

2024-2025 MCB Area of Interest Course Information

Cancer Biology

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

FOUNDATIONAL COURSES

Foundational Course One:

Course Number: MCB 539

Course Title: Biological Basis of Neoplasia

Instructor (s): David MacPherson, Robert Eisenman

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

Credits: 3

Quarter, Weeks, and Frequency course is offered: Spring, weeks 1-10. *Will be offered in Spring 2025*

Attributes (e.g., graded, lecture-based): Lecture and literature review

Sub Area (if applicable):

Synopsis: Introduces the major themes in research in the biology of neoplastic change. Covers principle molecular mechanisms responsible for tumor initiation and progression, with a specific emphasis on intracellular signaling, DNA repair, cell cycle checkpoints, and loss of normal tissue homeostasis. The latest state of the art research in Cancer Biology will be presented by invited scientists, experts in their relevant field. The discussion meetings will concentrate on selected major papers in cancer biology and be presented and discussed by the students with help and guidance of the instructors.

Foundational Course Two:

Course Number: PATH 518

Course Title: Emerging Topics in Cancer

Instructor (s): Eleanor Chen, Rosana Risques

Location: UW

Credits: 2

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10, odd years. *Will be offered in Winter 2025*

Attributes: Lecture

Sub Area (if applicable):

Synopsis: Science and translational advances in cancer and therapeutics, related to recent major technological progress in cancer research. Explores how knowledge of cancer genetics as well as new molecular discoveries are translated to clinical management and treatment options.

ELECTIVE COURSES

Subtrack 1 – Cellular mechanisms of transformation

Elective Course 1A:

Course Number: CONJ 532 (offered jointly with PHCOL 502)

Course Title: Signal Transduction from The Cell Membrane To The Nucleus

Instructor (s): TBD

Location: UW

Credits: 2

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 6-10. **Course is not currently being offered**

Attributes: Lecture

Sub Area (if applicable):

Synopsis: Intracellular signaling pathways leading from cell membrane receptors to nucleus. Pathways activated by seven transmembrane receptors and G-proteins, insulin/PI3 kinase, nitric oxide and WNTs and mechanisms of signal termination. Cytokine/Jak/Stat signaling and role of subcellular localization in signal transduction.

Elective Course 1B:

Course Number: CONJ 544

Course Title: Protein Structure, Modification and Regulation

Instructor (s): Barry Stoddard

Location: FH

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-5, odd years. *Will be offered in Winter 2025*

Attributes: Lecture, literature review, methods

Sub Area (if applicable):

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. Prerequisite: introductory biochemistry and cell biology. **Note:** Contact graduateeducation@fredhutch.org for add code.

Elective Course 1C:

Course Number: GENOME 565

Course Title: Advanced Human Genetics

Instructor (s): Mary Claire King, Evan Eichler

Location: UW

Credits: 4

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10. *Will be offered in Winter 2025*

Attributes: Graded, Lecture, Literature review, Methods, Discussion

Sub Area (if applicable):

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.

Prerequisite(s): College-level genetics course (GENOME 361 or 371); for genetics courses taken elsewhere, please ask the instructors. The class typically includes about 60 students, including both undergraduate and graduate students.

Capacity Limit: 20

Elective Course 1D:

Course Number: MCB 522

Course Title: The Developmental Basis of Human Disease

Instructor (s): Cecilia Moens

Location: FH

Credits: 3

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

Will be offered in Winter 2026

Attributes: Lecture, literature review

Sub Area (if applicable):

Synopsis: Rapid advances in human genetics have identified a host of new genes associated with rare human genetic disorders. In many cases, the functions of these genes have already been elucidated by developmental and cell biologists working in non-human model systems. This ten-week course will explore the intimate relationship between developmental biology and human disease, including both inherited genetic disorders and cancer. Each week we will choose a different human disorder whose underlying genetic cause has been discovered. We will then discuss how the causal gene or genetic pathway controls normal animal development. The second meeting of each week will be an opportunity for students to present papers from the literature to uncover specific mechanistic links between normal developmental gene functions and disease.

Subtrack 2 – Computational biology techniques

Elective Course 2A:

Course Number: GENOME 552

Course Title: Technologies for Genome Analysis

Instructor (s): TBD

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 6-10. ***Course not currently being offered***

Attributes:

Sub Area (if applicable):

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.

Prerequisite(s): Contact course instructor and state your interest.

Capacity Limit: 17 (required for the 14 GS first-year students); that is, 3 slots will be available on a first-come, first-served basis.

Elective Course 2B:

Course Number: GENOME 555

Course Title: Protein Technology

Instructor (s): TBD

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 1-5. ***Course is not currently being offered***

Attributes:

Sub Area (if applicable):

Synopsis: Focuses on current and emerging technologies and approaches in protein analysis, and considers applications of these technologies in biology, biotechnology, and medicine.

Elective Course 2C:

Course Number: GENOME 560

Course Title: Introduction to Statistical Genomics

Instructor (s): TBD

Location: UW

Credits: 3

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

Will be offered in Spring 2025

Attributes: Graded, lecture

Sub Area (if applicable):

Synopsis: An introduction to fundamental concepts necessary for the analysis of genetic and genomic data including, basic elements of probability theory, parameter estimation, and hypothesis testing.

Elective Course 2D:

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, every year.

Will be offered in Autumn 2026

Attributes: Graded, lecture, hands-on computational work

Sub Area (if applicable):

Synopsis: Introduction to established best practices in computational biology. Learn to organize unstructured data into standard formats, transform data for statistical analyses, and visualize the transformed data. Learn workflows for reproducible research such as version control, project organization, and code documentation. Gain basic experience with Linux command line tools and the Python and R programming languages. Classes will involve hands-on learning through coding exercises, collaborative problem solving, and extensive use of online learning resources.

Elective Course 2E:

Course Number: PATH 558 (offered jointly with MOLMED 558)

Course Title: Integrative Omics

Instructor (s): TBD

Location: UW

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Spring. ***Course not currently being offered.***

Attributes:

Sub Area (if applicable):

Synopsis: Explores how to integrate genomic, transcriptomic, and proteomic approaches with state-of-the-art genetic engineering strategies to uncover a systems-level understanding of pathway interactions that regulate disease pathogenesis and complex phenotypes. Recommended prep: Undergraduate biology or cellular and molecular biology.

Subtrack 3 – Cancer Immunology

Elective Course 3A:

Course Number: IMMUN 532

Course Title: Intersection of Innate and Adaptive Immunity in Disease

Instructor (s): Elia Tait Wojno

Location: UW

Credits: 4

Quarter, Weeks, and Frequency course is offered: Winter, weeks 1-10. *Will be offered in Winter 2025*

Attributes:

Sub Area (if applicable):

Synopsis: Examines the molecular and cellular basis of immune function. Topics include: hematopoiesis, innate immunity, antigen receptor structure, lymphocyte development, antigen presentation, effector T-cell functions, and immune-mediated diseases. **Prerequisite(s):** coursework in molecular genetics; intro to Immunology course; graduate standing in immunology; other graduate students with permission of instructor.

Elective Course 3B:

Course Number: IMMUN 537

Course Title: Immunological Methods

Instructor (s): Andrew Oberst

Location: SLU

Credits: 1.5

Quarter, Weeks, and Frequency course is offered: Autumn, weeks 6-10. *Will be offered in Autumn 2025*

Attributes:

Sub Area (if applicable):

Synopsis: Introduces whole animal, cellular, biochemical, and molecular techniques used in immunological research. Discusses strengths and limitations of each technique and emphasizes caveats in interpreting the resulting data.