

## 2021-2022 MCB Area of Interest Course Information

# Biophysical & Structural Biology

*Please check the University of Washington Time Schedule for the most updated course information.*

### FOUNDATIONAL COURSES

#### Foundational Course One:

**Course Number:** BIOC 530

**Course Title:** Introduction to Structural Biology

**Instructor (s):** Baker, Klevit, Zheng, Veessler, Hol, Daggett, Maly, Weiner

**Location (e.g., UW, FH, SLU):** TBA (UW)

**Credits:** 3.0

**Quarter, Weeks, and Frequency course is offered:** Autumn, weeks 1-10

**Attributes (e.g., graded, lecture-based):** Lecture-based

**Sub Area (if applicable):** Biochemistry/Structure

**Synopsis:** Graduate-level discussion of the structure, function, and chemistry of proteins, control of enzymatic reactions. Prerequisite: a comprehensive course in biochemistry and permission.

#### Foundational Course Two:

**Course Number:** MCB 536

**Course Title:** Tools for Computational Biology

**Instructor (s):** A. Subramaniam

**Location:** FH/UW

**Credits:** 3.0

**Quarter, Weeks, and Frequency course is offered:** Autumn, weeks 1-10

**Attributes:** Graded, lecture, hands-on computational work

**Sub Area (if applicable):** Computational

**Synopsis:** Introduces computational research methods to graduate students in biomedical science and related disciplines. Provides a survey of the most common tools and programming languages in the field. Students will gain foundational knowledge in reproducible computational science, including workflows and code documentation, and sufficient expertise that they can continue learning relevant tools to suit specific research interests. Classes will involve hands-on learning through coding exercises, collaborative problem solving, and extensive use of online learning resources.

### ELECTIVE COURSES

#### Elective Course One:

**Course Number:** B STR 519

**Course Title:** Current Problems in Macromolecular Structure

**Instructor (s):** Stenkamp

**Location:** UW

**Credits:** 2.0

**Quarter, Weeks, and Frequency course is offered:** Autumn, Winter, Spring, Summer

**Attributes:** Literature review

**Sub Area (if applicable):** Structure

**Synopsis:** Literature review for new topics in biological structure and macromolecules.

Elective Course Two:

**Course Number:** P BIO 545 (same as NEURO 545)

**Course Title:** Quantitative Methods in Neuroscience

**Instructor (s):** Rieke

**Location:** UW

**Credits:** 3.0

**Quarter, Weeks, and Frequency course is offered:** Winter, weeks 1-10

**Attributes:** Literature review, computer exercises

**Sub Area (if applicable):** Biophysics, Neuroscience

**Synopsis:** Discusses quantitative methods applicable to the study of the nervous system. Revolves around computer exercises/discussion of journal papers. May include linear systems theory, Fourier analysis, ordinary differential equations, stochastic processes, signal detection, and information theory.

Elective Course Three:

**Course Number:** BIOEN 588

**Course Title:** Computational Protein Design

**Instructor (s):** V. Daggett

**Location:** UW

**Credits:** 4.0

**Quarter, Weeks, and Frequency course is offered:** Winter, weeks 1-10, every year

**Attributes:** Lab based

**Sub Area (if applicable):** Computational

**Synopsis:** Explores methods in protein engineering, emphasizing biomedical and biotechnological applications. Includes molecular visualization, homology modeling, molecular dynamics, computational protein design, and evaluation of designs. Introduces current research in subject area. Students learn to use and apply computational tools to investigate design problems.

Elective Course Four:

**Course Number:** PHCOL 501

**Course Title:** Drug Discovery and Emerging Therapeutics

**Instructor (s):** N. Zheng

**Location:** UW

**Credits:** 2.0

**Quarter, Weeks, and Frequency course is offered:** Autumn

**Attributes:**

**Sub Area (if applicable):** Pharmacology

**Synopsis:** Consideration of the general principles and current approaches involved in modern drug discovery and development, with an emphasis on basic concepts in drug action, delivery, and metabolism. Discussion of novel drug discovery techniques and emerging non-standard therapeutics.

Elective Course Five:

**Course Number:** CONJ 544

**Course Title:** Protein Structure, Modification and Regulation

**Instructor (s):** Stoddard, Strong

**Location:** FH/UW

**Credits:** 1.5

**Quarter, Weeks, and Frequency course is offered:** Winter, weeks 1-5, *will be offered in Winter 2023*

**Attributes:** Lecture, literature review, methods

**Sub Area (if applicable):** Structure

**Synopsis:** Overview of general principles of protein structure, including forces that contribute to folding and stabilization, followed by an extended coverage of the means by which protein structure and function are modified and regulated. Examples from recent developments in protein folding, processing, and allosteric regulation.

Elective Course Six:

**Course Number:** MEDCH 528

**Course Title:** Biophysical Enzymology and Biopharmaceuticals

**Instructor (s):** Atkins, Catalano

**Location:** UW

**Credits:** 3.0

**Quarter, Weeks, and Frequency course is offered:** Winter, weeks 1-10, even years

**Attributes:** Lecture

**Sub Area (if applicable):**

**Synopsis:** Covers in-depth treatment of chemical catalysis and transition state theory as related to enzyme mechanisms; thermodynamics and kinetics of protein-ligand interactions, protein-protein-interactions and protein-lipid interactions, and methods for their study. Discusses therapeutically relevant examples, including viruses, therapeutic antibodies, and drug targets. (<http://courses.washington.edu/medch528/>)

## GENERAL METHODS/PROFESSIONAL DEVELOPMENT (GM/PD) COURSES

GM/PD Course One:

**Course Number:** UCONJ 510

**Course Title:** Introductory Laboratory Based Biostatistics

**Instructor (s):** Lloyd Mancl

**Location:** UW

**Credits:** 2.0

**Quarter, Weeks, and Frequency course is offered:** Summer

**Attributes:** Lecture-based with assignments

**Sub Area (if applicable):**

**Synopsis:** Introduces methods of data description and statistical inference for experiments. Covers principles of design and analysis of experiments; descriptive statistics; comparison of group means and proportions; linear regression; and correlation. Emphasizes examples from laboratory-based biomedical sciences, and provides demonstrations using standard statistical programs.

GMPD Course Two:

**Course Number:** MCB 533

**Course Title:** How to give a scientific seminar

**Instructor(s):** Jihong Bai

**Location:** FH

**Credits:** 1.5

**Quarter, Weeks, and Frequency course is offered:** Winter, weeks 1-5, *will be offered in 2023*

**Attributes:** Career development and methods

**Sub Area (if applicable):**

**Synopsis:** A crucial part of a scientific career is the ability to effectively deliver a research seminar. This course will focus on all aspects of giving a seminar and teach students how to introduce the research topic, how to make clear and effective slides, and how to explain methods and data in a clear manner. Students will prepare their own research seminar throughout the course. Each week they will practice a part of it and receive feedback from other students and the instructors. By the end of the course, students will have an entire seminar about their thesis project prepared. The course will also give examples of good and bad seminars and help students learn how to communicate with non-scientists about their research.

GM/PD Course Three:

**Course Number:** MCB 543

**Course Title:** Logic Constructs and Methodologies of Biological Research

**Instructor(s):** Sandra Bajjalieh

**Location:** UW

**Credits:** 3.0

**Quarter, Weeks, and Frequency course is offered:** Spring, weeks 1-10, *will be offered in 2022*

**Attributes:** Career development and methods

**Sub Area (if applicable):**

**Synopsis:** This course surveys the logic and methods of scientific practice from historical, practical, and sociological points of view. Topics covered include how the philosophy of science influences experimental approaches, how the demarcation between science and pseudoscience has evolved, how common cognitive biases lead to errors in judgement and interpretation, and how sociological factors impact scientific progress.

GM/PD Course Four:

**Course Number:** MCB 560

**Course Title:** MCB Biotechnology Externship

**Instructor(s):** Nina Salama

**Location:** TBA

**Credits:** 2.0

**Quarter, Weeks, and Frequency course is offered:** Summer, weeks 1-10

**Attributes:** Career development and methods

**Sub Area (if applicable):**

**Synopsis:** This externship program provides MCB students with the opportunity to gain firsthand research experience in biotechnology companies in the Puget Sound area. Applications are available in the early spring and reviewed by the Externship Program Director. Applications are submitted to participating companies to find a suitable match. This externship is only available during the summer between Year 1 and Year 2 to students who have completed 3 rotations and identified a dissertation laboratory. Students are supported by MCB for the summer quarter.