

BIOPHYSICAL CHEMISTRY AND DESIGN FOR BIOTECHNOLOGY, MASTER OF SCIENCE

Biophysical Chemistry and Design for Biotechnology, Master of Science

This innovative master's program is designed for students with a STEM-related bachelor's degree who are seeking a high-impact career in biotechnology or the pharmaceutical industry. The program can be completed in 10 to 24 months through full-time or part-time, in-person study.

Students will gain a strong foundation in the theory and practical application of biophysical chemistry and computational methods essential for the development of protein and RNA therapeutics. The curriculum includes training in the physical chemistry of macromolecules, computational design and analysis using physics-based and AI-driven methods, and laboratory techniques for screening and stability testing.

Taught by distinguished faculty with extensive expertise in the field, the program combines cutting-edge coursework with immersive, hands-on lab experiences—including a summer lab intensive. Students will also receive training on industry-standard instruments and software widely used across biotech and pharma sectors.

Program Requirements

Students will complete:

AS.250.649 Introduction to Computing in Biology

AS.250.622 Statistics and Data Analysis

AS.250.620 Biophysical methods

AS.250.623 Macromolecular Simulation

AS.410.656 Recombinant DNA Laboratory

Or AS.410.659 Advanced Recombinant DNA Lab

AS.250.xxx Computational analysis of protein and nucleic acids structures

AS.250.68 Biomolecular thermodynamics

Or AS.250.372 Biomolecular thermodynamics

AS.250.xxx Computational macromolecular design

AS.250.xxx Special Topics in Macromolecular Therapeutics

AS.250.xxx Protein design lab

2 electives from list:

AS.030.648 Biocatalysis: Fundamentals, Recent Advances, and Industrial Applications B

AS.030.623 Molecular Synthetic Biology

AS.410.633 Introduction to Bioinformatics

AS.410.652 Mammalian Cell Culture Techniques

AS.410.660 Immunological Techniques in Biotechnology

AS.410.613 Principles of Immunology

AS.410.607 The Biotechnology Enterprise

EN.540.614 Computational Protein Structure Prediction and Design

EN.540.637 Application of Molecular Evolution to Biotechnology

EN.580.632 Principles of Genomic Systems Engineering and Synthetic Biology

Total credits 32-33

Learning Outcomes

Students will develop strong theoretical and practical skills in biophysical chemistry and computational methods essential for the development of protein therapeutics. The curriculum includes training in the physical chemistry of macromolecules, computational analysis and design using physics- and AI-based approaches, and laboratory techniques for screening and stability testing. Students will gain hands-on experience with instrumentation and software widely used in the biotechnology and pharmaceutical industries.