DEVELOPMENTAL NEUROBIOLOBY – Bi466/566
WINTER 2014; MW 12-1:20; Deady 303

Instructor: Judith Eisen
315 Huestis
eisen@uoregon.edu
please use Bi466/566 in the subject line!
541-346-4524

Office hours: By appointment

Course description: This course will explore mechanisms underlying nervous system development and how these mechanisms fail in some neurodevelopmental disorders. The course is taught almost entirely from original research papers and reviews and will emphasize critical reading of the literature and critical thinking.

Course goals:

- To gain an understanding of mechanisms underlying nervous system development;
- To explore how alterations in some of these mechanisms can result in neurodevelopmental disorders;
- To become proficient at reading the primary research literature and evaluating data;
- To become proficient at discussing the primary research literature;
- To learn to give a concise and compelling oral presentation that identifies a scientific question from the literature, analyzes experimental data, and draws conclusions;
- To learn to formulate hypotheses about mechanistic bases for neurodevelopmental phenomena;
- To 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

Readings: Readings for each class session are listed in the course syllabus. Pdf files for all assigned readings are posted on *Blackboard*. In some cases, Pdf files of papers that provide background or additional information are also posted on *Blackboard*. To supplement the required readings, two books are on reserve in the Science Library: 1) SF Gilbert (1997) *Developmental Biology*; an excellent reference to review animal development, 2) DH Sanes, TA Reh & WA Harris (2006) *Development of the Nervous System*; an excellent reference for some aspects of nervous system development.

Participation: Students are expected to read the assigned papers BEFORE class and to participate in class discussions of those papers. To facilitate this, there will be homework questions about some of the assigned readings. Written answers to these questions will be due by the beginning of class on the dates posted in the syllabus. Please submit answers to homework by email in Word format. Please append your name to the file name before sending. Homework questions will serve as the basis of class discussions, and the written answers will be graded. Students are expected to hand in homework questions even if they cover a paper or papers that you are presenting (see below). Because participation in class discussions is crucial for the success of this class, attendance will be taken and participation in discussions will be part of your grade. 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 reseach proposal (see below).

Presentations: Each student will work in a small group (typically 4 students) to present one or two

research articles to the class. The articles that will be discussed in the student presentations are listed in the course syllabus and posted on *Blackboard*. 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.

Exams: The exam for this course will be a "term paper" in the form of a research proposal written in 2 parts: 1) MIDTERM: In this part, you will put forth an hypothesis concerning a topic of interest in Developmental Neurobiology. To support your hypothesis, you must provide a short literature review (no longer than 3 double-spaced pages, excluding references). More detailed information about formulating and supporting hypotheses will be provided during the term. You should plan to use the hypothesis you develop for your Midterm as the basis of the next part of your paper. You may be asked to meet briefly with the instructor between the midterm and final to discuss whether the hypothesis will be appropriate. 2) FINAL: In this part, you will propose experiments to address the hypothesis you put forth in your Midterm. This part should be no longer than 3 double-spaced pages for undergraduate students. Graduate students are expected to provide a more in depth proposal that should be no longer than 5 double-spaced pages. More detailed information about the final will be available later in the term. The final will be due at **10:15am WEDNESDAY MARCH 19**.

Grading:	Homework questions:	25%
	Class participation:	15%
	Class presentation:	20%
	Midterm:	15%
	Final:	25%

Etiquette: Please turn off 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.

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 Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

Academic Integrity: All students are expected to conform to the student conduct code (http://uodos.uoregon.edu/StudentConductandCommunityStandards/StudentConductCode/tabid/69/Default.aspx). You are encouraged to discuss ideas with each other. However, all submitted written work, including answers to homework questions and components of the midterm and final papers must be your original work. Proper citation of sources is required in all written work and oral presentations.

Duty to Report: UO is committed to providing an environment free of all forms of prohibited discrimination and sexual harassment, including sexual assault, domestic and dating violence and gender-based stalking. Any UO employee who becomes aware that such behavior is occurring has a duty to report that information to their supervisor or the Office of Affirmative Action and Equal Opportunity. The UO Health Center and University Counseling and Testing Center can provide assistance and have a greater ability to work confidentially with students. All UO employees are also required to report to appropriate authorities when they have reasonable cause to believe that any child with whom they come in contact has suffered abuse or any person with whom they come in contact has abused a child.

Date	Topic	Assigned reading	Presenter
Topic I: Nervous system patterning and specification			
1) Jan 6 M	Nervous system induction	Sanes et al. (2006); Hogan (1995); Weinstein (1997); Abdullah (2012)	Judith Eisen
2) Jan 8 W	Establishing the antero-posterior axis	**Nordstrom et al. (2002); New (1955)**	Judith Eisen **Homework 1 due**
3) Jan 13 M	Establishing the dorso-ventral axis	**Briscoe & Ericson (2000); Helms & Johnson (2003); Le Dreau & Marti (2012)**	Judith Eisen
4) Jan 15 W	Discussion of neural tube defects	**Wallingford et al. (2013);** Pyrgaki et al. (2010); Copp et al. (2013)	**Presentation group 1** **Homework 2 due**
5) Jan 20 M	Martin Luther King Holiday		
6) Jan 22 W	Specification of motoneurons	**Pfaff et al. (1996); Thor & Thomas (1997)**	Judith Eisen
7) Jan 27 M	Glia: the other half of the brain	**Wu et al. (2006);** Masahira et al. (2006); Leber et al. (1990)	Judith Eisen
8) Jan 29 W	Discussion of glia and Rett syndrome	**Lioy et al. (2011); Derecki et al. (2012)**	**Presentation group 2** **Homework 3 due**
9) Feb 3 M	Specification of neural crest cells	**Blentin et al. (2008); Lee et al. (2013)**	Judith Eisen **Homework 4 due**
Topic II: Axon guidance, synapse formation, and neuronal survival			
10) Feb 5 W	Molecular mechanisms of axon guidance	**Chilton (2006); Dickson (2002)**	Judith Eisen
11) Feb 10 M	Modulation of axon pathfinding	**Baudet et al. (2012)** Campbell et al. (2001)	Judith Eisen **Homework 5 due**
12) Feb 12 W	Synapse formation	TBA	Phil Washbourne **MIDTERM TOPIC DUE**
13) Feb 17 M	Discussion of synaptic proteins and autism	**Arons et al. (2012)**	**Presentation group 3** **Homework 6 due**
14) Feb 19 W	Growth and survival factors	**Davies (2003); Zhu (2008);** Purves & Lichtman (1985)	Judith Eisen **MIDTERM DUE**
Topic III: Neural stem cells			
15) Feb 24 M	Introduction to vertebrate neural stem cells	**Taupin & Gauge (2002); Alvarez-Buylla et al. (2001); Ruggieri (2013)**	Judith Eisen
16) Feb 26 W	Temporal patterning of insect neuroblasts	**Isshiki et al. (2001);** Doe & Goodman (1985); Skeath (1999)	Judith Eisen
17) Mar 3 M	Temporal patterning of cortical progenitors	**Shen et al. (2006); Mizutani & Gaiano (2006)**	Judith Eisen **Homework 7 due**
Topic IV: Microbial influences on neural development			
18) Mar 5 W	Microbial influences on neural development	**Heijtz et al. (2011)**	Judith Eisen
19) Mar 10 M	Discussion of microbial role in autism	**Hsiao et al. (2013)**	**Presentation group 4** **Homework 8 due**
Finale			
20) Mar 12 W	Finale		Judith Eisen
Mar 19 W			**FINAL DUE 10:15am**

required readings are listed in **bold**; background readings are in normal font; additional readings not listed here can be found on the course *Blackboard* website