

BI328 Developmental Biology Syllabus

Lecture: Tues/Thurs, 12-120pm, 110 Willamette

Lab: Wed, 12-1:50pm, 2-3:50pm, or 4-5:50pm, 33 Klamath

Instructors

Dr. Adam Miller - acmiller@uoregon.edu

Office hours: Monday, 10-11am, 314A Huestis

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Katie Perez – lab preparator

Course description

This course will explore mechanisms underlying animal development, drawing on examples from different organisms to illustrate basic principles of cellular, molecular, and activity-dependent mechanisms that contribute to creating a complex organism. The course will emphasize conceptual understanding of the topic and critical thinking. Broad topics of consideration will range from fertilization, through initial patterning and differentiation, to organogenesis, and developmental disorders will be explored throughout. In addition, there will be a lab component. The main goals of the lab are to explore concepts relevant to the course with hands on experience and to develop an independent research project that builds a hypothesis and rigorously test it, and then to present the results in a written and oral forms.

Learning objectives

- Gain an understanding of mechanisms underlying development, including similarities and differences between different animal taxa;
- Explore how alterations in some aspects of development can result in human developmental disorders and the importance of animal research for elucidating underlying mechanisms;
- Become acquainted with reading, discussing, and examining primary research literature and critically evaluating data;
- Develop the ability to formulate hypotheses about the mechanistic bases for biological phenomena;
- Become acquainted with designing experimental strategies to test hypotheses about the mechanistic bases for biological phenomena;
- Develop skills in presenting scientific ideas in written and oral formats.

Course timeline (*tentative* – if changed, announcements in lecture and on Canvas)

1	Tues	1/8	Lecture1	110 Wil	Overview of development
	Wed	1/9	no lab		
	Thurs	1/10	Lecture2	110 Wil	Non/Autonomous specification - genes and signaling
2	Tues	1/14	Lecture3	110 Wil	Cleavage and extended genetic principles
	Wed	1/15	Lab1	33 Kla	Zebrafish development
	Thurs	1/16	Lecture4	110 Wil	Breaking symmetry - dorsal/ventral axis
3	Tues	1/21	Lecture5	110 Wil	Gastrulation and the anterior/posterior axis
	Wed	1/22	Lab2	33 Kla	Drosophila larval salivary glands
	Thurs	1/23	Lecture6	110 Wil	The final turn - left/right axis + Review
4	Tues	1/28	Exam1	110 Wil	Exam
	Wed	1/29	Lab3	33 Kla	Drosophila ovary dissections
	Thurs	1/30	Lecture7	110 Wil	Neural tube formation
5	Tues	2/4	Lecture8	110 Wil	Stem cells, polarity, and differentiation
	Wed	2/5	Lab4	33 Kla	Drosophila ovary staining and imaging
	Thurs	2/6	Lecture9	110 Wil	Patterning a brain to make different cell types
6	Tues	2/11	Lecture10	110 Wil	The clock is ticking on the mesoderm
	Wed	2/12	Lab5	33 Kla	Introduction to planaria
	Thurs	2/13	Lecture11	110 Wil	Its guts all the way down - all about endoderm
7	Tues	2/18	Lecture12	110 Wil	Neural crest - not bound by its origin + Review
	Wed	2/19	Lab6	33 Kla	The ups and downs of regeneration
	Thurs	2/20	Exam2	110 Wil	Exam
8	Tues	2/25	Lecture13	110 Wil	Tetrapod limb - reuse of pathways for a different outcome
	Wed	2/26	Lab7	33 Kla	Student developed regeneration experiments
	Thurs	2/27	Lecture14	110 Wil	The octo-ly-brate retina - similarities, differences, and evolution
9	Tues	3/3	Lecture15	110 Wil	Brain organoids - human brains in a dish
	Wed	3/4	Lab8	33 Kla	Experimental results
	Thurs	3/5	Lecture2	110 Wil	Microbiome - we are more alien than we think
10	Tues	3/10	Lecture1	110 Wil	Sexual differentiation - more plastic than you think
	Wed	3/11	Lab9	33 Kla	Research project presentations
	Thurs	3/12	Lecture2	110 Wil	Primordial germ cells and development in reverse
11	TBD	TBD	Final	TBD	Final ***for date and time, check final schedule online***

Course materials

Course organization is handled through Canvas. Readings relevant to each lecture, Lab materials, and lab assignments will all be posted on or otherwise handled through Canvas.

Reading

We will use the below textbook. While it is not required, it is recommended.

Developmental Biology, 11th Edition, Gilbert and Barresi

- Available in the science library, critical supplement to class.
- Relevant sections posted on Canvas in the "Readings" section.
 - *** You can find free, older versions of this online. I will post notes on the general topics of interest, and you can track down the relevant sections in other books.
- Additional readings posted on Canvas in the "Readings" section.

Lectures

- pdfs of the lectures will be posted on Canvas in "Lectures" section ASAP.

Labs

Labs are a required part of the course. This is a lecture and lab course, and to receive full points for the course, you have to participate in both portions.

- Lab Readings, Lab Handouts, and PreLab questions will be posted on Canvas in "Labs" section Friday before lab.
- PreLab questions are due, on Canvas, before lab starts.
- Bring the Lab Handout to the lab each week (printed or on a digital device).
- Lab Reports are due, on Canvas, before the next week's lab starts.

Grading policy

All work must be your own original work. Anything less will result in a Fail.

Final grades will be based on scores in Exam (30%), Final (40%), Labs (20%), Research Project and Presentation (10%).

Two exams and one final

- The **first two exams** will focus on the material of lectures presented in the six lectures preceding the exam (see Course Timeline). However, the nature of the course is to build on concepts, so the second exam will build on previous concepts.
 - For the exam portion of the grade, only the best exam score of the two will be counted. In other words, the exam with the lowest score will be dropped. This allows for flexibility if an exam must be missed.
 - An exam will be worth *approximately* 150 points (the exact number will depend on the number and types of questions). They will consist of a mix of multiple choice, fill in the blank, and short answer questions.
- The **final** will cover topics and lectures from the entire course, although many questions will focus on the final topics covered in the class. It will occur during final's week on the date as stated on this site: <http://classes.uoregon.edu/> and more information can be found at: <https://registrar.uoregon.edu/calendars/examinations#complete-final-exam-schedule>
 - The **final must be taken** and will count towards the final grade.
 - The final will be worth *approximately* 200 points (the exact number will depend on the number and types of questions). It will consist of a mix of multiple choice, fill in the blank, and short answer questions.
- Make-up exams/final will not be offered. The goal of dropping one exam grade from your final score is to allow flexibility as needed throughout the term.

Point recovery on exams

- You can earn up to 25% of your missed points back on your exam. To get any points back I expect you to meet a high bar, the details of which are below.
- Failure to follow any of the below directions will result in fewer recovered points.

1. Put together a document containing all of your mistakes.
2. You must put your full name on the document.
3. You must address every mistake you made in the exam.
4. You must copy the question itself onto your document.
5. You must copy your incorrect answer onto the document.
6. You must write a response as to why you missed the question. You must clearly discuss what led you to your misunderstanding.
7. You must state the correct answer.
8. You must then write a response as to why it is the correct answer. This must demonstrate your understanding of the concept.
9. The above document is due by midnight 1 week after the class receives the exam back. For example, if the tests are returned Thursday, the corrections are due the following Thursday.
10. You must save the file as a pdf and the file name must contain your last name.
11. You must email your response to the instructor directly, and it must be received by 11:59pm one week after it was returned at the class, or it will not count.

Labs

The lab section will consist of 91 total points. Points will be received for complete PreLab questions, participating in lab, and turning in Lab Reports.

- There are 8 total labs during the term. Due to the challenge of setting up the labs, no makeup labs are available. To accommodate any issues that might arise throughout the term, to receive full points you must participate in 7 of 8 labs during the term (i.e. you can miss one lab). Labs consist of three parts: 1) PreLab questions, 2) performing the experiments in the lab, 3) turning in a lab report. **You must do your own work on all turned in portions of your labs.**

Lab Participation

You must be present in lab to receive points for the PreLabs or the Lab Report.

- You must bring your handout to lab (either printed or digital is fine). During lab the Handout will guide you through the procedures. You will be expected to keep notes on your methods, observations, and conclusions. The Lab Handout will also ask several questions related to the material of the lab.

PreLab Questions

Before each lab there will be PreLab questions based on the Lab Handouts. PreLab answers must be submitted on Canvas before your lab section begins. Each PreLab will be worth 3 points, making 21 points available for the term.

Lab Report

Each Lab Report will require you to report on your previous weeks experiments. In addition, there will be questions related to the material of the lab. Each Lab Report must be submitted on Canvas before your lab section begins the following week. Each Lab Report will be worth 10 points, making 70 points available for the term.

Research Project Paper and Presentation

The research project and presentation will be integrated into activities in lab but will constitute a separate final paper and presentation on the results of your research experiment. These will be due/presented at the final lab of the term. Both of these together will provide a total of 30 points. Points will be received for writing a research paper and presenting the results to the lab. **While**

this is a group research project, you must do your own work on your research paper and you must do your part for the presentation.

- The research paper will focus on learning writing skills to articulate the developmental of a research hypothesis and experimental results that aim to test the idea. 15 points.
- The research presentation will focus on learning public speaking skills to articulate the developmental of a research hypothesis and experimental results that aim to test the idea. 15 points.

No early exams or labs can be given for this course.

No makeup exams or labs can be given for this course.

If you have medically valid reasons and need accommodations for the term, please get in touch with the [AEC](#). And discuss this with me within the first week of the course in whatever manner is most comfortable for you.

Class conduct

Class starts promptly at noon and we will proceed for approximately 1 hour with time interaction and for Q&A. Please arrive on time and do not pack up before the conclusion of the lecture. Arriving late and leaving early is disruptive to others around you and to the speaker. Do not talk during lecture in a volume audible to anyone but the intended recipient. Do not use electronic devices for non-class purposes. **In particular, silence your devices and be respectful to everyone in the course.**

Open inquiry, freedom of expression, and respect for difference are fundamental to a comprehensive and dynamic education. We are committed to upholding these ideals by encouraging the exploration, engagement, and expression of divergent perspectives and diverse identities. Classroom courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, culture, religion, politics, sexual orientation, gender, gender variance, and nationalities. Our classroom is a learning environment, and as such should be a safe, inclusive and respectful place.

Academic Integrity: All students are expected to conform to the student conduct code (<http://dos.uoregon.edu/conduct> and <https://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code>). As detailed in the policy, academic misconduct means the violation of university policy involving academic integrity. This includes cheating (“any act of deception by which a student misrepresents or misleadingly demonstrates that the student has mastered information on an academic exercise that the student has not mastered”), and plagiarism (“using the ideas or writings of another as one’s own.”) The instructor has a zero-tolerance policy for academic dishonesty. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures.

You are encouraged to discuss ideas with each other. However, all work submitted in this course must be your own. Instances of suspected cheating or plagiarism on any material will be referred to the Office of Student Conduct and Community Standards. I take such cases seriously and pursue charges of academic misconduct and their sanctions to the fullest extent allowable, including but not limited to a failing mark for the course.

Inclusiveness: UO is working to create inclusive learning environments. Please notify me if there are aspects of instruction or design of this course that result in barriers to your

participation. You may also wish to contact the Accessible Education Center (541-346-1155; usaec@uoregon.edu, [Accessible Education Center](#)).

Campus resources to support your learning

Tutoring and Academic Engagement Center (<https://engage.uoregon.edu/services/>) Drop-in math and writing support in addition to tutoring, study skills support, and Class Encore. Located in the 4th Floor Knight Library (541) 346-3226, engage@uoregon.edu.

Counseling Center Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2nd Floor of the Health Center(541)346-3227

Accessible Education Center The University of Oregon is working to create inclusive learning environments. The instructor believes strongly in creating inclusive learning environments. If there are aspects of the instruction or design of this course that result in barriers to your participation, please notify us as soon as possible. You are also encouraged to contact the Accessible Education Center. If you are not a student with a documented disability, but you would like for us to know about class issues that will impact your ability to learn, we encourage you to come visit during office hours so that we can strategize how you can get the most out of this course. Located on the 1st Floor of Oregon Hall (541) 346-1155, uoac@uoregon.edu.

Center for Multicultural Academic Excellence (CMAE) mission is to promote student retention and persistence for historically underrepresented and underserved populations. We develop and implement programs and services that support retention, academic excellence, and success at the UO and beyond. We reaffirm our commitment to all students, including undocumented and tuition equity students. Located on the 1st Floor of Oregon Hall (541) 346-3479, cmae@uoregon.edu.

The *UO Access Shuttle* is an on-campus ride service provided at no cost to students with conditions that limit mobility. More information and a sign-up form can be found on the parking & transportation department website: <https://parking.uoregon.edu/content/access-shuttle>.

Discrimination and Harassment

Prohibited Discrimination and Harassment

Any student who has experienced sexual assault, relationship violence, sex or gender-based bullying, stalking, and/or sexual harassment may seek resources and help at safe.uoregon.edu. To get help by phone, a student can also call either the UO's 24-hour hotline at 541-346-7244 [SAFE], or the non-confidential Title IX Coordinator at 541-346-8136. From the SAFE website, students may also connect to Callisto, a confidential, third-party reporting site that is not a part of the university.

Students experiencing any other form of prohibited discrimination or harassment can find information at respect.uoregon.edu or aaeo.uoregon.edu or contact the non-confidential AAEO office at 541-346-3123 or the Dean of Students Office at 541-346-3216 for help. As UO policy has different reporting requirements based on the nature of the reported harassment or discrimination, additional information about reporting requirements for discrimination or harassment unrelated to sexual assault, relationship violence, sex or gender based bullying, stalking, and/or sexual harassment is available at [Discrimination & Harassment](#).

Reporting

The instructor of this class is a Student-Directed Employee. As such, if you disclose to me, I will respond to you with respect and kindness. I will listen to you and will be sensitive to your needs and desires. I will not judge you. I will support you. As part of that support, I will direct students who disclose sexual harassment or sexual violence to resources that can help. I will only report the information shared to the university administration when you as the student requests that the information be reported (unless someone is in imminent risk of serious harm or is a minor). Please note the difference between 'privacy' and 'confidentiality.' As a Student-Directed Employee I can offer privacy because I am not required to report certain information to the university. However, I cannot be bound by confidentiality as is the case with a counselor or attorney. Confidential resources mean that information shared is protected by federal and state laws. Any information that I as a student-directed employee receive may still be accessed by university or court proceedings. This means, for example, that I could still be called as a witness or required to turn over any related documents or notes that I keep.

Please note also that I am required to report all other forms of prohibited discrimination or harassment to the university administration. Specific details about confidentiality of information and reporting obligations of employees can be found at titleix.uoregon.edu.

Mandatory Reporting of Child Abuse

UO employees, including faculty, staff, and GEs, are mandatory reporters of child abuse. Child abuse pertains to individuals who are under the age of 18. This statement is to advise you that your disclosure of information about child abuse to the instructor may trigger my duty to report that information to the designated authorities. Please refer to the following links for detailed information about mandatory reporting: [Mandatory Reporting of Child Abuse and Neglect](#).

Safe Ride

541-346-7433 ext 2

pages.uoregon.edu/saferide

Safe Ride is an assault prevention shuttle that works to provide free, inclusive, and accessible alternatives to traveling alone at night for UO students, faculty, and staff.

We are a schedule-ahead service and riders can (1) call once we open to schedule a ride with a dispatcher or (2) leave a voicemail on the day of their ride request. We do not call riders ahead of time to confirm due to capacity constraints, but riders are always welcome to call us to double-check that their ride was scheduled. We are a feminist, 'for-the-students/by-the-students' organization and operate out of the Women's Center in EMU 12F.