

# BI328 Developmental Biology Syllabus

## Class discussions/lectures:

**Room - 141 ALL**

**Tues/Thurs, 1200-120**

Zoom [link](#) (Meeting ID: 933 9200 0055 Passcode: DevBio2023)

## Lab:

**Room - 33 KLA**

**Fri, 1000-1150a,**

**Fri, 1200-150p**

**Fri, 200-350p**

Zoom n/a - if you need to miss class, contact your GE for accommodations. Only attend if you are healthy.

## Instructors

**Prof. Adam Miller, PhD - [email](#)**

Office hours: **Mon, 1200-100** + by request (send email with Bi328 in Subject)

Zoom [link](#) (Meeting ID: 981 0377 6861 Passcode: DevBio2023)

**Rachael Giersch - [email](#)**

Office hours: **TBD**

**Saumya Keremane - [email](#)**

Office hours: **TBD**

**Francia Lopez Palomera - [email](#)**

Office hours: **TBD**

**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 complex, multicellular organisms. The course will emphasize conceptual understanding of the topic and especially highlight critical thinking. Broad topics of consideration will range from fertilization, to initial patterning and cellular differentiation, to organogenesis, with developmental disorders explored throughout for context.

In addition, there is a companion lab component. The main goals of the lab are to explore concepts relevant to the course and develop a sense of scientific inquiry. Throughout lab you will develop bench skills and do experiments to investigate developmental biology and work on a research project that investigates novel aspects of developmental biology. The experiments are

connected to ongoing work in Dr. Miller's research lab. Finally, you will work on scientific communication skills and will present your work.

### 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;
- Create a framework of understanding that goes beyond memorization to conceptual understanding of the scientific process;
- 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 schedule (*tentative – see Modules each week for up-to-date information*)

1	Tues	Lecture	Overview of Development - differentiation
	Wed	no lab	
	Thurs	Lecture	Differentiation determinants
2	Tues	Lecture	Its all about Mom - maternal-zygotic transition
	Wed	Lab	Introduction to zebrafish and microscopy I
	Thurs	Lecture	Breaking symmetry - dorsal/ventral axis
3	Tues	Lecture	Gastrulation - anterior/posterior axis

	Wed	Lab	Introduction to RNA in situ and microscopy II
	Thurs	Lecture	The final turn - left/right axis
4	Tues	Exam	Exam I
	Wed	Lab	Introduction to scRNAseq and data analysis
	Thurs	Lecture	Making a brain - neural tube development
5	Tues	Lecture	Patterning neural stem cells
	Wed	Lab	Research Project I - genes/anatomy
	Thurs	Lecture	Cell biology of asymmetric stem cell division
6	Tues	Lecture	How to read a paper - temporal patterning of stem cells
	Wed	Lab	Research Project II - genes/time
	Thurs	Lecture	Journal club - temporal patterning of stem cells
7	Tues	Lecture	Exam II
	Wed	Lab	Research Project III - development = time and space
	Thurs	Lecture	Mesoderm and Hox - evo/devo
8	Tues	Exam	Outside influences on development - microbiota of the gut

	Wed	Lab	Research Project IV - figure creation
	Thurs	Lecture	Journal club - microbiome and gut development
9	Tues	Lecture	More plastic than you think - sexual differentiation
	Wed	Lab	Research Project V - communication development
	Thurs	Lecture	Journal club - sex determination
10	Tues	Lecture	New frontiers - Development in reverse
	Wed	Lab	Research Project final due
	Thurs	Lecture	Exam III

### Course materials

Course organization is handled through Canvas. **EACH CLASS** will have relevant lecture and reading materials posted before class. In class, we will discuss and extend these concepts. **BEFORE CLASS** you will need to watch and read the day's material - there will be in class activities that require you have read the materials, e.g. quizzes.

### Reading

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

#### **Developmental Biology, Gilbert and Barresi**

\*\*\* You can find free versions of this online. I have not kept up with all the ongoing changes and that occur in each new edition of this book. *I do not want you to have to buy yet another book. Therefore, in the reading section of each Module, I will post notes on the general topics of interest, and you can track down the relevant sections in this and other books.*

- Several copies of the latest edition of this book are available in the science library.
- There are additional readings posted on Canvas (e.g. primary literature papers) in the "Readings" section of particular Modules. You will need to read these before the relevant lectures.

> Exam material will come from the lecture. Yet, having another perspective on the discussed topics is very useful. Readings posted in each module will supplement the lecture, providing an alternative voice, and more detail, on the topics discussed.

### Lectures

- Recorded lecture material necessary for each class will be posted before class in the relevant module.
- Slides of the lectures will be posted on Canvas.

### 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 Materials will be posted on Canvas during the week prior to class.
- PreLab questions are due *before* lab starts.
- While the pandemic may be 'over', you will be working closely with your group in the labs. Thus there are two things we strive for this year: (1) be in lab (2) when you are healthy. If you are not feeling well, we will find accommodations, but show up to lab when you are feeling well. There is simply no real substitute for doing lab work to understand the real process of doing developmental biology.
- PostLab Assignments are due *before* the subsequent lab starts.

### Grading policy (tentative – scoring percentages will update as we finalize course assignments)

- Final grades will be based on scores in Exams (two exams, best one counts, 25% total), Research Article Analysis (25% total), Participation Quizzes (10%), Lab Participation (10%), Labs (15%), Research Project (15%).
- All work must be your own, original work. Anything less will result in a fail and reporting via the UO ethics code.
- Much of the work will occur in groups. However, what you turn in has to be your own. \*Please work together to understand the concepts. \*\*But you will turn in work that is your own. \*\*\*Anything less will result in a fail and reporting via the UO ethics code.

### Two exams

- The **exams** will focus on the material presented in the lectures preceding the exam (see Modules). 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* 100 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, short answer questions, and interpretations of data/figures.

### Point recovery on exams

- You can earn up to 25% of your missed points back on your exam. To receive *any* points you *must meet a high bar*. You will only receive full points back if you follow all of the instructions below. **If you do not follow *all* of the below instructions, I will not evaluate the document, and you will receive no points.**

1. You must put your full name on each page of the document.
2. You must address every mistake you made in the exam.
3. You must copy the question itself onto your document (text color black).
4. You must copy your incorrect answer onto the document (text color blue).
5. You must state the correct answer. Your statement must clearly discuss what led you to your misunderstanding (text color black).
6. You must then write a response as to why it is the correct answer. This must demonstrate your understanding of the concept. (text color red)
7. You must save the file as a pdf and the file name must be in the format: **lastName\_firstName\_examXmakeup.pdf** and you must write in *your names* for “lastName” and “firstName” and also write in the appropriate exam number for “X”.
8. You must submit your response to Canvas, and it must be received by 11:59pm by the specified date or it will not count.

### Research Article Analysis

- The research article analysis will build from the last portion of class in which we delve into primary literature in the field. The goal of this section of class will be to teach you how to read scientific literature. We will focus on methods to break down the logic and organization of modern research articles, with the goal of making them more accessible.
- The research article analysis will focus on a single paper that will be assigned before the lecture. Everyone will have time to read, dissect, and discuss the paper before class.
- In class, you will be given a series of questions to address related to the assigned paper.
- The research article analysis will be worth *approximately* 100 points (the exact number will depend on the number and types of questions). It will consist of analysis of the structure of the paper, examination/explanation of the data, and will ask questions in relation to concepts learned in the course.

### Participation

The main goal is to create a learning environment that challenges the students to better learn the material. Critical to this effort will be lecture activities that will serve two main purposes: (1) engage all those taking the course and provide opportunities for problem solving, peer discussion, and higher-level synthesis, (2) develop understanding of how science is presented (i.e. reading and breaking down primary literature); and (3) provide examples of previous test questions to aid in exam preparation. These activities will take various forms throughout the course. In addition, lab participation is critical to this course. Receiving an introduction into scientific exploration and experimentation is a key piece of this course, and the only way to gain such knowledge is to participate.

## Labs

### Participation

- You must be present in lab to receive points for assignments related to that week.
- Due to timing constraints, no makeup labs are available. To accommodate any issues that might arise throughout the term, full credit for labs comes from your best n-1 scores. That is, you can miss one lab (or do poorly on one lab) and still receive full credit.
- Given the challenges of the pandemic, we will assess accommodations for absences on a one-on-one basis. NOTE - DO NOT COME TO CLASS IF YOU ARE SICK.
- Labs consist of three parts: 1) PreLab questions, 2) Participating in the lab, 3) turning in a PostLab report.
- **You must do your own work on all turned in portions of your labs.** Anything less will be a fail.
- You must be prepared and read to work when you get to Lab. Do the reading ahead of time.

### PreLab Questions

Before each lab there will be PreLab questions and answers must be submitted *before* your lab section begins.

### Lab Participation

Each lab will have specific tasks. You must be present to achieve the goals.

### PostLab Report

Each PostLab Report will require you to report on your previous weeks activities and answers must be submitted *before* your next lab section begins.

## Research Project

Through the lab you will work on a research project. At the end of the term, you will create a final summary of your work through the term. Details can be found in the Lab Manual and the project will develop over the entire term.

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

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

## Accommodations

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

## Respiratory illnesses - the 'triplodemic' or whatever it is we are in now

PANDEMIC - it is critically we keep one another healthy in these times. After all we have been through I hope we have learned that we can keep one another healthy and still learn if we take a few reasonable precautions, first and foremost, if you are sick, stay home. Accommodations due to health challenges will be made. The materials will be available online. Office hours can help

supplement missed material. The key is to push yourself in the class, but keep your health and others in mind. We can find the right solutions for everyone and learn a lot together.

### ***Good Classroom Citizenship***

- ***Stay home if you're sick***
- ***Get to know your neighbors in class, and let them know if you become ill with any respiratory viruses***
- ***Watch for signs and symptoms with the daily symptom self-check***
- ***Wear a mask to protect yourself and others***
- ***Wash your hands frequently or use hand sanitizer***

### **Class conduct**

Class starts promptly at the time set in the schedule and we will proceed for approximately 1 hour with time interaction and for Q&A. Lab starts promptly at the designated time of your section and we will work on papers throughout. Please arrive on time and do not pack up before the conclusion of class. 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**

*The University Student Conduct Code (available at [conduct.uoregon.edu](https://conduct.uoregon.edu)) defines academic misconduct. Students are prohibited from committing or attempting to commit any act that constitutes academic misconduct. By way of example, students should not give or receive (or attempt to give or receive) unauthorized help on assignments or examinations without express permission from the instructor. Students should properly acknowledge and document all sources of information (e.g. quotations, paraphrases, ideas) and use only the sources and resources authorized by the instructor. If there is any question about whether an act constitutes academic misconduct, it is the students' obligation to clarify the question with the instructor before committing or attempting to commit the act. Additional information about a common form of academic misconduct, plagiarism, is available at <https://researchguides.uoregon.edu/citing-plagiarism>.*

### **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](mailto: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 4<sup>th</sup> Floor Knight Library (541) 346-3226, [engage@uoregon.edu](mailto:engage@uoregon.edu).

*Counseling Center* Call anytime to speak with a therapist who can provide support and connect you with resources. Located on the 2<sup>nd</sup> 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 1<sup>st</sup> Floor of Oregon Hall (541) 346-1155, [uoaec@uoregon.edu](mailto:uoaec@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 1<sup>st</sup> Floor of Oregon Hall (541) 346-3479, [cmae@uoregon.edu](mailto: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](http://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](http://respect.uoregon.edu) or [aaeo.uoregon.edu](http://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](http://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](http://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.