

BICD 130:
Embryos, Genes, and Development
Syllabus and General Course Information

Fall 2021

T+Th 9:30-11AM

Tata Hall Auditorium, Room 3201

Instructor

Dr. Michael Perry

E-mail: mwperry@ucsd.edu

Office hours: Friday 10AM at the Art of Espresso Coffee Cart next to the Mandeville Center

Instructional Assistants

Zach Goldberg, zhgoldbe@ucsd.edu

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IA Office Hours will be posted on Canvas. You are welcome to attend the office hours of any IA.

Course Description

How genetic information is used during development to produce complex, three-dimensional multicellular structures such as tissues, organs, and ultimately complete animals is the focus of one of the most active areas of research in biology. In this class, we tackle the molecular processes and cellular phenomena that result in the formation of organized tissues and functional organisms. Focusing on animals, we will cover essential concepts in developmental biology, including the methods and fundamental principles that will give you a preliminary but broad understanding of ontogenesis. We will emphasize evolutionary mechanisms as well as discussion of relevant diseases. Specific topics include formation of early body plan, cell type determination, organogenesis, morphogenesis, stem cells, cloning, and issues in human development.

Welcome and health statement

Students: Welcome to BICD 130! This has been a challenging year. As your professor, I value your health, wellbeing, and learning. Navigating the return to campus and beyond will require both hard work and prioritization of your mental and physical health. In this course I will challenge you to deepen your understanding and to grow as students – but not at the expense of your wellbeing. This is an in-person course, and we will follow UCSD's guidelines for the Return to Learn. I have built flexibility into the course this quarter should you need to complete coursework or assignments asynchronously. You will see in my grading policies that you will be able to **drop your lowest exam and quiz score regardless of the reason**. Throughout the quarter I will encourage you to take the time you need to deal with the added difficulties of life during a pandemic. Lectures will be recorded and made available online. Please do try to take advantage of the resources available: discussion section, office hours, and exam review sessions. Many of you may benefit from getting back into a physical classroom, and it may be a

nice change from online learning. I encourage you to join us in person even if things are not entirely back to normal, and by following campus guidance I think we can do this in a safe way.

Course prerequisites

BICD 100 (Genetics) and BIBC100 or BIBC102 or CHEM114A or CHEM114B (Biochemistry).

Textbook

None required. Readings are listed on the course schedule and will be posted in Canvas.

Course website

Announcements, information, and materials for this course will be posted on our course website (<http://canvas.ucsd.edu>). Use your UCSD student email account login and password to access the website. Slides and images from lectures will be posted as PDFs on the course website. Podcasts of lectures will also be available online (<http://podcast.ucsd.edu>).

Learning outcomes

After completing this course, students should be able to:

1. Understand the concepts and terminology inherent to developmental biology.
2. Be knowledgeable about the mechanisms that lead a single cell to become an organized embryo, or an undifferentiated tissue to become an organ.
3. Understand the translational importance of developmental biology in relation to human health and environmental sciences.
4. Appreciate how evolutionary change relies on developmental modifications.
5. Understand common techniques used for studying gene expression and for genome editing.

Grading

Discussion problems: 10%

Quizzes (best 3 of 4): 30%

Exams (best 2 of 3 equally weighted exams): 60%

Because you can drop the lowest exam and quiz for any reason, there will be **no makeup exams or quizzes** for any reason.

The class will be graded on a “hybrid curve”. The top 5% of the class will be normalized to 100%, and letter grade cutoffs made at 12.5% point intervals, e.g. 87.5-100%=A, 75-87.5%=B, etc. Everyone in this course **could** therefore get an A.

Quizzes

Four quizzes and one homework assignment will be submitted through Canvas. You will have a flexible time window during which to take each quiz, but there will be a time limit once you begin it. These are open note, but PLEASE work alone. I rely on you to be honest, to work hard, and to accept the grade that is the outcome of your hard work. I am relying on your academic integrity to allow for greater flexibility during the pandemic. Quizzes will be timed in a way to make it difficult to use resources outside your own understanding.

Discussion sections

Discussion sections will meet weekly, beginning in week 2 (week of September 27th). Each discussion section will provide you with additional problem-solving experience; your IAs will present new problems (called “Discussion Problem Set”) each week. In addition, discussion sections provide an opportunity to ask your IAs questions about other aspects of the course material.

Attendance and Discussion Problem Sets

Given the circumstances we cannot require synchronous attendance without an alternative. However, discussion sections are more useful for everyone if there is enough active participation. For that reason, we encourage discussion attendance in this way: if you attend and participate in discussion section, you will get full points for the Discussion Problem Set for that week. If you are unable to attend class in real time but would like to earn those points another way, you will be able to instead submit answers to that week’s Discussion Problem Set on Canvas by noon of the following Saturday. These makeup submissions will be graded, but it will be possible to receive IA help during office hours. If you are engaged, even if remote, you will be able to earn full points.

Discussion board

The course website features a discussion board where you can post questions, receive answers, read other students’ questions and answers, and even answer other students’ questions. The discussion board is the first place to go with your questions about or during this course.

Contact information

If you have questions that have not been answered by the discussion board, you can contact the IAs by email. For questions that have not been answered by the discussion board or by the IAs, you can contact the instructor by email. In your emails regarding our course, please make sure that the subject line includes “BICD 130”.

Office hours

The instructor will hold office hours each week on Friday from 10-11AM outdoors at the Art of Espresso coffee cart next to the Mandeville Center, beginning October 1st. IA office hours will be posted on the course website and will begin during the week of September 27th. You are welcome to attend the office hours of any IA.

OSD students

If you need testing accommodation for this class, please work with the Office for Students with Disabilities (OSD). Students requesting accommodations and services due to a disability for this course need to provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD), prior to eligibility for requests. Receipt of AFAs in advance is necessary for appropriate planning for the provision of reasonable accommodations. OSD Academic Liaisons also need to receive current AFAs. For more information, contact the OSD at (858) 534.4382 (V); (858) 534-9709 (TTY); osd@ucsd.edu, or <http://osd.ucsd.edu>. **You will need to coordinate scheduling of exams with the instructors. All these arrangements should be made within the first two weeks of the quarter.**

Enrollment questions

Administrative, advising, or registration questions, including questions about registering P/NP, should be submitted via the Virtual Advising Center (vac.ucsd.edu).

Schedule

#	Date	Activity Before Class This will be updated regularly on Canvas	Lecture Topic; Graded Quiz
1	9/23	none	Basics
2	9/28	Download Activity #1 Fertilization.pptx ahead of class. Print or have a digital copy in class to write on.	Oogenesis and Fertilization
3	9/30	Watch the "find it - lose it - move it" video here , take notes and summarize both parts: (Bindin/Egg, and Juno/Izumi parts)	Find it Lose it Move it
4	10/5	Watch this once and take notes. https://www.youtube.com/watch?v=Fr-MWjNkbSQ Lecture will largely review concepts from this video.	Cleavage and animal-vegetal polarity in Sea Urchins
5	10/7	https://depts.washington.edu/vurchin/index.php?view=embryogen	Sea Urchin Oral-Aboral axis and Left-Right Asymmetries
6	10/12	Quiz #1 on reading: Wolpert Chapter 8 (PDF provided on Canvas) Ten questions: timed on Canvas, complete before lecture.	Control of Gene Expression I
7	10/14	Watch "Polydactily.mp4". Required reading: Differential Gene Expression Handout.	Control of Gene Expression II
8	10/19		Midterm #1
9	10/21	Turn in Homework #1 on Canvas before class Start reading Wolpert Chapter 2 (it is long) (.pdf provided)	Drosophila - from eggs to body axes
10	10/26	Quiz #2 on reading: Wolpert Chapter 2 (.pdf provided)	Drosophila - from stripes to segments
11	10/28		Xenopus: Gastrulation
12	11/2	Read: https://www.ncbi.nlm.nih.gov/books/NBK10101/#_A2340	The Xenopus Organizer
13	11/4		Neural Tube Formation
14	11/9		Somitogenesis, Mesodermal Derivatives, and Limbs
	11/11	Veterans Day - no class	
15	11/16		Midterm #2
16	11/18	Quiz #3 on assigned reading	Cell Differentiation, Stem Cells, and Germline

17	11/23	Watch this video on neural crest cell development . Watch this technical video ; summarize the experiment in a few sentences.	Neural Crest Cells
	11/25	Thanksgiving - no class	
18	11/30		Sexual Dimorphism
19	12/2	Quiz #4 on reading: Quirks book chapters (PDF provided)	Evo-Devo and Human Adaptation
	12/9	8-10AM Location TBA	FINAL EXAM