

# MAJOR IN CHEMISTRY - PROFESSIONAL TRACK

The major in Chemistry requires completion of required and elective courses. A student may repeat no more than three courses, including multiple attempts at the same course, required for the Chemistry major. This includes all foundation courses, as well as required courses and electives for the major.

## Professional Track

This track is recommended for those students who wish to obtain a more in-depth view of chemistry. This program is strongly recommended for students who intend to pursue graduate studies in chemistry or a closely related field, or who intend to work in basic or applied research in chemistry or as a chemist in industry. Students electing this track should contact the Department of Chemistry and Forensic Science to assist them in designing programs to meet their career needs.

## Requirements

The Professional track consists of 45 units of required chemistry courses, 16 units of additional required courses and 6 units of elective courses, of which 2 units must be CHEM or FRSC courses. The Professional track is designed to meet the requirements for American Chemical Society (ACS) certification as described elsewhere in the catalog.

Code	Title	Units
<b>Required Chemistry Courses</b>		
CHEM 131 & 131L	GENERAL CHEMISTRY I LECTURE and GENERAL CHEMISTRY I LABORATORY	4
CHEM 132 & 132L	GENERAL CHEMISTRY II LECTURE and GENERAL CHEMISTRY II LABORATORY	4
CHEM 220 & 220L	ANALYTICAL CHEMISTRY [LECTURE] and ANALYTICAL CHEMISTRY [LAB]	5
CHEM 310	INSTRUMENTAL ANALYSIS	4
CHEM 334 & CHEM 336 & CHEM 337 & CHEM 339	ORGANIC CHEMISTRY I [LECTURE] and INTRODUCTORY ORGANIC CHEMISTRY LABORATORY and ORGANIC CHEMISTRY II [LECTURE] and INTERMEDIATE ORGANIC CHEMISTRY LABORATORY	10
CHEM 323	INORGANIC CHEMISTRY	5
CHEM 345	PRINCIPLES OF PHYSICAL CHEMISTRY	3
CHEM 346	THEORETICAL FOUNDATIONS OF PHYSICAL CHEMISTRY	3
CHEM 351	BIOCHEMISTRY	3
CHEM 372	PHYSICAL CHEMISTRY LABORATORY	2
CHEM 401	COMMUNICATION SKILLS IN CHEMISTRY	1
CHEM 491	RESEARCH IN CHEMISTRY	2
<b>Additional Required Courses</b>		
MATH 273 & MATH 274	CALCULUS I and CALCULUS II	8

PHYS 241 & PHYS 242	GENERAL PHYSICS I CALCULUS-BASED and GENERAL PHYSICS II CALCULUS-BASED <sup>1</sup>	8
<b>Total Units</b>		<b>62</b>

<sup>1</sup> PHYS 211 and PHYS 212 may be taken in place of PHYS 241 and PHYS 242, but this is not recommended. For ACS certification of the degree, two semesters of calculus-based physics is required.

In addition to the required courses listed above, students selecting this track must take a minimum of two additional courses (6 additional units) from the list of electives given below. These 6 units must include at least one CHEM or FRSC course.

Code	Title	Units
<b>Elective Courses</b>		
Select at least 6 units of the following:		6
BIOL 408	CELL BIOLOGY <sup>2</sup>	
BIOL 409	MOLECULAR BIOLOGY <sup>2</sup>	
BIOL 421	IMMUNOLOGY <sup>2</sup>	
BIOL 428	VIROLOGY <sup>2</sup>	
CHEM 356	BIOCHEMISTRY LAB	
CHEM 357	ADVANCED BIOCHEMISTRY	
CHEM 391	SPECIAL PROBLEMS IN CHEMISTRY I <sup>1</sup>	
CHEM 461	ADVANCED LECTURE TOPICS	
CHEM 462	ADVANCED LABORATORY TECHNIQUES	
CHEM 472	APPLICATIONS OF ENVIRONMENTAL CHEMISTRY	
CHEM 480	CHEMICAL TOXICOLOGY	
CHEM 491	RESEARCH IN CHEMISTRY <sup>1</sup>	
CHEM 499	HONORS THESIS IN CHEMISTRY	
FRSC 363	CHEMISTRY OF DANGEROUS DRUGS	
FRSC 367	FORENSIC CHEMISTRY	
FRSC 467	FORENSIC ANALYTICAL CHEMISTRY	
GEOL 331	MINERALOGY <sup>2</sup>	
GEOL 415	HYDROGEOLOGY	
MATH 330	INTRODUCTION TO STATISTICAL METHODS	
MATH 374	DIFFERENTIAL EQUATIONS	
MBBB 301	INTRO TO BIOINFORMATICS	
MBBB 401	ADVANCED BIOINFORMATICS <sup>2</sup>	
PHYS 307	INTRODUCTORY MATHEMATICAL PHYSICS	
PHYS 311	MODERN PHYSICS I	
PHYS 352	THERMODYNAMICS AND KINETIC THEORY	
PHYS 354	ELECTRICITY AND MAGNETISM <sup>2</sup>	
<b>Total Units</b>		<b>6</b>

<sup>1</sup> A maximum of 1 unit of CHEM 391 and a maximum of 2 units of a combination of CHEM 391, CHEM 491, or CHEM 495 may be used for elective credit.

<sup>2</sup> Course has prerequisite(s) not listed among the required courses above.

Students selecting this track should plan their college careers carefully because not all the advanced chemistry courses are offered every term. A long-term schedule for these courses may be obtained from the Department of Chemistry. Advanced chemistry electives are offered periodically, subject to adequate enrollment.

## Four-Year Plan of Study

### Sample Four-Year Plan

The selected course sequence below is an example of the simplest path to degree completion. Based on course schedules, student needs, and student choice, individual plans may vary. Students should consult with their adviser to make the most appropriate elective choices and to ensure that they have completed the required number of units (120) to graduate.

#### Freshman

Term 1	Units Term 2	Units
CHEM 131 & 131L (Core 7)	4 CHEM 132 & 132L (Core 8)	4
MATH 273 (Core 3)	4 MATH 274	4
PHYS 211 or 241	4 PHYS 212 or 242	4
Core 1 (or Core 2)	3 Core 2 (or Core 1)	3
	Core 14	3
	<b>15</b>	<b>18</b>

#### Sophomore

Term 1	Units Term 2	Units
CHEM 220 & 220L	5 CHEM 310	4
CHEM 334	3 CHEM 336	2
Core 4	3 CHEM 337	3
Core 5	3 Core 9	3
	Core 10	3
	<b>14</b>	<b>15</b>

#### Junior

Term 1	Units Term 2	Units
CHEM 339	2 CHEM 491	1-3
CHEM 351	3 CHEM 323	5
Core 6	3 Core 12	3
Core 11	3 Core 13	3
Elective 1 (from approved list)	1-4 Elective 2 (from approved list)	1-4
Elective	3	
	<b>15-18</b>	<b>13-18</b>

#### Senior

Term 1	Units Term 2	Units
CHEM 345	3 CHEM 346	3
CHEM 401	1 CHEM 372	2
Elective 3 (from approved list)	2-3 Elective	3
Elective	3 Elective	3
Elective	3 Elective	3
Elective	3 Elective (optional) <sup>1</sup>	1
	<b>15-16</b>	<b>15</b>

**Total Units 120-129**

<sup>1</sup> This elective is optional and only necessary if the student is not on target to earn 120 units by the end of their final term.

## Learning Outcomes

1. Explain important chemical concepts and solve chemical problems by application of relevant concepts and analytical tools.
2. Design an experiment to test a hypothesis or theory in chemistry, and collect and interpret experimental data within the framework of the appropriate chemical theory.
3. Prepare written laboratory reports in a journal format that provide a description of the experiment, explain the experiment and reasoning clearly, and provide an appropriate conclusion. Students will be able to give oral presentations on topics in chemistry.
4. Use computer resources effectively.