

CANNABIS BIOLOGY & CHEMISTRY, MASTER OF SCIENCE

The graduate program leading to a Master of Science in Cannabis Biology & Chemistry allows individuals interested in the field of cannabis to gain a graduate degree in the science associated with cannabis. The program is beneficial to students who desire to work on the scientific side of the cannabis industry. The program can be tailored to individual student needs and future directions (doctoral program, analytical laboratory, research laboratory, etc.). The majority of the coursework is centered around cannabis, but elective courses can expand the student's knowledge in scientific areas beyond cannabis.

Specific Admission Requirements

Admission to the Cannabis Biology and Chemistry MS program (CBC MS) 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 CBC MS program must include:

1. A completed Chemistry MS application form;
2. A personal statement;
3. Three letters of recommendation from CSU Pueblo faculty; and
4. Combined GRE scores above 300 (students may be admitted into the CBC MS program before taking the GRE; however, they must submit satisfactory GRE scores by the last day of finals at the end of their first semester in the CBC MS program to remain in the program).

Program Goals

The objective of the program is to produce students prepared for a career in the scientific side of the cannabis industry. Graduates will be well versed in several scientific aspects of cannabis (separations, pharmacology, etc.) and will be prepared to undertake a career in the industry or to further their education in a doctoral program. Since the program requires the completion of a thesis, graduates will have full understanding of the application of the scientific method to scientific research, especially in the area of experimental design, experimentation, and data-driven decision making. Graduates will also be adept at preparation and presentation of scientific materials.

Student Learning Outcomes

Upon completion of a CBC-MS degree, students will:

- Be able to understand and evaluate the scientific literature and use it in their courses and their research applied to cannabis science.
- Be able to effectively communicate scientific research, both their own and information from the research literature, in written and oral fashions.
- Students will understand advanced chemical and biological principles applied in these fields and how those principles can be applied to the emerging field of cannabis science.
- Develop and master the scientific problem solving skills required to define and solve basic or applied original scientific questions, propose appropriate experimental design, and effectively employ the scientific method.

- Actively engage in research/internships and discourse with the faculty engaged in scientific cannabis research in the Biology or Chemistry Departments and other STEM disciplines.

Outcomes Assessment Activities

The faculty will use a variety of methods for evaluating student learning outcomes. These include required student enrollment in CBC 510 Foundations in Graduate Studies (3 credit hours), 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, CBC 593 Seminar (1 credit hour), 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 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

Specific Core Requirements

Course	Title	Credits
CBC 510	Foundations in Graduate Studies	3
CBC 589	Thesis Defense	1
CBC 593	Seminar	1
CBC 599	Thesis Research	6
Total Credits		11

Additional Core Requirements

Students must complete 10 credit hours from the following:

Course	Title	Credits
CBC 501	Medicinal Plant Biochemistry	3
CBC 513	Cannabis Physiology & Growth	3
CBC 513L	Cannabis Physiology & Growth Lab	1
CBC 522	Natural Products Extraction & Analysis	3
CBC 522L	Natural Products Extraction & Analysis Lab	1
CBC 563	Medicinal Chemistry & Pharmacology	3

Additional Requirements

The elective coursework must be at the 500 level or above and is approved by the student's thesis committee. The courses should be selected to benefit the student and to prepare the student for their desired path after completion of the MS degree. These elective courses can include, but are not limited to, the CBC courses not completed as part of the Core requirements or approved Chemistry and Biology graduate courses. The following list provides examples of courses that may be counted as Elective courses.

Students must complete at least 9 credits of the following:

Course	Title	Credits
BIOL 540	Advanced Biotechniques	2.00
BIOL 540L	Advanced Biotechniques Lab	2.00

BIOL 548	Biological Statistics	3
BIOL 585	Plant Taxonomy	2.00
BIOL 585L	Plant Taxonomy Lab	2.00
CHEM 512	Biochemistry II	3.00
CHEM 512L	Biochemistry II Lab	2.00
CHEM 513	Molecular Basis of Disease	3.00
CHEM 519	Instrumental Analysis	3.00
CHEM 519L	Instrumental Analysis Lab	2.00
CHEM 525	Environmental Chemistry	3.00
CHEM 525L	Environmental Chemistry Lab	2.00
CHEM 529	Advanced Analytical Chemistry	3
CHEM 591	Special Topics	1.00

Specific Graduation Requirements

The program requires that all students complete 30 credit hours of graduate coursework. A set of common core coursework, totaling 11 credit hours, must be completed by all students in the program.

Additional core coursework comes from completion of at least ten credit hours in the listed CBC courses. To complete the degree, students must complete at least nine credit hours of elective graduate coursework that is approved by the student's thesis committee. The elective coursework can be completed in Chemistry, Biology, Math, Engineering, or any graduate subject approved by the student's thesis committee. Included in the core courses is six credits of Thesis Research and a one credit Thesis Defense. All students must write and successfully defend a thesis based on their research.

All students must maintain a minimum GPA of a 3.000, and students must have a 3.000 GPA in all coursework that is approved by their thesis committee.