113	4	ENGL 1020	3
ENGL 1010	3	MATH 1910	4
General Education or Math	3	General Education	3
TOTAL	15*	TOTAL	18

## Applied Chemistry Curriculum

CHEM 1110	4	CHEM 1120	4
CHEM 1500	1	MATH 1530	3
BIOL 1113	4	BIOL 1123	4
ENGL 1010	3	ENGL 1020	3
General Education or Math	3		
TOTAL	15*	TOTAL	14*

\*For lottery scholarship purposes, total load should probably be at least 16 hours.



<b>Last Name</b>		<b>First</b>		<b>Middle</b>		<b>email :</b>
<b>Class Meeting Times</b>	<b>List Course (Ex. ENGL 1010) for each period</b>					
	<b>MON</b>	<b>TUE</b>	<b>WED</b>	<b>THUR</b>	<b>FRI</b>	
8:00-8:55		8:00				
9:05-10:00		9:00				
		9:30				
10:10-11:05		10:00				
11:15-12:10		11:00 Dead Hour		Dead Hour		
12:20-1:15		12:00				
1:25-2:20		1:00				
		1:30				
2:30-3:25		2:00				
3:35-4:30		3:00				
4:40-5:35		4:00				
		4:30				
		5:00				
6:00-6:50						
7:00-7:50						
8:00-8:50						

# EAGLE ONLINE INFORMATION AND REGISTRATION WORKSHEET

NAME: \_\_\_\_\_ TERM: \_\_\_\_\_

T# \_\_\_\_\_ ALTERNATE PIN: \_\_\_\_\_

Access the internet at <https://www.tntech.edu/studyabroad/exchange-students/class-registration.php> . You will be guided through the registration process. Your Appointment Day/Time and Alt PIN are obtained from your academic advisor.

TRIAL SCHEDULE						
CRN	DISC	NUMBER	SECTION	DAYS	TIME	CR HRS

ALTERNATE COURSES						



## 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.** Fall, Spring. 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 1110-20. General Chemistry.** Fall, Spring. Lec. 3. Lab. 3. Credit 4. Prerequisites: CHEM 1110, with a grade of C or better, is a prerequisite to 1120. Basic course in general chemistry for curricula requiring more than one year of chemistry. Laboratory includes qualitative analysis procedures.

**CHEM 1111. General Chemistry I Honors Recitation.** Rec. 1. Credit 0. Co-requisite: 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. A grade of "A" or "B" in CHEM 1110 is also recommended. 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 1310. Concepts of Chemistry.** Lec. 2. Lab. 2. Credit 3. Basic principles of chemistry including atomic structure, chemical bonding, basic stoichiometry, organic and inorganic compounds, and kinetic theory. Will not count as part of a chemistry sequence.

**CHEM 1500. First Year Interactions and Advisement.** 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 1971, 1972, 1973. Special Topics in General Chemistry.** Fall, Spring. 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 3005. Elementary Organic Chemistry.** Fall, Spring. Lec. 3. Lab. 3. Credit 4. Prerequisite: CHEM 1020 or 1120. Aliphatic and aromatic organic chemistry for students in agriculture, home economics, and pre-medical technology. Not for chemistry majors.

**CHEM 3010. Organic Chemistry I.** Fall, Spring. 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.** Fall, Spring. 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.** Fall. 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.** 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 and CHEM 3500 or 3510. 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 3500 or 3510 (may be taken concurrently). 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.** Lec. 3 Lab. 1. Credit 4. Prerequisites: CHEM 1120, 3020 and 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. 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, 3510. 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.** Fall, Spring. Lec. 3. Credit 3. Prerequisite: CHEM 3010 and 3020 or consent of instructor. Chemistry of proteins, lipids, carbohydrates, and nucleic acids. Includes study of pH, buffer system, and biological separation methods.

**CHEM 4620/5620. General Biochemistry II.** Spring. Lec. 3. Credit 3. Prerequisite: CHEM 4610/5610. Intermediary metabolism and its regulation, bioenergetics and photosynthesis, biosynthesis of proteins and nucleic acids.

**CHEM 4650/5650. General Biochemistry Laboratory.** Spring. Lab 6 Credit 2. Prerequisite: CHEM 4610/5610 or 4300. 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.** 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.** 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 4910. Chemistry Seminar.** Fall. Lec. 2. Credit 2. Prerequisite: One year of chemistry. Chemical literature, report writing, statistics, computers in chemistry, employment and interviewing.

**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 ten 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 TTU Student Research 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.



**Information Release Authorization**

Student's Full Name (Please Print) \_\_\_\_\_

Student ID (T #) \_\_\_\_\_

I give my TTU academic advisor \_\_\_\_\_ permission to release any  
(advisor name)

information regarding my academic record to the following people:

\_\_\_\_\_  
Name Relationship

\_\_\_\_\_  
Name Relationship

\_\_\_\_\_  
Name Relationship

I also give my above advisor permission to release my academic information in the form of recommendation or reference letters for the purpose of applications to employment or post-graduate education.

I understand that the above Release Authorization pertains to all periods of enrollment. I further understand that I may void this authorization at any time in writing by fax or mail.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date

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**Photo/Video Image Release Authorization**

I hereby give the Chemistry Department of TTU permission to use my photo/video for promotional purposes as they see fit. I understand that I will not be compensated for allowing the Department to use my name and likeness.

I understand that the above Release Authorization pertains to all periods of enrollment. I further understand that I may void this authorization at any time in writing by fax or mail.

\_\_\_\_\_  
Student Signature

\_\_\_\_\_  
Date