

2021-2022 MCB Area of Interest Course Information

Developmental Biology, Stem Cells & Aging

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

FOUNDATIONAL COURSES

Foundational Course One:

Course Number: CONJ 542

Course Title: Cell Biology of Development

Instructor (s): Dave Raible, Celeste Berg

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

Credits: 3

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

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

Sub Area (if applicable): Development

Synopsis: The course will focus on four topics that reveal how molecular processes within individual cells are coordinated across tissues to build structures. The instructors will introduce each topic through an explanatory lecture and then devote four sessions to the discussion of key papers in the field. The topics are:

1. How cytoskeletal and motor proteins create tensile forces that change cell shapes and alter tissue structures
2. How apical-basal polarity within cells contributes to the establishment and maintenance of tissue architecture
3. How differential adhesion facilitates construction of tissue types and the movement of cells within and through tissue layers
4. How these cell biological characteristics combine to influence tissue morphogenesis

Foundational Course Two:

Course Number: MCB 522

Course Title: The Developmental Basis of Human Disease

Instructor (s): Cecilia Moens

Location: FH

Credits: 3.0

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

Attributes: lecture and literature review

Sub Area (if applicable): Development

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.

Foundational Course Three:

Course Number: CONJ 530

Updated Sept. 2021

Course Title: Directing Stem Cells Toward Regenerative Medicine

Instructor (s): Hannele Ruohola-Baker

Location: SLU

Credits: 3.0

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

Attributes: lecture and literature review

Sub Area (if applicable): Stem Cells

Synopsis: In this class we will discuss three topics: the recent findings on adult and embryonic stem cell classes and their niches, on epigenetic control of stem cells and stem cells in human disease. **Learning objectives:** After this class, the students should have a solid foundation on stem cell biology, epigenetic analysis and regulation of stem cells and human diseases connected to stem cell biology.

Foundational Course Four:

Course Number: PATH 517

Course Title: The Biology and Pathology of Aging

Instructor (s): Jonathan An and Alex Mendenhall

Location: UW

Credits: 3

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

Attributes: lecture and literature review

Sub Area (if applicable): Aging

Synopsis: The students focus on learning about aging, either centered around the hallmarks of aging or some contemporary topic in aging. Students attend or listen to prerecorded lectures, discuss the topic of the lecture in class, perform peer review of a related paper, and discuss the peer review in groups. The peer review model we use is the eLife peer review model.

ELECTIVE COURSES

Elective Course One:

Course Number: FHL/BIOL 536

Course Title: Comparative Invertebrate Embryology

Instructor(s): Billie Swalla and Andreas Heyland

Location: UW/Friday Harbor Labs

Credits: 5.0

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

Attributes: Practical course, Literature and Methods

Sub Area (if applicable):

Synopsis: Comparative Invertebrate Embryology will use hands-on lab experience to introduce students to the great diversity of developmental modes and processes found among marine invertebrates. The course will bridge cell and molecular approaches with ecological and evolutionary approaches to provide an integrated view of animal development. The course is intended to serve both biologists who wish to understand diversity in modes of development for ecological and evolutionary studies, and cell and developmental biologists who wish to broaden their knowledge of embryos beyond the standard model systems.

Elective Course Two:

Course Number: BIOL416

Course Title: Molecular Genetics of Plant Development

Instructor(s): Takato Imaizumi

Location: UW

Credits: 3.0

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

Attributes: Lecture and Literature Review

Sub Area (if applicable): Course includes upper-level undergraduates

Synopsis: The major goal of this class is to convey the excitement and challenges of doing research in the dynamic field of plant developmental biology. This class will not be a complete survey of plant development, but rather we will take an in-depth look at a few selected areas of current research. Students must obtain approval from the MCB Co-Directors for this 400-level class to count toward their 18-graded credits.

Elective Course Three:

Course Number: PATH 511

Course Title: Topics in Experimental Pathology: The Biology of Aging

Instructor(s): Jonathan An and Alex Mendenhall

Location: UW

Credits: 1.0

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

Attributes: Seminar and Discussion

Sub Area (if applicable):

Synopsis: Students listen to invited speaker lectures on aging research and review and discuss related papers. Class sessions alternate between a lecture and a literature review.

Elective Course Four:

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, *will be offered in winter 2023*

Attributes: Lecture, Lit review and 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.

Elective Course Five:

Course Number: MCB 539

Course Title: Biological Basis of Neoplasia

Instructor(s): MacPherson

Location: FH

Credits: 3.0

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

Attributes: 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.

Elective Course Six:

Course Number: BIOL 519

Course Title: Data Science for Biologists

Instructor(s): Brunton

Location: UW

Credits: 4.0

Quarter, Weeks and frequency: Winter, weeks 1-10

Attributes:

Sub Area (if applicable):

Synopsis: Explores, analyzes, and visualizes biological data sets using scientific computing software. Focuses on the foundations of data wrangling, data analysis, and statistics, particularly the development of automated techniques that are reproducible and scalable to large data sets. Automated techniques are useful for image analysis because cells/tissues change shape during development; e.g., morphometric analysis.

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.