

2021-2022 MCB Area of Interest Course Information

Genetics, Genomics, & Evolution

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

FOUNDATIONAL COURSES

Foundational Course One:

Course Number: GENOME 561

Course Title: Molecular Population Genetics and Evolution

Instructor (s): Kelley Harris

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

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-5

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

Sub Area (if applicable): Evolution

Synopsis: Surveys recent literature to gain an understanding of the basic principles of molecular population genetics and evolution as applied to analysis of genome data. Requires some computer analysis of genome data.

Foundational Course Two:

Course Number: MCB 536

Course Title: Tools for Computational Biology

Instructor (s): Arvind Subramaniam

Location: FH

Credits: 3

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

Attributes: Graded, lecture, hands-on computational work

Sub Area (if applicable): Genomics

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.

Foundational Course Three:

Course Number: GENOME 553

Course Title: Advanced Genetic Analysis

Instructor (s): Celeste Berg

Location: UW

Credits: 1.5

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

Attributes: Graded, Discussion

Sub Area (if applicable): Genetics; Genomics

Synopsis: Explores genetic analysis as a powerful approach for dissecting complex biological processes. Covers how scientists use selective removal, addition, or alteration of specific

proteins to: identify and order genes in a pathway; define protein function; determine tissue, temporal, and sub-cellular requirements for activity; and distinguish among competing hypotheses to explain biological phenomena.

ELECTIVE COURSES

Elective Course One:

Course Number: GENOME 551

Course Title: Principles of Gene Regulation

Instructor (s): Cole Trapnell

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Winter, weeks 6-10

Attributes: Graded, Lecture/discussion

Sub Area (if applicable): Genetics

Synopsis: A detailed examination of the mechanisms of transcription and translation as determined by experimental genetics, molecular biology, and biochemistry.

Elective Course Two:

Course Number: BIOST 545

Course Title: Biostatistical Methods For Big Omics Data

Instructor (s): TBA

Location: UW

Credits: 4

Quarter, Weeks, and Frequency course is offered: TBA

Attributes: Hands on computational work, may/may not continue to be offered

Sub Area (if applicable): Genomics

Synopsis: This "hands-on" course introduces statistical methods for high-dimensional omics data, as well as the R programming language and the Bioconductor project as tools to extract, query, integrate, visualize, and analyze real world omics data sets.

Elective Course Three:

Course Number: GENOME 552

Course Title: Technologies For Genome Analysis

Instructor (s): Debbie Nickerson

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 6-10

Attributes: Graded, lecture/discussion

Sub Area (if applicable): Genomics

Synopsis: Discussion of current and newly-emerging technologies in genome analysis with regard to applications in biology and medicine and to potential advantages and limitations

Elective Course Four:

Course Number: GENOME 559

Course Title: Introduction To Statistical And Computational Genomics

Instructor (s): Bill Noble, Brian Beliveau

Location: UW

Credits: 3

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

Attributes: Graded, for students with little/no coding experience

Sub Area (if applicable): Genomics

Synopsis: Rudiments of statistical and computational genomics. Emphasis on basic probability and statistics, introduction to computer programming, and relevant web databases.

Elective Course Five:

Course Number: GENOME 562

Course Title: Population Genetics

Instructor (s): TBA

Location: UW

Credits: 4

Quarter, Weeks, and Frequency course is offered: Winter, odd years

Attributes:

Sub Area (if applicable): Genetics; Evolution

Synopsis: Mathematical and experimental approaches to the genetics of natural populations, especially as they relate to evolution. Emphasis on theoretical population genetics.

Elective Course Six:

Course Number: GENOME 565

Course Title: Advanced Human Genetics

Instructor (s): Evan Eichler, Mary-Claire King

Location: UW

Credits: 4

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

Attributes: Career development, graded, lecture, literature review, methods

Sub Area (if applicable): Genetics; Genomics

Synopsis: The goal of the course is to provide students with knowledge and tools most useful for successful research in human genomics. Components of the course are: gene discovery and molecular function; genomic architecture; cancer genetics; and human diversity and evolution. The course meets winter quarter, with three lectures per week by the instructors and weekly section meetings. Multiple problem sets are based on real data. GENOM372 is a pre-requisite; for genetics courses taken elsewhere, please ask the instructors. The class typically includes about 40 students.

Elective Course Seven:

Course Number: GENOME 569

Course Title: Bioinformatics Workflows For High-Throughput Sequencing Experiments

Instructor (s): Cole Trapnell

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Spring

Attributes: lectures, graded, hands-on bioinformatics projects

Sub Area (if applicable): If you plan to work with next-gen sequencing data

Synopsis: Programming skills and software tools for building automated bioinformatics pipelines and computational biology analyses. Emphasis on UNIX tools and R libraries for distilling raw sequencing data into interpretable results. For students familiar with UNIX and with some programming experience in Python, R, or C/C++.

Elective Course Eight:

Course Number: CONJ 537

Course Title: Mechanism Of Transcriptional Regulation

Instructor (s): Tsukiyama

Location: FH

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Autumn

Attributes: Graded, lecture/discussion

Sub Area (if applicable): Genetics

Synopsis: A five-week graduate survey course concentrating on biochemical mechanisms of gene transcription. The course will cover a broad range of transcriptional regulation including: Mechanisms of transcriptional initiation; Regulation of transcription by chromatin; Transcriptional regulation, development and diseases in mammals.

Elective Course Nine:

Course Number: CONJ 549

Course Title: Principles of ecology and evolution as they apply to microorganisms.

Instructor (s): Mittler

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Spring, even years

Attributes: graded, lecture, discussion

Sub Area (if applicable): Evolution

Synopsis: Principles of ecology and evolution as they apply to microorganisms.

Elective Course Ten:

Course Number: CONJ 557

Course Title: Microbial Evolution And Ecology

Instructor (s): TBD

Location: TBD

Credits: 2

Quarter, Weeks, and Frequency course is offered: Spring, *will be offered in Spring 2022*

Attributes: General microbiology knowledge required prior to taking course

Sub Area (if applicable): Evolution

Synopsis: Selected topics in microbial evolution including evolution of the main lines of descent, and bacterial and archaeal speciation and co-speciation, and evidence for early microbial life on Earth.

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

Updated Sept. 2021

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.