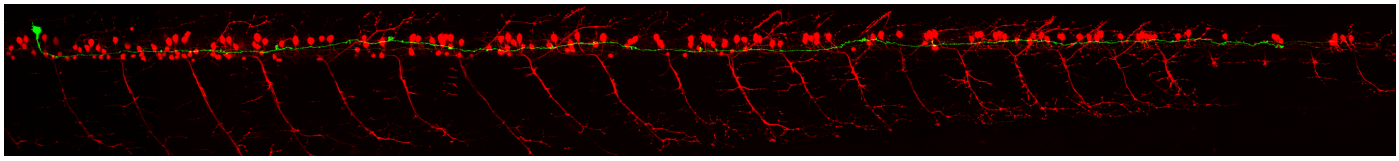

Biology 466/566 – Developmental Neurobiology – Winter 2023

Instructor: Judith Eisen
Class meeting: TR 12:00-1:20 pm Price Science Commons and Research Library B040

INTRODUCTION TO COURSE AND INSTRUCTOR

Communicating with the Instructor:

Office Hours: I look forward to meeting with each of you during my office hours, from 1:30-2 Thursdays in PSC B040; this is right after class in the same room. I realize that this time will not work for everyone, thus I will also be available to meet by appointment. You can schedule a meeting with me by email or by talking with me before or after class. Please do not hesitate to email me with any questions. I will respond as quickly as possible during business hours.

Instructor Contact Information: eisen@uoregon.edu; please use BI466/566 in the subject line

Course Description: This course will explore mechanisms underlying nervous system development and how these mechanisms fail in some neurodevelopmental disorders. The course is based on primary research literature, drawing on examples from different organisms to illustrate basic principles about cellular and molecular mechanisms underlying nervous system development. The course will emphasize critical reading of the literature and critical thinking. Students will be required to present papers from the literature and to complete regular homework assignments. During the course, students will develop original research proposals that will use the types of experimental approaches covered in the course to address unanswered questions about neural development. Students will present these proposals orally and submit them as a final written research project.

Course Learning Objectives:

- Gain an understanding of mechanisms underlying nervous system development, including similarities and differences between different animal taxa;
- Explore how alterations in some aspects of neural development can result in human neurodevelopmental disorders and the importance of animal research for elucidating underlying mechanisms;
- Become proficient at reading, discussing and presenting primary research literature and critically evaluating data and conclusions;
- Develop the ability to formulate hypotheses about the mechanistic bases for biological phenomena;
- Become proficient at designing experimental strategies to test hypotheses about the mechanistic bases for biological phenomena;
- Learn to work with a group to give an oral presentation and to discuss primary research literature critically;
- Learn to work individually to develop a compelling oral presentation that identifies a scientific question, proposes a hypothetical answer to this question, and describes a novel experimental strategy to test this hypothesis;
- Learn to write a concise and compelling research proposal that identifies a scientific question, proposes a hypothetical answer to this question, and describes a novel experimental strategy to test this hypothesis

Course Website: All course materials will be available through Canvas (canvas.uoregon.edu) under BI 466/566 (Winter 2023; 20892 and 20909). To access our course Canvas site, log into canvas.uoregon.edu using your DuckID. Additional information is available at the Canvas support page or at 541-346-4357.

Course Format: The course will be a combination of lectures, in class exercises, discussions, and student presentations. I will post notes for my presentations on Canvas before class. I will also post annotated notes after class, when appropriate. If you must miss class and need more information than is contained in the notes, please feel free to schedule an appointment to talk with me about the material.

Course Modality: This is an in-person course. That means that, unlike asynchronous online/ASYNC WEB courses, we will meet during scheduled class meeting times in PSC B040. I will accommodate absences as described in the Absences Policy. If you need additional flexibility, UO encourages you to consider ASYNC WEB courses. If you need accommodation related to disability, you can request those by working with the Accessible Education Center (https://aec.uoregon.edu).

COURSE POLICIES

Course Participation Guidelines:

Participate and Contribute: Students are expected to participate by sharing ideas and contributing to the collective learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others. More specific participation guidelines and criteria for contributions will be provided for each specific activity.

Etiquette: Please silence your cell phone during class. You are encouraged to discuss your work with others, but all work you submit for a grade must be your own. Some of the papers we discuss may be controversial, so disagree respectfully with your colleagues.

Expect and Respect Diversity: All courses at the University of Oregon welcome and respect diverse experiences, perspectives, and approaches. What is not welcome are behaviors or contributions that undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, or socioeconomic status. We will value differences and communicate disagreements with respect. We may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.

Help Everyone Learn: Part of how we learn together is by learning from one another. To do this effectively, we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and feedback from others. Don't hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

Course Materials: Assigned readings for each class session are listed in the course syllabus. Pdf files for all assigned readings are posted on Canvas. In some cases, pdf files of papers that provide background or additional information are also posted on Canvas. To supplement the required readings, two books are on reserve in the Price Science Commons and Research Library: 1) SF Gilbert (2014) *Developmental Biology*, an excellent reference to review animal development; 2) DH Sanes, TA Reh & WA Harris (2012) *Development of the Nervous System*, an excellent reference for some aspects of nervous system development. The syllabus for this course is "tentative" because if new papers pertinent to the course are published during the term, we may use them instead of the papers listed in the syllabus; any changes will be announced in advance.

Course Absences Policy: This is a face-to-face course. Attendance is important because we will develop our knowledge through in-class activities that require your active engagement. We'll have discussions, small-group activities, presentations, and workshops during class that will be richer for your presence, and

that you won't be able to benefit from if you are not here. Our UO community will still be navigating Covid-19, as well as other ongoing respiratory infections that will mandate that some students stay home, rest, and isolate, particularly in the case of Covid. Please take absences only when necessary, so when they are necessary, your prior attendance will have positioned you for success.

If you must miss a class for any reason, please email me as much in advance as possible so we can determine whether it is possible to make an accommodation via Zoom or another mechanism such as emailing me a paragraph about a paper or meeting with me to discuss a paper, as described in the Grading Policies.

Course Grading Policy:

Homeworks: 25% There will be six homework assignments that will cover assigned readings and material covered in class. Homeworks will be available on Canvas. You should answer the questions and upload them to Canvas. Homeworks will typically be posted following the class meeting prior to when they are due. Homeworks will be due at 11:45am on the days listed in the syllabus. Late homeworks will not be accepted unless you discuss it with the instructor in advance.

Class Participation: 10% Class participation is crucial for the success of this course. Attendance will be taken and students will be expected to come to class having read and thought about the assigned material and prepared to participate in all class activities. As you read the assigned articles, please keep in mind that some of the topics we will cover are controversial. Therefore, you should think critically about what you are reading, continually question how the authors of an article arrived at their conclusions, what assumptions they made, whether their data seem credible, and what future experiments could support or refute their conclusions. This type of critical thinking will be necessary for your original research proposal. If you cannot attend particular classes, let me know in advance and in lieu of participating in class discussions thoses day, you can write a paragraph summarizing the key points of the assigned paper(s) and email it to me.

Research Article Presentation: 15% Each student will work in a small group (typically 3-4 students) to present a research article or articles to the class. The articles that will be discussed in the student presentations are listed in the course syllabus and posted on Canvas. These may change, depending on the number of students in the course; any changes will be announced in advance. Each member of the class is also expected to participate in developing a written critique for another presentation group. Graduate students are expected to organize and lead the presentation groups. If you cannot participate in your scheduled group presentation in person, you should notify your group and me as soon as possible and we will make every attempt to have you participate via Zoom. If that is not possible, let me know and we will schedule a time to discuss the assigned paper, in lieu of your class presentation.

Proposal Assignments: Each student will be required to write and to present an original research proposal that uses approaches similar to those covered in the course to address an unanswered question in the field of nervous system development. Students will develop their proposals throughout the course, as indicated on the class schedule. The components of this proposal development process will contribute to the final course grade as follows:

(1) Title, abstract, specific aims: ***3%***
(2) Feedback on group member's title, abstract, specific aims: ***3%***
(3) REVISED title, abstract, specific aims: ***3%***
(4) Outlined experimental design & expected outcomes: ***3%***
(5) Feedback on group member's aims, design and outcomes: ***3%***
(6) Oral presentation: ***10%***
(7) Written research proposal: ***25%***

Late Submissions: Late submissions of parts 1-5 will receive partial credit. If you cannot

participate in your scheduled presentation in person, you should notify me as soon as possible and we will make every attempt to have you participate via Zoom. If that is not possible, let me know and we will schedule a time to discuss the assigned paper, in lieu of your in-class presentation. Late submission of the written research proposal will result in an "incomplete" grade until the work has been submitted and I have time to grade it, pursuant to UO policy (https://provost.uoregon.edu/grades-incompletes-policy).

Grading for Undergraduate and Graduate Students: Undergraduate and graduate students will be graded separately, based on different expectations of their background knowledge in scientific approaches. Graduate students will be expected to organize and lead research article presentations. Expectations for the research proposal and scope of the project will also be different for undergraduate and graduate students. Undergraduates will be expected to describe a single experimental strategy to address an unanswered question. Graduate students will be expected to write a longer proposal that employs several independent approaches to address a well-defined research question, similar in scope to a professional predoctoral research fellowship proposal.

UNIVERSITY POLICIES

Accessible Education: The University of Oregon is working to create more inclusive learning environments, including for students who identify as having a disability. At UO, 10% of students use the Accessible Education Center (AEC) and nationally an estimated 20% of undergraduates identify as having a disability. If there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, please contact me—your success matters.

You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu. The AEC offers a wide range of support services including note-taking, testing services, sign language interpretation and adaptive technology.

Accommodations for Religious Observances: The University of Oregon respects the right of all students to observe their religious holidays, and will make reasonable accommodations, upon request, for these observances. If you need to be absent from a class period this term because of a religious obligation or observance, please fill out the Student Religious Accommodation Request fillable PDF form and send it to me within the first weeks of the course so we can make arrangements in advance.

Your Wellbeing: Life at college can be very complicated. Students often feel overwhelmed or stressed, experience anxiety or depression, struggle with relationships, or just need help navigating challenges in their life. If you're facing such challenges, you don't need to handle them on your own—there's help and support on campus.

As your instructor if I believe you may need additional support, I will express my concerns, the reasons for them, and refer you to resources that might be helpful. It is not my intention to know the details of what might be bothering you, but simply to let you know I care and that help is available. Getting help is a courageous thing to do—for yourself and those you care about.

University Health Services helps students cope with difficult emotions and life stressors. If you need general resources on coping with stress or want to talk with another student who has been in the same place as you, visit the Duck Nest (located in the EMU on the ground floor) and get help from one of the specially trained Peer Wellness Advocates.

University Counseling Services (UCS) has a team of dedicated staff members to support you with your concerns, many of whom can provide identity-based support. All clinical services are free and confidential. Find out more at counseling.uoregon.edu or by calling 541-346-3227 (anytime UCS is closed, the After-Hours Support and Crisis Line is available by calling this same number).

Basic Needs: Being able to meet your basic needs is foundational to your success as a student at the University of Oregon. If you are having difficulty affording food, don't have a stable, safe place to live, or are struggling to meet another need, visit the UO Basic Needs Resource page for information on how to get support. They have information food, housing, healthcare, childcare, transportation, technology, finances (including emergency funds), and legal support.

If your need is urgent, please contact the Care and Advocacy Program by calling 541-346-3216, filling out the Community Care and Support form, or by scheduling an appointment with an advocate.

Student Experience Surveys: Midway and end-of-term Student Experience Surveys will be conducted in class during the 4th and 9th or 10th weeks of the term, probably on 31 January and 9 March. These are important opportunities to provide feedback about your learning experiences. I deeply value this feedback and am continually improving the course with students' responses in mind. The key parts of the survey are the open-ended questions where you share concrete, actionable feedback and about the teaching practices that stand out to you. Thank you for your thoughtful reflections!

Academic Integrity and Reporting:

Academic Integrity: All students are expected to conform to the student conduct code (http://dos.uoregon.edu/conduct). You are encouraged to discuss ideas with each other. However, all submitted written work, including answers to homework questions and components of the research proposal must be your original work. Proper citation of sources is required in all written work and oral presentations. If you do not know how to properly cite literature, I would be very happy to discuss this with you.

Manditory Reporter Status: I am an assisting employee. For information about my reporting obligations as an employee, please see Employee Reporting Obligations on the Office of Investigations and Civil Rights Compliance (OICRC) website. Students experiencing sex or gender-based discrimination, harassment or violence should call the 24-7 hotline 541-346-SAFE [7244] or visit safe.uoregon.edu for help. Students experiencing all forms of prohibited discrimination or harassment may contact the Dean of Students Office at 541-346-3216 or the non-confidential Title IX Coordinator/OICRC at 541-346-3123. Additional resources are available at UO's How to Get Support webpage. I am also a mandatory reporter of child abuse. Please find more information at Mandatory Reporting of Child Abuse and Neglect."

Academic Disruption: In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are unable to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas. If the instructor of this course has to quarantine, the course may be taught online. If this occurs, more information will be provided at that time.

Inclement Weather: It is generally expected that class will meet unless the University is officially closed for inclement weather. If it becomes necessary to cancel class while the University remains open, this will be announced on Canvas and by email. Updates on inclement weather and closure are also communicated as described on the Inclement Weather webpage.

Week(Class)	Date	Learning objective	Readings and assignments
Nervous system patterning and specification			
1 Tu (1)	Jan 10	Explain nervous system induction	Background readings: Hogan (1995); Weinstein (1997); Sanes et al. (2006); Zeliadt (2018)
1 Th (2)	Jan 12	Learn how the anteroposterior axis is established	Nordstrom et al. (2002) [background reading: New (1955)] **Homework 1 due: 11:45am**
2 Tu (3)	Jan 17	Learn about the origin of neural tube defects	Wallingford et al. (2013) [additional resources: Pyrgaki et al. (2010); Copp et al. (2013)]
2 Th (4)	Jan 19	Learn how the dorsoventral axis is established	Briscoe & Ericson (2000); Helms & Johnson (2003); Le Dreau & Marti (2012) **Homework 2 due: 11:45am**
3 Tu (5)	Jan 24	Compare invertebrate & vertebrate motoneuron specification	Pfaff et al. (1996); Thor & Thomas (1997)
3 Th (6)	Jan 26	Discuss the origin of neural crest cells	Alhashem et al. (2022) **PRESENTATION GROUP 1** **Homework 3 due: 11:45am**
Neural stem cells and glia			
4 Tu (7)	Jan 31	Understand stem cells and glia	Taupin & Gage (2002); Alvarez-Buylla et al. (2001); Zuchero & Barres (2015); Abdullah et al. (2012)
4 Th (8)	Feb 2	Discuss involvement of glia in schizophrenia	Windrem et al. (2017) **PRESENTATION GROUP 2** **Homework 4 due: 11:45am**
5 Tu (9)	Feb 7	Describe temporal patterning of insect neuroblasts	Doe & Goodman (1985); Isshiki et al. (2001) [additional background: Skeath (1999)] **Proposal title, abstract, specific aims due: 11:45am**
5 Th (10)	Feb 9	Discuss temporal patterning of vertebrate CNS progenitors	Dias et al. (2014); Mattar & Cayouette (2014)
6 Tu (11)	Feb 14	Proposal writing workshop: refining an hypothesis and developing experiments	Group discussions of experimental tests of hypotheses **Feedback on group member's title, abstract, specific aims due: 11:45am**
Axon guidance, synapse & circuit formation, and neuronal survival			
6 Th (12)	Feb 16	Learn about axon guidance & synapse formation	Koppers et al. (2019) [background Chilton (2006); Dickson (2002)]
7 Tu (13)	Feb 21	Identify mechanisms of synapse and circuit assembly	Scheiffele et al. (2000) **Revised title, abstract, specific aims due: 11:45am**
7 Th (14)	Feb 23	Discuss role of synapses in schizophrenia	Jiang et al. (2018) [background Hayashi-Takagi (2017)] **PRESENTATION GROUP 3** **Homework 5 due: 11:45am**
8 Tu (15)	Feb 28	Understand the basis of neuronal competition and survival	Davies (2013); Lichtman & Coleman (2000); Je et al. (2013) [additional background: Purves & Lichtman (1985)]
Microbial influences on neurodevelopment			
8 Th (16)	Mar 2	Learn how microbes affect host neural development	Heijtz et al. (2011); Lins (2021) **Outlined experimental design & expected outcomes due: 11:45am**
9 Tu (17)	Mar 7	Discuss role of host-associated microbes in schizophrenia	Zhu et al. (2019) **PRESENTATION GROUP 4** **Homework 6 due: 11:45am**
Student projects			
9 Th (18)	Mar 9	Proposal writing workshop: refining experiment design	Group discussions of experimental design and expected outcomes **Feedback on group member's experimental design & outcomes due: 11:45am**
10 Tu (19)	Mar 14	Research oral presentations	
10 Th (20)	Mar 16	Research oral presentations	
11 M	Mar 20		**WRITTEN RESEARCH PROPOSAL DUE: 8am**