

## Department of Chemistry and Biochemistry

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### Degree Programs Offered

- BS, major in Biochemistry
- BS/MS, major in Biochemistry
- BS, major in Chemistry
- BS, major in Chemistry (with teacher certification)
- BS, major in Chemistry (with Physical Science teacher certification)
- BS/MS, major in Chemistry

### Minors Offered

- Biochemistry
- Chemistry

The science of chemistry provides the basic knowledge needed to address many of society's most pressing needs, such as feeding, clothing, and housing the peoples of the world; tapping new sources of energy; improving health and conquering disease; providing renewable substitutes for dwindling resources; strengthening our national security; and monitoring and protecting our environment. Basic research in chemistry will help future generations cope with their evolving needs and unanticipated problems. Chemistry and biochemistry majors gain skills in quantitative thinking and problem solving. Advanced students can work as laboratory instructors for lower division courses or as research assistants in the department's research laboratories. The faculty, facilities, library holdings, and chemistry curriculum of the Department of Chemistry and Biochemistry have been accredited by the American Chemical Society.

Chemists and biochemists work in research, production, quality control, technical services, and/or sales. Graduates have an excellent record of job placement in such diverse areas as the petrochemical industry, computer chip manufacturing, aerospace companies, pharmaceutical companies, the food industry, or as teachers in secondary schools. Many also seek advanced degrees or pursue careers in medicine, dentistry, or pharmacy.

The BS in Biochemistry is a degree program that prepares students for careers or advanced study in the biochemical sciences. The program is laboratory intensive and provides students instruction in the modern techniques of biochemistry and molecular genetics.

Recipients of the BS in Chemistry are awarded certificates by the American Chemical Society stating that the minimum requirements for professional chemists have been fulfilled. This program is recommended as preparatory training for graduate or industrial work in chemistry.

Qualified chemistry or biochemistry majors completing their junior year of chemistry courses who plan to pursue advanced studies have the opportunity to complete both a BS and MS degrees with one additional year (including summers) of course work and research past the BS degree. Students must be active in undergraduate research before or during their junior year to be eligible for the program.

### Teacher Certification

Students may earn either the Chemistry or the Physical Science (Texas Grades 8-12) certifications through a BS in Chemistry. Initial or additional certification may also be acquired as a post-baccalaureate or graduate student. Students interested in certification are strongly encouraged to see the Science Advisor early in their undergraduate program or certification process.

For students who are seeking teacher certification within their major and are not in the College of Science, but would like a second teaching field in Chemistry (Texas Grades 8-12) the requirements are: CHEM 1341/1141, 1342/1142, 2341/2141, 2342/2142, 3410, 4295, and 4375.

## Bachelor of Science Major in Biochemistry

Minimum required: 120 semester hours

### General Information:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. Two semesters of CHEM 4299 is highly recommended.
5. Recommended minor is biology. Minor and electives should be chosen in consultation with the departmental or academic advisor.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Freshman Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 1141, 1341 .....	4	CHEM 1142, 1342.....	4
BIO 1430 .....	4	BIO 1431 .....	4
US 1100 .....	1	MATH 2471 .....	4
ENG 1310 .....	3	ENG 1320.....	3
PHIL 1305.....	3		
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15</b>
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Sophomore Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 2141, 2341 .....	4	CHEM 2142, 2342.....	4
MATH 2472.....	4	BIO 2450.....	4
PHYS 1430 .....	4	PHYS 2425.....	4
ENG Literature (see gen. req. 5) .....	3	COMM 1310 .....	3
		PFW one course.....	1
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>16</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 3330.....	3	CHEM 3380 .....	3
CHEM 3375.....	3	CHEM 3275 .....	2
BIO 2400 .....	4	HIST 1320.....	3
HIST 1310.....	3	POSI 2320 .....	3
POSI 2310.....	3	Social Science Component (see gen. req. 2) .....	3
		PFW one course.....	1
<b>Total</b>	<b>16</b>	<b>Total</b>	<b>15</b>
<b>Senior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Senior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4360.....	3	CHEM 4385 .....	3
CHEM 4481.....	4	CHEM 4482 .....	4
Minor Advance Elective (see gen. req. 1 & 5) .....	4	Minor Advanced Elective (see gen. req. 1 & 5).....	4
Minor Advance Elective (see gen. req. 1 & 5) .....	3	ART, DAN, MU, or TH 2313.....	3
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>14</b>

**Bachelor of Science and Master of Science  
Major in Biochemistry  
(Early-Entry Combined program)**

Minimum required: 154 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required for the BS degree. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then enough additional hours to total the minimum 124 hours required for the degree will fulfill this requirement. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. Students should consult a departmental or academic advisor before selecting an undergraduate minor. A minor in biology is recommended.
5. Students completing 124 semester hours will be eligible for graduation with a BS degree. The MS degree will be awarded only after the completion of all required courses and the successful defense of a research thesis.
6. The graduate-level courses taken in the senior year are CHEM 5110, 5395, 5399A, and a 3-hour elective approved by the graduate advisor. After admission to the Graduate College, 20 additional graduate hours (including a research thesis) and successful completion of a comprehensive examination is required for the MS degree.
7. Students may be admitted to the MS program without entrance qualification exams if they have a 3.00 GPA or higher in all chemistry and biochemistry courses, have completed CHEM 3275, 3380, and two semesters of CHEM 4299, have taken the Graduate Record Exam, and have been accepted by a graduate thesis advisor. Applicants will be evaluated by the Graduate Evaluation Committee to determine their suitability to enter the program. The application process is the same as for other graduate applicants to the Graduate College. Graduate status is provisional until the BS degree is awarded.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Freshman Year – 2<sup>nd</sup> Semester Hours</b>	
CHEM 1141, 1341 .....	4	CHEM 1142, 1342.....	4
BIO 1430 .....	4	BIO 1431 .....	4
US 1100 .....	1	MATH 2471 .....	4
ENG 1310 .....	3	ENG 1320.....	3
PHIL 1305.....	3	<b>Total</b>	<b>15</b>
<b>Total</b>	<b>15</b>		
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Sophomore Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 2141, 2341 .....	4	CHEM 2142, 2342.....	4
MATH 2472.....	4	BIO 2450.....	4
PHYS 1430.....	4	PHYS 2425.....	4
ENG Literature (see gen. req. 2) .....	3	COMM 1310 .....	3
<b>Total</b>	<b>15</b>	PFW one course.....	1
		<b>Total</b>	<b>16</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 3330.....	3	CHEM 3380 .....	3
CHEM 3375.....	3	CHEM 3275 .....	2
CHEM 4299.....	2	CHEM 4299 .....	2
BIO 2400 .....	4	Minor Advanced Elective (see gen. req. 1 & 4).....	4
Minor Advanced Elective (see gen. req. 1 & 4) .....	4	Social Science Component (see gen. req. 2) .....	3
<b>Total</b>	<b>16</b>	PFW one course.....	1
		<b>Total</b>	<b>15</b>
<b>Junior Year – Summer I</b>	<b>Hours</b>	<b>Junior Year – Summer II</b>	<b>Hours</b>
HIST 1310.....	3	HIST 1320 .....	3
POSI 2310.....	3	POSI 2320 .....	3
<b>Total</b>	<b>6</b>	<b>Total</b>	<b>6</b>

<b>Senior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Senior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4360.....	6	CHEM 4385.....	3
CHEM 4481.....	4	CHEM 4482.....	4
Minor Advance Elective (see gen. req. 1 & 4).....	3	ART, DAN, MU, or TH 2313.....	3
CHEM 5110.....	1	CHEM 5399A.....	3
CHEM 5395.....	3	Graduate level CHEM Elective.....	3
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>16</b>
<b>Fifth Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Fifth Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 5110.....	1	CHEM 5110.....	1
Graduate level CHEM Electives.....	9	Graduate level CHEM Electives.....	6
<b>Total</b>	<b>10</b>	<b>Total</b>	<b>10</b>

## Bachelor of Science Major in Chemistry

Minimum required: 120 semester hours

### General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. CHEM 4299 twice is required as the upper-level CHEM elective if the student is seeking ACS approval.
5. Students should consult a departmental or academic advisor before selecting a minor.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Freshman Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 1141, 1341.....	4	CHEM 1142, 1342.....	4
US 1100.....	1	ENG 1320.....	3
COMM 1310.....	3	HIST 1320.....	3
ENG 1310.....	3	MATH 2471.....	4
HIST 1310.....	3	PFW one course.....	1
PFW one course.....	1	<b>Total</b>	<b>15</b>
<b>Total</b>	<b>15</b>	<b>Sophomore Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	CHEM 2142, 2342.....	4
CHEM 2141, 2341.....	4	PHYS 2425.....	4
MATH 2472.....	4	ART, DAN, MU, or TH 2313.....	3
PHYS 1430.....	4	PHIL 1305.....	3
ENG Literature (see gen. req. 2).....	3	Electives (see gen. req. 1 & 5).....	3
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>17</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 3330.....	3	CHEM 3340.....	3
CHEM 3410.....	4	CHEM 3245.....	2
POSI 2310.....	3	POSI 2320.....	3
Electives (see gen. req. 1 & 5).....	3	Social Science Component (see gen. req. 2).....	3
Minor Advanced Elective (see gen. req. 1 & 5).....	3	Minor Advanced Elective (see gen. req. 1 & 5).....	3
<b>Total</b>	<b>16</b>	<b>Total</b>	<b>14</b>

<b>Senior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Senior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4331 .....	3	CHEM 4341 .....	3
CHEM 4231 .....	2	CHEM 4241 .....	2
CHEM 4375 .....	3	CHEM Advanced Elective (see gen. req. 4) .....	3-4
Minor Advanced Elective (see gen. req. 1 & 5) .....	3	Electives (see gen. req. 1 & 5) .....	3
Electives (see gen. req. 1 & 5) .....	3	Electives (see gen. req. 1 & 5) .....	2-3
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>14</b>

**Bachelor of Science  
Major in Chemistry  
(with Chemistry Teacher Certification)**

Minimum required: 120 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. CHEM 4299 twice is required as the upper-level CHEM elective if the student is seeking ACS approval.
5. A minor in Secondary Education is required.
6. Minor and electives should be chosen in consultation with the departmental or academic advisor.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Freshman Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 1141, 1341 .....	4	CHEM 1142, 1342 .....	4
MATH 2471 .....	4	MATH 2472 .....	4
US 1100 .....	1	PHYS 1430 .....	4
ENG 1310 .....	3	ENG 1320 .....	3
PHIL 1305 .....	3	<b>Total</b>	<b>15</b>
<b>Total</b>	<b>15</b>	<b>Freshman Year – Summer I</b>	<b>Hours</b>
<b>Freshman Year – Summer I</b>	<b>Hours</b>	CHEM 2141, 2341 .....	4
CHEM 2141, 2341 .....	4	<b>Total</b>	<b>4</b>
<b>Total</b>	<b>4</b>	<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	CHEM 3330 .....	3
CHEM 3330 .....	3	CHEM 3410 .....	4
CHEM 3410 .....	4	PHYS 2425 .....	4
PHYS 2425 .....	4	ENG Literature (see gen. req. 2) .....	3
ENG Literature (see gen. req. 2) .....	3	<b>Total</b>	<b>14</b>
<b>Total</b>	<b>14</b>	<b>Sophomore Year – Summer II</b>	<b>Hours</b>
<b>Sophomore Year – Summer I</b>	<b>Hours</b>	HIST 1320 .....	3
HIST 1310 .....	3	POSI 2320 .....	3
POSI 2310 .....	3	<b>Total</b>	<b>6</b>
<b>Total</b>	<b>6</b>	<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	CHEM 4331 .....	3
CHEM 4331 .....	3	CHEM 4231 .....	2
CHEM 4231 .....	2	CHEM 4375 .....	3
CHEM 4375 .....	3	CI 4332 .....	3
CI 4332 .....	3	Social Science Component (see gen. req. 2) .....	3
Social Science Component (see gen. req. 2) .....	3	<b>Total</b>	<b>14</b>
<b>Total</b>	<b>14</b>	<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>	CHEM 4341 .....	3
CHEM 4341 .....	3	CHEM 4241 .....	2
CHEM 4241 .....	2	CHEM Advanced Elective (see gen. req. 4 & 6) .....	3-4
CHEM Advanced Elective (see gen. req. 4 & 6) .....	3-4	CI 3325 .....	3
CI 3325 .....	3	Electives (see gen. req. 1, 3 & 6) .....	0-1
Electives (see gen. req. 1, 3 & 6) .....	0-1	<b>Total</b>	<b>12</b>
<b>Total</b>	<b>12</b>		

<b>Senior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Senior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4295 .....	2	EDST 4681 .....	6
CI 4370 .....	3		
CI 4343 .....	3		
RDG 3323 .....	3		
PFW one course .....	1		
<b>Total</b>	<b>12</b>	<b>Total</b>	<b>6</b>

**Bachelor of Science  
Major in Chemistry  
(with Physical Science Teacher Certification)**  
Minimum required: 133-134 semester hours

General Information:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required to graduate. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then no additional language hours will be required for the degree. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. CHEM 4299 twice is required as the upper-level CHEM elective if the student is seeking ACS approval.
5. A double minor in Secondary Education and Physics is required.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Freshman Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 1141, 1341 .....	4	CHEM 1142, 1342 .....	4
MATH 2471 .....	4	MATH 2472 .....	4
US 1100 .....	1	PHYS 1430 .....	4
ENG 1310 .....	3	ENG 1320 .....	3
PHIL 1305 .....	3		
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15</b>
<b>Freshman Year – Summer I</b>	<b>Hours</b>	<b>Freshman Year – Summer II</b>	<b>Hours</b>
CHEM 2141, 2341 .....	4	CHEM 2142, 2342 .....	4
<b>Total</b>	<b>4</b>	<b>Total</b>	<b>4</b>
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Sophomore Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 3330 .....	3	CHEM 3340 .....	3
CHEM 3410 .....	4	CHEM 3245 .....	2
PHYS 2425 .....	4	PHYS 2435 .....	4
ART, DAN, MU, or TH 2313 .....	3	Social Science Component (see gen. req. 2) .....	3
		COMM 1310 .....	3
<b>Total</b>	<b>14</b>	<b>Total</b>	<b>15</b>
<b>Sophomore Year – Summer I</b>	<b>Hours</b>	<b>Sophomore Year – Summer II</b>	<b>Hours</b>
HIST 1310 .....	3	HIST 1320 .....	3
POSI 2310 .....	3	POSI 2320 .....	3
<b>Total</b>	<b>6</b>	<b>Total</b>	<b>6</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>	<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4331 .....	3	CHEM 4341 .....	3
CHEM 4231 .....	2	CHEM 4241 .....	2
CHEM 4375 .....	3	CHEM Advanced Elective (see gen. req. 4) .....	3-4
CI 4332 .....	3	PHYS 3411 .....	4
PHYS 4320 or 4321 .....	3	PHYS 3312 .....	3
PFW one course .....	1		
<b>Total</b>	<b>15</b>	<b>Total</b>	<b>15-16</b>

<b>Junior Year – Summer I</b>		<b>Hours</b>					
ENG Literature (see gen. req. 2) .....			3				
CI 3325 .....			3				
<b>Total</b>			<b>6</b>				
<b>Senior Year – 1<sup>st</sup> Semester</b>		<b>Hours</b>		<b>Senior Year – 2<sup>nd</sup> Semester</b>		<b>Hours</b>	
CHEM 4295 .....			2	EDST 4681 .....			6
CI 4370 .....			3				
CI 4343 .....			3				
RDG 3323 .....			3				
PFW one course .....			1				
<b>Total</b>			<b>12</b>	<b>Total</b>			<b>6</b>

**Bachelor of Science and Master of Science  
Major in Chemistry  
(Early-Entry Combined program)**

Minimum required: 150 semester hours

General Requirements:

1. A minimum of 9 writing intensive hours and a total of 36 advanced hours are required for the BS degree. An advanced course is one that is numbered above 3000 and below 5000.
2. See the University College section of this catalog for general education core curriculum requirements.
3. If two years of the same foreign language were taken in high school, then enough additional hours to total the minimum 120 hours required for the degree will fulfill this requirement. In the absence of such high school language, two semesters of the same modern language must be taken at the college level.
4. The graduate-level courses taken in the senior year are CHEM 5110, 5395, 5399A, and a 3-hour elective approved by the graduate advisor. After admission to the Graduate College, 20 additional graduate hours (including a research thesis) and successful completion of a comprehensive examination is required for the MS degree.
5. Students should consult a departmental or academic advisor before selecting an undergraduate minor or electives.
6. Students completing 120 semester hours will be eligible for graduation with a BS degree. The MS degree will be awarded only after the completion of all required courses and the successful defense of a research thesis.
7. Students may be admitted to the MS program without entrance qualification exams if they have a 3.00 GPA or higher in all CHEM courses, have completed two semesters of CHEM 4299, have taken the Graduate Record Exam, and have been accepted by a graduate thesis advisor. Applicants will be evaluated by the Graduate Evaluation Committee to determine their suitability to enter the program. The application process is the same as for other graduate applicants to the Graduate College. Graduate status is provisional until the BS degree is awarded.

<b>Freshman Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
CHEM 1141, 1341 .....	4
US 1100 .....	1
ENG 1310 .....	3
HIST 1310 .....	3
PHIL 1305 .....	3
PFW one course .....	1
<b>Total</b>	<b>15</b>
<b>Sophomore Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
CHEM 2141, 2341 .....	4
MATH 2472 .....	4
PHYS 1430 .....	4
ENG Literature (see gen. req. 2) .....	3
<b>Total</b>	<b>15</b>
<b>Junior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
CHEM 3330 .....	3
CHEM 3410 .....	4
CHEM 4299 .....	2
Electives (see gen. req. 1 & 3) .....	3
Minor Advanced Elective (see gen. req. 1 & 5) .....	3
<b>Total</b>	<b>15</b>
<b>Junior Year – Summer I</b>	<b>Hours</b>
POSI 2310 .....	3
Electives (see gen. req. 1 & 3) .....	3
<b>Total</b>	<b>6</b>
<b>Senior Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
CHEM 4331 .....	3
CHEM 4231 .....	2
CHEM 4375 .....	3
Minor Advanced Elective (see gen. req. 1 & 5) .....	3
CHEM 5110 .....	1
CHEM 5395 .....	3
<b>Total</b>	<b>15</b>
<b>Fifth Year – 1<sup>st</sup> Semester</b>	<b>Hours</b>
CHEM 5110 .....	1
Graduate level CHEM Electives .....	9
<b>Total</b>	<b>10</b>

<b>Freshman Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 1142, 1342 .....	4
MATH 2471 .....	4
ENG 1320 .....	3
HIST 1320 .....	3
PFW one course .....	1
<b>Total</b>	<b>15</b>
<b>Sophomore Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 2142, 2342 .....	4
PHYS 2425 .....	4
ART, DAN, MU, or TH 2313 .....	3
COMM 1310 .....	3
Electives (see gen. req. 1 & 3) .....	2
<b>Total</b>	<b>16</b>
<b>Junior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 3340 .....	3
CHEM 3245 .....	2
CHEM 4299 .....	2
Social Science Component (see gen. req. 2) .....	3
Minor Advanced Elective (see gen. req. 1 & 5) .....	3
<b>Total</b>	<b>13</b>
<b>Junior Year – Summer II</b>	<b>Hours</b>
POSI 2320 .....	3
Electives (see gen. req. 1 & 3) .....	3
<b>Total</b>	<b>6</b>
<b>Senior Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 4341 .....	3
CHEM 4241 .....	2
Electives (see gen. req. 1 & 3) .....	3
CHEM 5399A .....	3
Graduate level CHEM Elective .....	3
<b>Total</b>	<b>14</b>
<b>Fifth Year – 2<sup>nd</sup> Semester</b>	<b>Hours</b>
CHEM 5110 .....	1
Graduate level CHEM Electives .....	6
CHEM 5399B .....	3
<b>Total</b>	<b>10</b>

### Minor in Chemistry

A minor in Chemistry requires CHEM 1141 and 1341, 1142 and 1342, 2141 and 2341, 2142 and 2342, 3410, and one advanced course with a minimum of 3 advanced hours, not to include CHEM 4299.

### Minor in Biochemistry

A minor in Biochemistry can also be obtained and requires CHEM 1141 and 1341, 1142 and 1342, 2141 and 2341, 2142 and 2342, 3275, 3375, and 4360 or 4385.

### Courses in Chemistry (CHEM)

**1141 (CHEM 1111) General Chemistry Laboratory I.** (0-3) First of two laboratory courses in general chemistry for science-related majors. Course introduces the students to the basics of experimental measurements, including density, separation techniques, formula determinations, titrations, thermodynamics, gas laws, and descriptive chemistry. Prerequisite or Co-requisite: CHEM 1341 or CHEM 1310.

**1142 (CHEM 1112) General Chemistry Laboratory II.** (0-3) Second of two laboratory courses in general chemistry. Laboratory techniques are emphasized, and applied to both qualitative and quantitative analysis. Prerequisites: CHEM 1341, 1141. Prerequisite or Co-requisite: CHEM 1342.

**1310 (CHEM 1305) Introductory Chemistry for Non-Science Majors.** (3-0) **A one semester principles courses for students in non-science related majors. Course covers the major concepts of chemistry and the role of chemistry in contemporary society. Students will not receive credit for both CHEM 1310 and CHEM 1341. Must be followed by CHEM 1430 for general education credit.**

**1341 (CHEM 1311) General Chemistry I.** (3-0) Initial lecture course in general chemistry for science-related majors, covering atomic and molecular structure, bonding, states of matter, solutions, and descriptive chemistry. Concurrent registration in CHEM 1141 is recommended. Prerequisite: Mathematics ACT score of at least 24 (SAT 500 or SAT re-centered 520) or MATH 1315 with a grade of "C" or higher.

**1342 (CHEM 1312) General Chemistry II.** (3-0) Second of two lecture courses in general chemistry for science-related majors, covering equilibrium processes, acid-base chemistry, and kinetics, and electrochemistry. A basic knowledge of algebra is needed. Concurrent enrollment in CHEM 1142 is recommended. Prerequisite: CHEM 1341 with a grade of "C" or higher.

**1430 (CHEM 1407) Chemistry for Non-Science Majors.** (3-3) A one semester course which surveys organic and biochemistry and may include petro-chemistry, nuclear chemistry, synthetic and natural polymers. Prerequisite: CHEM 1310 or 1341.

**2130 Laboratory Technique in Organic Chemistry.** (0-3) An optional laboratory to accompany CHEM 2330, covers experimental techniques of preparation, purification, and determination of physical and chemical properties of organic compounds. Prerequisites: CHEM 1342/1142. Co-requisite: CHEM 2330.

**2141 (CHEM 2123) Organic Chemistry Laboratory I.** (0-3) This laboratory introduces the student to the general techniques of organic chemistry. Prerequisites: CHEM 1342 with a grade of "C" or higher, CHEM 1142. Prerequisite or Co-requisite: CHEM 2341.

**2142 (CHEM 2125) Organic Chemistry Laboratory II.** (0-3) This laboratory involves the study of typical organic reactions. Prerequisites: CHEM 2341 with a grade of "C" or higher, CHEM 2141. Prerequisite or Co-requisite: CHEM 2342.

**2150 Biochemistry & Metabolism Lab.** (0-3) An optional laboratory to accompany CHEM 2350. This laboratory examines the physical properties and chemistry of carbohydrates, amino acids, proteins, lipids and nucleotides. Course is designed for students majoring in nutrition, clinical laboratory science and agriculture. Prerequisites: CHEM 2330/2130 or 2342/2142. Co-requisite: CHEM 2350.

**2330 Fundamentals of Organic Chemistry.** (3-0) A one-semester course which covers nomenclature, structure and reactions of organic compounds with an introduction to

bioorganic molecules. Course is designed for students majoring in nutrition, clinical laboratory sciences and agriculture. Prerequisites: CHEM 1342/1142.

**2341 (CHEM 2323) Organic Chemistry I.** (3-0) This course covers the nomenclature, reactions and reaction mechanisms of the hydrocarbons and the alkyl halides. Prerequisites: CHEM 1342 with a grade of "C" or higher. Pre- or Co-requisite: CHEM 1142.

**2342 (CHEM 2325) Organic Chemistry II.** (3-0) This course covers the nomenclature, reactions and reaction mechanisms of the major functional groups. Prerequisite: CHEM 2341 with a grade of "C" or higher. Prerequisite or Co-requisite: CHEM 2141.

**2350 Biochemistry & Metabolism.** (3-0) A one-semester study of carbohydrate, proteins, lipids and nucleotides which presents both structure and intermediary metabolism along with an introduction to the function of enzymes and coenzymes. Course is designed for students majoring in nutrition, clinical laboratory science and agriculture. Prerequisites: CHEM 2330/2130 or CHEM 2342/2142.

**2390 Environmental Chemistry.** (3-0) Environmental chemistry examines sources, reactions, transport and fate of chemical entities in the environment, as well as their effects on human health and the natural environment. This multidisciplinary subject draws from such fields as geology, physics, toxicology, limnology, water-treatment and chemistry. Prerequisites: CHEM 1342/1142.

(WI) **3245 Physical Chemistry Laboratory. (1-4)** Experiments illustrating principles and methods of physical chemistry are performed. Written reports on the experiments are prepared. Prerequisites: CHEM 3330, 3410. Prerequisite or Co-requisite: CHEM 3340.

(WI) **3275 Biochemical Techniques. (1-4)** Course introduces students to the fundamental techniques used in modern biochemistry. Experiments use the essential techniques employed in the study of proteins, enzymes and nucleic acids with emphasis on the use of modern instruments and the manipulation and analysis of experimental data. Prerequisite: CHEM 3375 with a grade of "C" or higher.

**3330 Physical Chemistry I.** (3-0) The course covers principles of thermodynamics and thermochemistry, phase equilibria, electrochemistry and elementary kinetics including rate laws and mechanisms. Prerequisites: CHEM 1142; CHEM 1342 and MATH 2472 with a grade of "C" or better.

**3340 Physical Chemistry II.** (3-0) The course covers mechanics, spectroscopy and statistical thermodynamics and other selected topics. Prerequisites: CHEM 3330; MATH 2472; PHYS 2425 or 1420.

**3375 Principles of Biochemistry.** (3-0) Course provides biochemistry majors and minors with a rigorous introduction to biochemistry. Topics include the chemical function and structure of proteins, nucleic acids, lipids and carbohydrates; enzyme mechanisms, kinetics and regulation. Students may not receive credit for both CHEM 3375 and CHEM 4375. Prerequisites CHEM 2342 with C or better.

**3380 Physical Methods in Biochemistry.** (3-0) This course is designed to acquaint the student with the chemical and physical principles of modern biochemical methods. Emphasis is placed upon the application of the methods to current problems in biochemistry and molecular biology and the interpretation of data. Prerequisite: CHEM 3375 with a grade of "C" or higher.

**3410 Quantitative Analysis.** (3-6) Course covers the general theory and practice of typical methods of gravimetric and volumetric analysis, satisfies the quantitative analysis requirements for chemistry majors, minors, pre-medical and pharmacy students. Prerequisites: CHEM 1342 with a grade of "C" or higher, CHEM 1142.

(WI) **4231 Advanced Laboratory I.** (2-4) An advanced integrated lab illustrating a variety of chemical techniques for the preparation, characterization and analysis of organic and inorganic materials. Prerequisites: CHEM 3245, 3340, 3410. Prerequisite or Co-requisite: CHEM 4331.

(WI) **4241 Advanced Laboratory II.** (2-4) An advanced integrated lab illustrating a variety of chemical techniques for the preparation, characterization and analysis of inorganic and organic materials. Prerequisites: CHEM 4331, 4231. Prerequisite or Co-requisite: CHEM 4341.

**4295 Laboratory Development and Practice.** (1-2) This course develops the laboratory instructional abilities of students seeking either 8-12 Chemistry or 8-12 Physical Science Teaching Certification. Topics include both traditional laboratory techniques and guided inquiry techniques, safety, laboratory management, pedagogical theory and practical knowledge of laboratory experiments. Pre- or Co-Requisite: CI 3310.

**4299 Undergraduate Research.** (0-4) This course is available to undergraduate chemistry majors only. It may be repeated but a maximum of four semester hours from this course are applicable toward the Bachelor of Science degree. Prerequisite: Permission of department.

**4331 Instrumental Analysis.** (3-0) The theory and methodology associated with the quantitative analysis of materials, i.e., electronics, spectroscopy, electrochemistry and chromatography are presented. Prerequisite: CHEM 3340.

**4333 Spectroscopy.** (3-0) The study of various spectrometric techniques in qualitative and structural analysis of chemical substances. Prerequisite: CHEM 2342 with a grade of "C" or higher.

**4341 Advanced Inorganic Chemistry.** (3-0) Chemical bonding, coordination chemistry compounds, acid-base concepts, and other topics are included along with some descriptive chemistry. Prerequisite: CHEM 3340.

**4350 Modern Molecular Modeling.** (3-0) A study of the application of computational techniques to molecular modeling. Topics covered include quantum mechanical modeling, forcefield based molecular modeling, molecular energy minimization, molecular dynamics, vibrational spectra, solution of crystalline structures, diffraction patterns, molecular blends, phase equilibria, crystal morphology, physical property prediction and mesoscale modeling. Prerequisite: CHEM 3340.

**4351 Introduction to Polymers.** (3-0) This course is designed to develop the student's general understanding of polymer history and importance as well as terminology, structure, and synthesis. The overall scope of the course will be to develop the student's general knowledge of polymer synthesis and structure. Prerequisite: CHEM 2342 with a grade of "C" or higher.

**4360 Advanced Biochemistry and Molecular Biology.** (3-0) This course provides Biochemistry majors and minors with advanced knowledge of the field of molecular biochemistry. Topics include gene expression (transcription and translation of genes in bacteria and higher organisms), post-translational modification of proteins, chromosomal DNA replication, cell cycle checkpoint controls, DNA damage and repair, as well as theories of cancer and aging. Prerequisite: CHEM 3375.

**4371 Directed Study.** (3-0) Independent study on a particular subject area in chemistry. The specific study area, resource material, goals, and achievements will be approved by the instructor. May be repeated once for additional credit. Prerequisites: CHEM 2142/2342, 3410, and permission of instructor.

**4375 Biochemistry.** (3-0) Course provides Chemistry majors and minors with an overview of biochemistry topics. Topics include a description of the structure and function of proteins, enzymes, nucleic acids, lipids and carbohydrates. Students may not receive credit for both CHEM 3375 and CHEM 4375. Prerequisites CHEM 2342 with C or better.

**4385 Metabolism.** (3-0) A study of the biodegradation and biosynthesis of carbohydrates, lipids, amino acids, proteins, and nucleic acids. Prerequisite: CHEM 2342 with a grade of "C" or higher.

**4390 Supramolecular Chemistry.** (3-0) This course is designed to be a survey of the nature of non-covalent interactions between host and guest species. Emphasis will be focused on the rational design of hosts, thermodynamic and kinetic parameters involved in binding and the applications of various binding/recognition phenomena. Prerequisite: CHEM 2342 with a grade of "C" or higher.

(WI) **4481 Advanced Biochemistry Lab I. (2-8)** The first of two laboratory courses providing instruction in the modern techniques of biochemistry. Experiments are performed on the isolation, manipulation and characterization of DNA, RNA and proteins. Students will prepare

formal written reports and oral presentations. Prerequisites: CHEM 3275 with a grade of “C” or higher; CHEM 3380.

(WI) **4482 Advanced Biochemistry Lab II. (2-8)** The second of two laboratory courses providing instruction in the modern techniques of biochemistry. Experiments are performed on the isolation, manipulation and characterization of DNA, RNA, and proteins. Students will use their results and the scientific literature to prepare formal written reports and oral presentations. Prerequisite: CHEM 4481.