

BIOMOLECULAR CHEMISTRY (BMOLCHEM)

BMOLCHEM/B M I/BIOCHEM/MATH 609 – MATHEMATICAL METHODS FOR SYSTEMS BIOLOGY

3 credits.

Provides a rigorous foundation for mathematical modeling of biological systems. Mathematical techniques include dynamical systems and differential equations. Applications to biological pathways, including understanding of bistability within chemical reaction systems, are emphasized.

Requisites: MATH 415 and (MATH 320, 340, 341, or 375) or graduate/professional standing or member of the Pre-Masters Mathematics (Visiting International) Program

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Fall 2023

BMOLCHEM/MICROBIO 668 – MICROBIOLOGY AT ATOMIC RESOLUTION

3 credits.

Three-dimensional protein structures form the basis for discussions of high resolution microbiology; how particular problems are solved with given protein architectures and chemistries and how themes of protein structure are modified and recycled.

Requisites: (BIOCHEM 501 or 507) and (MICROBIO 470 or 612) or graduate/professional standing

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Last Taught: Spring 2023

BMOLCHEM 675 – ADVANCED OR SPECIAL TOPICS IN BIOMOLECULAR CHEMISTRY

1-3 credits.

Examines special topics in biomolecular chemistry. Topics and content will vary each semester and by section of the course.

Requisites: None

Course Designation: Breadth - Biological Sci. Counts toward the Natural Sci req

Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

BMOLCHEM 699 – SPECIAL RESEARCH PROBLEMS

1-5 credits.

Self-directed work under the supervision and guidance of an Instructor and often in conjunction with a day-to-day mentor that is a graduate student or postdoc researcher in the instructor's group. Students normally participate in aspects of ongoing research projects.

Requisites: Consent of instructor

Course Designation: Level - Advanced

L&S Credit - Counts as Liberal Arts and Science credit in L&S

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

Learning Outcomes: 1. Apply concepts learned in coursework to real life situations Audience: Undergraduate

2. Read and effectively search scientific literature Audience: Undergraduate

3. Develop critical, analytical, and independent thinking skills Audience: Undergraduate

BMOLCHEM 700 – PRACTICAL BIOPHYSICS

3 credits.

Introduction to methods used in biophysical measurements.

Thermodynamics and kinetics are introduced along with the theory and instrumentation used for several complementary biophysical approaches. Hands-on experimentation using state-of-the-art instrumentation and data interpretation.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: No

Learning Outcomes: 1. Describe the strengths and weaknesses of several biophysical methods and use that knowledge to design biophysical experiments for their research. Audience: Graduate

2. Explain the fundamentals of thermodynamics, kinetics, and fluorescence and practically apply this knowledge to modern research problems. Audience: Graduate

3. Use data interpretation skills to interpret results from several biophysical instruments. Audience: Graduate

4. Integrate their knowledge of biophysical methods in the form of an experimental plan within a grant application. Audience: Graduate

BMOLCHEM/BIOCHEM 701 – RESPONSIBLE CONDUCT IN BIOSCIENCE RESEARCH

2 credits.

Introductory training in the practical aspects of being a graduate-level scientist and the professional standards and expectations of ethical researchers. Covers a wide variety of professional development topics, including choosing a research laboratory and a thesis mentor, transitioning to self-education, managing stress in graduate school, and the importance of diversity in science. Ethics topics include conflicts of interest, the protection of human subjects, the welfare of laboratory animals and workers, safe laboratory spaces, mentor and mentee responsibilities, collaborative research, peer review, data acquisition and data management practices, research misconduct, responsible authorship and publication, contemporary ethical issues in biomedical research, and the roles of responsible scientists in society. Covers all NIH-recommended topics for Responsible Conduct of Research, thus meeting the requirements for trainees involved in NIH-sponsored research programs.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Fall 2023**Learning Outcomes:** 1. Evaluate and apply fundamental concepts and best practices in bioscience research conduct and research ethics Audience: Graduate

2. Identify and meet individual and professional responsibilities and obligations to society Audience: Graduate

3. Explore and implement activities for professional skills development and career management Audience: Graduate

BMOLCHEM 720 – EXPERIMENTAL DESIGN AND PARADIGMS IN CELLULAR BIOCHEMISTRY AND MOLECULAR BIOLOGY

3 credits.

Covers following areas from historical to modern contexts: biochemistry of post-translational modification of proteins, model organisms, transcriptional switches, chromosome replication, and RNA in biological regulation.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** No**Last Taught:** Spring 2024**Learning Outcomes:** 1. Develop critical thinking skills required to design and interpret an experiment in molecular and/or cellular biology Audience: Graduate

2. Develop the writing skills relevant to preparing a grant proposal Audience: Graduate

3. Gain insight into how the scientific method is applied in molecular and cellular biology Audience: Graduate

4. Develop an ability to critically evaluate research literature Audience: Graduate

BMOLCHEM 901 – BIOMOLECULAR CHEMISTRY SEMINAR

1 credit.

Critical review of selected topics in biomolecular chemistry.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2024**Learning Outcomes:** 1. Gain exposure to a variety of relevant research topics, potentially leading to cross-disciplinary, collaborative research opportunities Audience: Graduate

2. Identify principles and best practice for preparing and presenting a seminar Audience: Graduate

3. Gain experience in evaluating and critiquing research presentations in light of those principles and best practices Audience: Graduate

BMOLCHEM/BIOCHEM 913 – SEMINAR-RIBOGROUP (ADVANCED)

1 credit.

Student-led discussions of RNA-related problems.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Spring 2024**Learning Outcomes:** 1. Develop an understanding of current research questions in the field of RNA biology Audience: Graduate

2. Become familiar with the approaches used to study RNA and its interactions with proteins Audience: Graduate

3. Build a professional network with other RNA biologists on campus Audience: Graduate

4. Develop techniques for presenting complex concepts to a diverse audience Audience: Graduate

BMOLCHEM/BIOCHEM/M M & I 914 – SEMINAR-MOLECULAR BIOSCIENCES (ADVANCED)

1 credit.

During the fall semester, molecular biosciences trainees who have not achieved dissertator status will present seminars based primarily on literature related to their projects. During the spring semester, molecular biosciences trainees with dissertator status will present seminars based upon their own research.

Requisites: Graduate/professional standing**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement**Repeatable for Credit:** Yes, unlimited number of completions**Last Taught:** Fall 2020

BMOLCHEM 990 – ADVANCED BIOMOLECULAR CHEMISTRY AND RESEARCH

1-12 credits.

Research supervised by individual faculty members.

Requisites: Graduate/professional standing

Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement

Repeatable for Credit: Yes, unlimited number of completions

Last Taught: Spring 2024

Learning Outcomes: 1. Exhibit a broad understanding of general biochemical principles. Audience: Graduate

2. Conduct independent research using a variety of approaches.

Audience: Graduate

3. Think critically to address research challenges. Audience: Graduate

4. Exhibit and foster professional and ethical conduct in their research.

Audience: Graduate

5. Collaborate with other investigators within or outside the thesis lab.

Audience: Graduate