

# CHEMISTRY 3+2 PLAN, JOINT BACHELOR OF SCIENCE/ MASTER OF SCIENCE

## Chemistry 3+2 Plan (BS/MS)

A feature of the Chemistry MS program is the 3+2 plan. This plan gives qualified undergraduate students the opportunity to simultaneously pursue both the Baccalaureate (BS) and Master of Science (MS) degrees. Talented students are thus quickly moved toward expanding their academic and scientific horizons based on individual student's abilities and motivation.

Specific requirements for the 3+2 program are included in the Chemistry MS description of the College of Science, Technology, Engineering, and Mathematics undergraduate programs section of this catalog. Students must meet the requirements of both degrees.

## Specific Admission Requirements

Students in the 3+2 program are expected to successfully complete the requirements for both the BS and MS degree in five academic years. This is shorter than the typical six years that are necessary to complete BS and MS programs independently. Students must apply to the 3+2 program during the Spring semester of their junior year or the Fall semester of their senior year and meet the course requirements listed below. Students applying to the 3+2 program must have a minimum 3.0 overall GPA and a minimum 3.25 GPA in their chemistry courses.

The application file for admission to the Chemistry MS 3+2 plan must include:

1. A completed Chemistry MS application form (online);
2. A letter of intent explaining your expectations and purpose for obtaining the MS in Chemistry;
3. Current CSU Pueblo transcript documenting an undergraduate GPA of 3.00 overall and 3.25 in chemistry courses; and
4. Three letters of recommendation from CSU Pueblo faculty addressing your qualifications and potential to succeed in the program.

## Expected Student Learning Outcomes

Upon completion of the Chemistry 3+2 BS/MS, students will:

- Evaluate the scientific literature and use it in their courses and their research.
- Effectively communicate scientific research, both their own and information from the research literature, in written and oral fashions.
- Develop and master the scientific problem-solving skills required to define and solve basic or applied original scientific questions using the scientific method; propose appropriate experimental design; and effectively employ the scientific method.
- Actively engage in research/internships and discourse with the faculty in the Chemistry Department and other STEM disciplines.
- Disseminate, in collaboration with faculty, the products of the Chemistry-MS program within the CSU Pueblo community and with communities outside of the University in activities using their professional expertise.

## Outcomes Assessment Activities

The faculty will use a variety of methods for evaluating student learning outcomes. These include required student enrollment in CHEM 510 Foundations in Graduate Studies (3 c.h.), which involves faculty directed instruction and practice in searching, evaluating, and discussing scientific literature, instruction in experimental design, and dissemination of scientific research results. Students completing this degree program will give a public research seminar (CHEM 593 Seminar (1 c.h.)) that will be evaluated by cognizant faculty members. A written research thesis or internship report will be publicly presented and defended by students to demonstrate proficiency in their area of study and these will be evaluated by the student's Graduate Advisory Committee. Students will collaborate with faculty to present the results of their thesis research or internship project within the greater Southern Colorado region, give seminars/posters on campus and / or at appropriate scientific meetings, publish the results of their research in peer reviewed scientific journals, or disseminate information through other appropriate media.

## Specific Program Requirements

Students in the 3+2 BS/MS program must complete:

- The requirements for a BS in Chemistry including specific concentration courses.
- The requirements for the MS in Chemistry including thesis or non-thesis options.

It is expected that students take any 400/500 level courses at the 500 level once they are enrolled in the 3+2 program plan.

The 3+2 degree plan has the following requirements:

Course	Title	Credits
General Education		24
BS Chemistry Core		42
BS Chemistry Concentration		29-34
MS Chemistry Requirements		30-32
General Electives		13-20
<b>Total Credits</b>		<b>138-152</b>

## Undergraduate Requirements Specific Core Requirements

Course	Title	Credits
CHEM 121 & 121L	General Chemistry I (GT-SC2) and General Chemistry Lab I (GT-SC1)	5
CHEM 122 & 122L	General Chemistry II (GT-SC2) and General Chemistry Lab II (GT-SC1)	5
CHEM 170	Academic Orientation	0.5
CHEM 301 & 301L	Organic Chemistry I and Organic Chemistry Lab I	5
CHEM 302 & 302L	Organic Chemistry II and Organic Chemistry Lab II	5
CHEM 317 & 317L	Quantitative Analysis and Quantitative Analysis Lab	5
CHEM 321	Physical Chemistry I	3
CHEM 322	Physical Chemistry II	3
CHEM 370	Academic Enrichment	0.5

CHEM 419 & 419L	Instrumental Analysis and Instrumental Analysis Lab	5
CHEM 420 & 420L	Inorganic Chemistry and Inorganic Chemistry Lab	4
CHEM 493	Seminar	1
<b>Total Credits</b>		<b>42</b>

Select from the following BS Chemistry concentrations:

- ACS Certified Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-acs-certified-concentration/>)
- Basic Chemistry Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-basic-chemistry-concentration/>)
- Biochemistry Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-biochemistry-concentration/>)
- Chemistry Double Major Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-double-major-concentration/>)
- Environmental Chemistry Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-environmental-chemistry-concentration/>)
- Chemistry Secondary Teaching Certification Concentration (<https://catalog.csupueblo.edu/college-of-science-technology-engineering-and-mathematics/chemistry/chemistry-bs-secondary-teaching-certification-concentration/>)

### Graduate Requirements

The course of study requires five semester credits of course work common to all students. Each student must complete three of the five core courses (9 credit hours). Students are required to complete 10-12 additional credit hours of approved graduate level electives in Chemistry, Biology, Math, or Engineering as outlined in the graduation plan developed with the student's advisor and graduate committee, and approved by the Program Director. The signed graduation plan may be completed at any time, but is a requirement for successful completion of CHEM 510 Seminar (3 c.h.).

Thesis option students are required to defend their research results before their graduate committee. Non-thesis option students must take a written comprehensive examination over courses taken in their program of study. A non-thesis option student must submit a formal written report based on an internship and defend their internship and work before their graduate committee.

Each student must pass qualifying exams in three of five areas of selected chemistry content (analytical, biological, inorganic, organic, or physical chemistry). Students will have two opportunities to pass each area exam. Qualifier examinations are scheduled during the week preceding the beginning of classes each term or in consultation with the program director or department chair. If an examination is failed, the requirement may be satisfied by completing the designated undergraduate coursework in the appropriate subdiscipline, as specified by the program director or department chair, with a minimum grade of "B". Students enrolling into the 3+2 program will be exempt from the requirement to pass qualifying exams if they have completed courses at CSU Pueblo in analytical, biological, inorganic, organic, or physical

chemistry with a grade of "B" or better. Students enrolled in the 3+2 program required to pass qualifying exams will schedule the exams in consultation with the Program Director.

### Specific Core Requirements

Course	Title	Credits
<b>Select three of the following:</b>		
CHEM 501	Advanced Organic Chemistry	3
CHEM 511	Biochemistry I or CHEM 512 Biochemistry II	3
CHEM 521	Advanced Inorganic Chemistry	3
CHEM 529	Advanced Analytical Chemistry	3
CHEM 531	Advanced Physical Chemistry	3
<b>Total Credits</b>		<b>9</b>

### Plan A (Thesis Option)

Course	Title	Credits
<b>Thesis Option Courses</b>		
CHEM 510	Foundations in Graduate Studies	3
CHEM 589	Thesis Defense	1
CHEM 593	Seminar	1
CHEM 599	Thesis Research Students may only enroll for a total of 6 credit hours.	1
<b>Electives</b>		<b>10</b>
<b>Total Credits</b>		<b>21</b>

### Plan B (Non-Thesis Option)

Course	Title	Credits
<b>Non-Thesis Option Courses</b>		
CHEM 510	Foundations in Graduate Studies	3
CHEM 588	Internship Defense	1
CHEM 593	Seminar	1
CHEM 598	Internship	4
<b>Electives</b>		<b>14</b>
<b>Total Credits</b>		<b>23</b>

### Electives

Elective courses may be selected from the following or others may be added with permission of the Graduate Committee.

Course	Title	Credits
CHEM 501 & 501L	Advanced Organic Chemistry and Advanced Organic Chemistry Lab	5
CHEM 503	Polymer Chemistry	3
CHEM 511	Biochemistry I	3
CHEM 512 & 512L	Biochemistry II and Biochemistry II Lab	5
CHEM 519 & 519L	Instrumental Analysis and Instrumental Analysis Lab	5
CHEM 521	Advanced Inorganic Chemistry	3
CHEM 525	Environmental Chemistry	3
CHEM 529	Advanced Analytical Chemistry	3
CHEM 531	Advanced Physical Chemistry	3
CHEM 550	Industrial Chemistry	3
CHEM 591	Special Topics	1-4

CHEM 592	Research	1-3
CHEM 595	Independent Study	1-4

## Planning Sheet

Disclaimer: The Planning Sheet is designed as a guide for student's planning their course selections. The information on this page provides only a suggested schedule. Actual course selections should be made with the advice and consent of an academic advisor. While accurately portraying the information contained in the college catalog, this form is not considered a legal substitute for that document. Students should become familiar with the catalog in effect at the time in which they entered the institution.

Enrollment in CHEM 121 requires successful placement exam score or completion of CHEM 111 with a grade of C or better, and completion of MATH 120 with a grade of C or better, or mathematics placement above MATH 120. The placement exam is administered through the Testing Center - contact them to make arrangements.

### Plan A (Thesis Option)

Course	Title	Credits
<b>Year 1</b>		
<b>Fall</b>		
CHEM 121	General Chemistry I (GT-SC2)	4
CHEM 121L	General Chemistry Lab I (GT-SC1)	1
CHEM 170	Academic Orientation	0.5
MATH 126	Calculus & Analytic Geometry I (GT-MA1)	5
ENG 101	Rhetoric & Writing I (GT-CO1)	3
General Education	recommended to select a Humanities course	3
<b>Credits</b>		<b>16.5</b>
<b>Spring</b>		
CHEM 122	General Chemistry II (GT-SC2)	4
CHEM 122L	General Chemistry Lab II (GT-SC1)	1
MATH 224	Calculus and Analytic Geometry II	5
ENG 117 or ENG 102	Intro. Scientific/Medical Writing (GT-CO2) or Rhetoric & Writing II (GT-CO2)	3
General Education	recommended to select a Social Science course	3
<b>Credits</b>		<b>16</b>
<b>Year 2</b>		
<b>Fall</b>		
CHEM 301	Organic Chemistry I	3
CHEM 301L	Organic Chemistry Lab I	2
CHEM 317	Quantitative Analysis	3
CHEM 317L	Quantitative Analysis Lab	2
General Education	recommended to select a Social Science course	3
Elective		3
<b>Credits</b>		<b>16</b>
<b>Spring</b>		
CHEM 302	Organic Chemistry II	3
CHEM 302L	Organic Chemistry Lab II	2
PHYS 221	General Physics I	4
PHYS 221L	General Physics I Lab (GT-SC1)	1
General Education	recommended to select a History course	3
CHEM Elective	CHEM 292 recommended	1
<b>Credits</b>		<b>14</b>
<b>Year 3</b>		
<b>Fall</b>		
CHEM 322	Physical Chemistry II	3
PHYS 222	General Physics II	4
PHYS 222L	General Physics II Lab (GT-SC1)	1
General Education	recommended to select a Humanities course	3

CHEM 492	Research	1
Elective		3
<b>Credits</b>		<b>15</b>
<b>Spring</b>		
CHEM 321	Physical Chemistry I	3
CHEM 370	Academic Enrichment	0.5
CHEM 419	Instrumental Analysis recommended to select CHEM 519 if accepted to 3+2 program	3
CHEM 419L	Instrumental Analysis Lab recommended to select CHEM 519L if accepted to 3+2 program	2
CHEM 492	Research recommended to select CHEM 592 if accepted to 3+2 program	2
CHEM Elective		3
<b>Credits</b>		<b>13.5</b>
<b>Year 4</b>		
<b>Fall</b>		
CHEM 420	Inorganic Chemistry program select CHEM 520L if accepted to 3+2 program	3
CHEM 420L	Inorganic Chemistry Lab program select CHEM 520L if accepted to 3+2 program	1
CHEM 510	Foundations in Graduate Studies	3
CHEM 511	Biochemistry I	3
CHEM 592	Research	1
CHEM Elective		3
<b>Credits</b>		<b>14</b>
<b>Spring</b>		
CHEM 323	Experimental Physical Chemistry or CHEM Elective - see your faculty advisor	2
CHEM 521	Advanced Inorganic Chemistry	3
CHEM 599	Thesis Research	2
CHEM Elective	see your faculty advisor	5
Elective		3
<b>Credits</b>		<b>15</b>
<b>Total Credits</b>		<b>120</b>

### "Senior year" below is Year 5 of thesis option.

Course	Title	Credits
<b>Senior</b>		
<b>Fall</b>		
CHEM 593	Seminar	1
CHEM 599	Thesis Research	3
Elective	total required electives depends on your concentration area - see your faculty advisor	9
<b>Credits</b>		<b>13</b>
<b>Spring</b>		
CHEM 599	Thesis Research	1
General Education	recommended to select a Humanities course	3
Electives	total required electives depends on your concentration area - see your faculty advisor	8
CHEM 589	Thesis Defense	1
<b>Credits</b>		<b>13</b>
<b>Total Credits</b>		<b>26</b>

### Plan B (Non-Thesis Option)

Follow the plan of study for years 1-3 in Plan A (Thesis Option) above, then continue with years 4-5 below.

Course	Title	Credits
<b>Year 4</b>		
CHEM 420	Inorganic Chemistry select CHEM 520 if accepted to 3+2 program	3
CHEM 420L	Inorganic Chemistry Lab select CHEM 520L if accepted to 3+2 program	1
CHEM 510	Foundations in Graduate Studies	3
CHEM 511	Biochemistry I	3
CHEM 592	Research	1

CHEM Elective		3
	<b>Credits</b>	<b>14</b>
<b>Spring</b>		
CHEM 323	Experimental Physical Chemistry	2
CHEM 521	Advanced Inorganic Chemistry	3
CHEM 598	Internship	1
CHEM Elective		5
Elective		3
	<b>Credits</b>	<b>14</b>
	<b>Total Credits</b>	<b>28</b>

**"Senior year" below is Year 5 of non-thesis option.**

Course	Title	Credits
<b>Senior</b>		
<b>Fall</b>		
CHEM 593	Seminar	1
CHEM 598	Internship	2
Elective	the number of Elective credits may vary - see your faculty advisor	12
	<b>Credits</b>	<b>15</b>
<b>Spring</b>		
CHEM 598	Internship	1
CHEM 589	Thesis Defense	1
General Education	recommended to select a Humanities course	3
Elective	the number of Elective credits may vary - see your faculty advisor	9
	<b>Credits</b>	<b>14</b>
	<b>Total Credits</b>	<b>29</b>