

GRADUATE CERTIFICATE IN DATA SCIENCE FOR BIOLOGY AND CHEMISTRY

Modern biological and chemical sciences increasingly requires strong computational skills to conduct cutting-edge research. The Data Science for Biology and Chemistry Certificate will enable students to learn computational and programming skills that are relevant to their work in biology and chemistry. This certificate program is a 2-year, 12- unit certificate program that students can complete in line with their Master's degree program requirements. There are 4 core required courses and 1 elective. Of the 4 core courses, one 3+ unit classes is devoted to learning data and computer science, using assignments and examples drawn from biology and chemistry. One one-unit course is a support courses that provide inclusive environments for students to master coding and data science skills. One one-unit course is a professional development course to connect students to opportunities in basic data science with professionals in academics and industry. There is also 3 units required for research, in which students utilize their computational skills in their research projects required for their MS degrees in Biology and Chemistry. Students also select one elective course (3-4 units) that uses computational analysis.

Learning Outcomes

- Develop computational skills needed to create, debug, and run a computer program to perform data analyses.
- Obtain, store, manage and share data in a distributed environment through practical, hands-on experience with programming languages and big data tools.
- Evaluate data, as well as to apply key technologies data science analysis including statistical analysis, machine learning, and data visualizations.
- Develop data science as an aspect of their professional identity, effectively communicate their data analyses and results, and will connect with professionals outside of the University to further their data science careers.
- Apply their data science skills to discipline-specific data and questions to solve real-world problems of high complexity.

Graduate Certificate in Data Science for Biology and Chemistry – 12-13 units

Code	Title	Units
BIOL/CHEM 806	Exploratory Data Science for Scientists	4
BIOL/CHEM 807	Coding Community for Data Science Components of Independent Research Projects	1
BIOL/CHEM 808	Professional Prospects for Quantitative Biologists, Data Scientists, and Bioinformaticians	1
BIOL 897 or CHEM 897	Research Research	3

In addition to the courses listed above, students also select one discipline-specific application of data science (3 or 4 units) from the following list:

Code	Title	Units
BIOL 446	Microbial Genomics	4
BIOL 458	Biometry	4
BIOL 490	Ecology of Infectious Diseases	4
BIOL/CHEM 677		3
BIOL 710	Advanced Biometry	3
BIOL 738	Bioinformatics and Genome Annotation	4
BIOL 815	Advanced Phylogenetic Analysis	4
CHEM 370	Computer Applications in Chemistry and Biochemistry	3
CHEM 870	Computational Methods in Chemistry	3
CSC 306	An Interdisciplinary Approach to Computer Programming	3