Bio6690: Neurobiology 1 **W2019**
T/Th 2:30-3:45 pm
0426 State Hall

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Description: Neural development is an absolutely fascinating process. Teaching it also provides a wonderful opportunity to integrate many cell biology, genetic, biochemistry and physiology concepts. You get to put all your other classes to use in this 6000 level class. Seminal work, from a variety of animal models will be discussed as we outline the principles underlying the induction of neural tissue and its eventual differentiation into the specialized components making up the central and peripheral nervous systems. Topics include neural induction, formation of a body plan, neurogenesis and migration, neural differentiation, axon pathway formation, synapse formation and maturation, apoptosis, and aspects of neural development that depend on activity, experience and social interactions. The text also considers some philosophy, as a glimpse into the mind. You will be experiencing genuine learning as we explore the amazing process of neural development.

Learning Outcomes:

You will delineate how basic processes of cell biology, genetics and gene regulation are applied to create a body pattern, and differentiate cells.

You will create flow charts depicting the processes of neural induction.

You will describe how selected molecular families provide key information (signaling) during several different developmental stages.

You will analyze research results and explain how researchers asked and answered questions about the developmental processes.

You will develop an appreciation for the strengths and weaknesses of different model organism, and the need to use them to understand development.

You will model how activity, experience and social interactions contribute to the development and plasticity of the nervous system.

The ultimate goal is for you to develop a deep appreciation for the amazing process of neural development, still occurring in you as an adult. The class structure is also designed to develop skills in oral and written communication, your ability to read and synthesize information. Learning to work in teams, and enhancing critical thinking skills are also developed.

Text: *Foundations of Neural Development. 2017. S. Marc Breedlove, Oxford Press, ISNB: 9781605355795.*

This is an undergraduate textbook well written, easy to understand fashion, and complemented by really great figures. Breedlove tries to identify the underlying principles as gleamed from work in a variety of model organisms. Enticed by homework questions, you will read/study each chapter before we begin lectures and come to lecture ready to engage in a *conversation* that will connect the textbook information to models of how, when, where and WHY development occurs. Other readings may include research papers (classic or new) that will be uploaded as required. These will help illustrate how certain information was experimentally derived.

Canvas: Log in at https://canvas.wayne.edu/ and access this class to get copies of handouts and material. I will be developing the class throughout the semester and will try hard upload things in a timely fashion, but some material may be last minute. Lectures are NOT recorded so ECHO center will be empty. Canvas works best in Chrome, but if you have connection problems contact C&IT help desk. I would appreciate if you e-mail me directly [mvb@wayne.edu] rather than through the Canvas system.

Office hours: I will be available in my office from 10 to 11:30 am on T/Th and will often be available immediately after class. You can also e-mail for a mutually convenient appointment. I only answer an odd question or two via e-mail; if complicated find me. I do NOT repeat class announcements by e-mail.

Attendance & timeliness: Given the discussion nature of the class, timely attendance is important, and daily participation points are assigned. Repeated absence may affect your grade. If you miss class activities,

including potential quizzes, a make up will not always be possible. You are also responsible for all class announcements even if they are not posted on Canvas.

In addition, be on time. A failure to do so may affect participation points (see below). Weather and/or other exceptional circumstances will be considered, as will the frequency in which tardiness occurs. If it is an exam date, I will not extend the allotted time period just because you were late.

3 exams (50 each)	150 pts
"Homework"	250 pts
Participation	50 pts

Grading Policy & Exams: My goal is to have all students experience a genuine learning environment, where learning about neurodevelopment - an absolutely phenomenal process - will be challenging but fun. I would love to get rid of the point game but we all know that is not possible. Yet, in an attempt to minimize your focus on points, I am trying a novel (for me at least) grading structure, where exams are only a small part of the final grade, and homework a major part, along with some participation. *Your final letter grade will also depend on both your absolute grade and your relative standing within the class.*

Exams: Three midterm exams will be given, each worth 50 points towards your final grade. All exams will be short answer and/or essay type questions generally directed at basic principles as delineated by examples given in textbook, other reading assignments, and especially homework.

The first and third exams will be closed book and done in class with the *most likely dates* shown in box below. However, if the pace of class requires us to move exam 1 date we may after a class discussion; but in the absence of a consensus it will be Feb 12 as indicated. For exam 3, it may be convenient to have it on the last day of class (April 18) but if not, it will occur as indicated - April 25 starting at 2:45 pm and going to 4:45 pm (i.e. WSU final exam matrix). The second exam will be a take home exam assigned over the March break; in this case you may get equivalent but different subsets of questions.

Exam 1 - Feb. 12, 2019
Exam 2 - take home during March break.
Exam 3 - April 25 in final exam matrix.

Homework: Your homework represents the majority of your workload; it is not just an add-on. Expect something to be due almost every class. Each assignment will have its own weight, usually based on the depth of answer expected. By the end of the semester when everything is competed these will be normalized to a total of 250 points towards your final letter grade. Late assignments will be docked up to 20% of whatever that assignment was worth. If you make it a habit, I reserve the right to not accept further late assignments. Unless otherwise stated, assignments are due at the beginning of each class.

It is very important to take the homework seriously! *I will work hard not to make it 'busy work.'* With genuine, professional attempts, the majority of your learning is likely to occur through this homework section, as questions, answers, discussion and re-iteration all re-enforce concepts. For this reason, grading of assignments may appear rigorous, as many answers will require a synthesis of information requiring you to write proper, thorough and succinct answers. This may be a challenge initially as many science students have not enjoyed this opportunity.

Participation: This is new for me so hopefully it works! I reserve the right to make some adjustment if it becomes a sticky issue. Or if it is noticeably un-workable, after explaining why, I will remove this category from your grade calculation. But I am attempting this to emphasize the importance of discussion (actually typical in liberal art classes) regardless of how novel or uncomfortable this may initially be for you.

Accordingly, for each class (~25 - not first class or exam dates) you will earn up to 2 points for participation to a maximum of 50 points towards your final grade. Ideally, every student will earn 2 points in every class. As an **incentive**, say if you miss a class, or were off to a slow start, exceptional performance in a given class can also be awarded up to 5 pts, and up to 55 total points to grade. On the other hand, disruptive, abusive or unkind inputs can be assigned negative points.

To ensure everyone is given an opportunity to participate I may randomly select a student hoping to encourage an attempt, and a student that answers a lot may be asked to not answer. This will be recognized when I assign points. So, yes there is a level of subjectivity on the profs part, and while I will discuss them with you, they are still at my discretion. A general rubric to think about participation points is as follows:

Zero (0) points if not attend class, or show up late (how late depends on you).
One (1) point if you attend, but weak engagement
Two (2) points if you have stronger active participation

Challenge option*:* Almost all exam questions are anticipated to be short written or essay questions that require a degree of subjective grading on the profs part to determine the quality and thoroughness of an answer. I try hard to grade "what is written" and NOT read between the lines. It also needs to be legible. It is not just a download of key words/phrases, but an ability to accurately communicate an answer, usually involving some degree of synthesis. Also keep in mind that most science students have had little opportunity to provide written answers, so a learning curve to develop better answers is expected. With these caveats in mind, I will allow students to submit a written challenge on exam grades for one week; after this the grade stands "as is." Be careful when exercising this option as I have no patience with the "point game" - it's about accuracy and completeness, not an opportunity to beg for or bolster points.

Individuals with Disabilities: If you have a documented disability that requires accommodations, you will need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The SDS office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department or call 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodation in place, I will be glad to meet with you privately to discuss your needs. A delay in getting a SDS accommodation letter may hinder the availability or facilitation of those accommodations; it is in your best interest to process accommodation letters ASAP.

Religious Conflicts: If you have a conflict with any of the scheduled class or exam times due to religious reasons, you must notify me in writing **by class time on Jan. 10, 2019,** so look over ALL exam dates NOW. Assuming you meet this deadline, every attempt will be made to find a mutually convenient solution, which may include doing the exam earlier, or having an exam of completely different format.

ADD/DROP POLICY: I follow all university policies on adding or dropping this class. Contact a Biology Advisor for help in this area. Recall, you will receive an "F" if you fail to do the administration work required to drop the class. Last day to drop the class this semester is Sun Nov. 12, 2017, just befre the third exam. If you drop the course, you will be assigned WP, WF or WN as appropriate. *Be aware that I do NOT drop the lowest exam grade nor do I account for potential clicker or homework points as these are ONLY applied upon completion of the semester.* Any "I" given to a student will automatically revert to "F" if the work is not completed within one calendar year. No exceptions [see: http://sdcl.wayne.edu/RegistrarWeb/Registrar/policies.htm.]

UNEXPECTED UNIVERSITY CLOSURES: If the University is ***officially*** closed on an exam day, ***the exam will be held on the next regularly scheduled class day.*** Closure of the University is announced by the following mechanisms:

1. The University News line (313) 577-5345 *
2. WSU Homepage (www.wayne.edu) *
3. WSU Pipeline (www.pipeline.wayne.edu) *
4. WDET-FM (Public Radio 101.9)
5. WSU emergency broadcast system
6. by other local radio and television stations

In case of closure, monitor our BB site, as I will post, as necessary, specific information related to the class.

Disputes that cannot be resolved following the guidelines present in this syllabus will be resolved by following the guidelines of the University "Student Due Process".

****Very** <u>Tentative LECTURE Schedule</u>** **W2019**

Jan. 8 Admin, cell division and gene regulation
10 Chp 1

15 - Chp 1
17 Chp 2

22 Chp 2
24 Chp 2 - paper?

29 Chp 3
31 Chp 3

Feb. 5 Chp 3 - paper
7 Chp 3

12 Exam 1
14 Chp 4

19 Chp 4
21 Chp 5

26 Chp5
28 Chp 5 paper

Mar. 5 **Chp 7 ---apoptosis part only ---- NOTE different order**
7 overview & *Take home exam over break*

12/14 - March BREAK

19 Chp 6
21 Chp 6

26 Chp 6 paper
28 Chp 8

April 2 Chp 8
4 Chp 8 - paper

9 Chp 9
11 Chp 9

16 Chp 10
18 Chp ??

This is a new textbook and first time I teach this class, so the pace of lecture etc is basically unknown.

Anticipate about one chapter a week, with an extra class for a research paper.

Exam 1 is likely Feb 12 (and will default to that date) but, after class discussion near end of Jan., we may move it forward or back to accommodate pace.

Exam 2 will be a take home over March break.

We will also discuss having exam 3 on last day of class - or as default, keeping it in final exam matrix = April 25 as shown.

APRIL 25, 2:45 - 4:45 pm in Final Exam matrix.