BIOCHEMISTRY, MASTER OF SCIENCE

The graduate degree program outlined leads to the degree of Master of Science in Biochemistry. The degree program prepares graduates for professional employment or for further advanced studies at the interface of chemistry and biology, and in molecular biosciences, including biochemistry and biotechnology.

Course work for this degree option includes several important classes at the intersection of the biological and chemical sciences, including advanced topics in cellular biology, biochemistry, and laboratory techniques. This program also offers a 3+2 plan, described elsewhere, which allows students to simultaneously complete requirements for a BS and MS degree in five years.

The Master of Science in Biochemistry requires a minimum of 30 semester credit hours of approved graduate course work and a thesis.

Specific Admission Requirements

Admission to the Biochemistry MS program is in accordance with Colorado State University Pueblo and the Department of Chemistry requirements for master's programs as specified in the University's Catalog. The application file for admission to the Biochemistry MS program must include:

1. A completed Biochemistry MS application form (online);
2. A letter of intent explaining your expectations and purpose for obtaining the MS in Biochemistry;
3. Transcript(s) documenting an undergraduate GPA of 3.000 or higher;
4. Three letters of recommendation from faculty addressing the student's qualifications and potential to succeed in the program; and
5. An interview (in-person or remote) with graduate faculty of the Chemistry Department or Chemistry and Biology Departments, and the Chemistry / Biochemistry MS Program Director.

GRE scores are optional and may be used to supplement your application.

Student Learning Outcomes

1. Be able to understand and evaluate the scientific literature and use it in their courses and their research.
2. Be able to effectively communicate scientific research, both their own and information from the research literature, in written and oral fashions.
3. Develop and master the scientific problem solving skills required to define and solve basic or applied original scientific questions using the scientific method.
4. Actively engage in research/internships and discourse with the faculty in the Chemistry Department and other STEM disciplines.
5. Disseminate, in collaboration with faculty, the products of the Biochemistry-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 will be publically presented and defended by students to demonstrate proficiency in their area of study and this will be evaluated by the student's Graduate Advisory Committee. Students will collaborate with faculty to present the results of their thesis research within the greater Southern Colorado region, give seminars/posters on campus 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

The course of study requires 11 semester credits of course work common to all students, and 6 credits of thesis research. Each student must complete 4 core courses (13 credit hours). Students are required to complete 6 additional credit hours of approved graduate level electives in Biology, Chemistry, 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. Students are required to defend their research results before their graduate committee.

Each student must pass a total of three qualifying exams one each in biochemistry and biology (molecular and cellular biology) and one of four other areas of selected chemistry content (analytical, inorganic, organic, or physical chemistry). 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, inorganic, organic, or physical chemistry; as well as cellular biology and molecular biology 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.

Biochemistry program requirements are summarized as follows:

Thesis Option Only

Course	Title	Credits
Required Courses		
CHEM 510	Foundations in Graduate Studies	3
CHEM 589	Thesis Defense	1
CHEM 593	Seminar	1
CHEM 599	Thesis Research [1]	6
Core Courses		
CHEM 512	Biochemistry II [2]	3
BIOL 512	Advanced Cellular Biology [2]	3
BIOL 540 & 540L	Advanced Biotechniques and Advanced Biotechniques Lab	4
CHEM 531	Advanced Physical Chemistry	3
Elective Courses		

Select 6 credits	6
Total Credits	**30**

1 Students may enroll for a total of 6 credit hours of CHEM 599 Thesis Research (1-6 c.h.).
2 Labs are not required.

Electives

Elective courses may be selected from the following courses or others may be added with permission of the graduate committee.

Course	Title	Credits
BIOL 502	Immunology	3
BIOL 503	Virology	3
BIOL 552 & 552L	Advanced Microscopy and Advanced Microscopy Lab	4
CHEM 501 & 501L	Advanced Organic Chemistry and Advanced Organic Chemistry Lab	5
CHEM 513	Molecular Basis of Disease	3
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 591	Special Topics	1-4
CHEM 592	Research	1-6
MATH 550	Statistical Methods	3

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.

Electives shown in the planning sheet are for illustration only. Work with your faculty advisor to select those courses (as shown below or other approved electives) most appropriate for you.

Course	Title	Credits
Year 1		
Fall		
CHEM 510	Foundations in Graduate Studies	3
CHEM 531	Advanced Physical Chemistry	3
	Credits	**6**
Spring		
CHEM 512	Biochemistry II	3
BIOL 512	Advanced Cellular Biology	3
CHEM 599	Thesis Research	1
	Credits	**7**
Summer		
CHEM 599	Thesis Research	2
	Credits	**2**
Year 2		
Fall		
BIOL 540	Advanced Biotechniques	2
BIOL 540L	Advanced Biotechniques Lab	2
CHEM 593	Seminar	1
CHEM 599	Thesis Research	2
	Credits	**7**
Spring		
CHEM 599	Thesis Research	1
Elective		3
Elective		3
	Credits	**7**
Summer		
CHEM 589	Thesis Defense	1
	Credits	**1**
	Total Credits	**30**