Biology 5890 – Neuroplasticity
Winter 2020
Course website: canvas.wayne.edu/courses/126108

Instructor: Dr. Karen Myhr
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Dr. Myhr's office hours are from 11:10 am to 12:30 pm on Tuesdays in the STEM Commons in the Kresge Library, and in Room 2113 in the Biological Sciences Building by appointment using the appointment request link in our Canvas site.

Lectures are 2:30 pm to 3:45 pm on Mondays and Wednesdays in Room 1172 Old Main.

Description: Neuroplasticity is the study of the ways the brain changes in response to genetic controls, and to the internal and external environments. Neuroplasticity includes neural development (neurogenesis and migration, neural differentiation, axon pathway formation, and synapse formation and maturation), mechanisms of learning and memory, homeostasis of excitability, aging, diseases, and responses to injury. To explore these topics, students will read and discuss readings from their textbook and seminal research articles from a variety of animal models, and run simulations.

Outcomes: Students who successfully complete the course will be able to:
- describe neuroplasticity through oral discussion; writing; drawing, labeling and explaining diagrams; and/or creating flow charts or concept maps.
- describe the key types of experiments that generate what we know about neuroplasticity, including the steps, the logic of the steps, and controls.
- predict results, analyze and evaluate primary research results, and design experiments.
- describe and evaluate the strengths and weaknesses of different model organisms, and the need to use them to understand neuroplasticity.
- model and simulate how molecular signals, activity, experience and social interactions contribute to the plasticity of the nervous system.
- work independently and with classmates.

Materials: *Foundations of Neural Development. 2017. S. Marc Breedlove, Oxford Press, ISNB: 9781605355795* is required. You will complete homework assignments on textbook readings before each lecture.

Homework: Homework assignments will be based on readings in the textbook, and primary and review article readings (links to free articles in Canvas) or simulation programs (e.g. NeuroLab, free). Enticed by these homework questions, you will study before we begin lectures and come to lecture ready to engage in a conversation that will connect the foundational information to a deeper understanding of the research and models of development and neuroplasticity. Articles will help illustrate how our understanding of neural plasticity was experimentally derived.

You will have a homework assignment **due before each class for preparation**. The purpose of the homework is to help you prepare for class, to let me know what we need to spend the most time on in class, and to stimulate conversations. Your homework represents the majority of your workload; it is not just an add-on. Each assignment will have its own weight, usually based on the depth of answer expected. At the end of the semester these will be normalized to a total of 250 points towards your final letter grade. Late assignments will rarely be accepted, and will be docked up to 20% of whatever that assignment was worth. 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: For each class (~25 meetings – not the 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 by meeting expectations. **Expectations include showing up on time and staying engaged throughout the whole class, and contributing to a conversation where we speak up and listen to each other, and build on the ideas that are shared.** As an incentive, for example 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 points, and up to 55 total points towards your grade. To ensure everyone is given an opportunity to participate I may randomly select a student hoping to encourage an attempt, and a student that speaks a lot may be asked to listen instead. This will be recognized when I assign points. A general rubric to think about participation points is as follows:

> Zero (0) points if you do not attend class
> One (1) point if you attend, but do not meet expectations
> Two (2) points if you meet expectations
> Three to Five (3-5) points if you exceed expectations

Exams: Three exams will be given, each worth 50 points towards your final grade. Exams will be multiple choice, fill-in-the-blank, short answer, essay, data analysis, modeling and/or labeled diagram questions. Questions will be generally directed at fundamental principles as delineated by examples given in textbook, other reading assignments, classroom discussions, and homework.

Challenge option: Some exam questions are anticipated to be short written or essay questions that require a degree of subjective grading 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 from when you get the exam back; after this the grade stands "as is." The purpose of this policy is to correct any errors in grading what you wrote, not what you meant to write. Be careful when exercising this option because scores on regraded exams may either increase **or decrease**.

Grades:	Exam 1 (2/12/2020, during lecture time)	50
	Exam 2 (3/18/2020, during lecture time)	50
	Exam 3 (4/22/2020, 2:45-4:45 pm)	50
	Homework	250
	Participation	50
	Total	**450 points**

The University final exam calendar and rules are available online. The URL sometimes changes, but you can search on "WSU, Wayne, finals schedule" to find the current schedule.

Grading Policy: Grades will be calculated on the following scale:

		A	92.5-100%	A-	90.0-92.4%
B+	87.5-89.9%	B	82.5-87.4%	B-	80.0-82.4%
C+	77.5-79.9%	C	72.5-77.4%	C-	70.0-72.4%
D+	67.5-69.9%	D	62.5-67.4%	D-	60.0-62.4%
		F	0-59.9%		

TECHNICAL SUPPORT

Discussions in Canvas: Discussions in Canvas is a good place for content questions. There will be topics for discussing logistics, homework, and exams.

WSU Computing and Information Technology (C&IT): For free help with campus computing, including email, Canvas, or your AccessID call (313) 577-4778, see computing.wayne.edu/ or email csthelp@wayne.edu. Unfortunately, I am not trained to provide technical computing support.

Lecture Recording: C&IT will record lectures and create a link in Canvas under Echo360 Recordings, but it sometimes fails. You are welcome to record lecture on your own for your own use.

GENERAL POLICIES

1) Any **special considerations** (disabilities, religious holiday conflicts, civic duties like military service or jury duty, etc.) must be emailed to kmyhr@wyane.edu by January 17, 2020 or as soon as possible as you become aware of the situation. There is no retroactive accommodation from when I know of the issue. You need to register documented disabilities with Student Disability Services for coordination of your academic accommodations. They need a week or more to arrange accommodations, so make an appointment early. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TTY: telecommunication device for the deaf; phone for hearing impaired students only).

Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your needs. Please refer to the SDS website for further information about students with disabilities and the services we provide for faculty and students: studentdisability.wayne.edu/

2) If you need to see me and cannot come during STEM Commons drop-in hours, you are welcome to set up an appointment. To make this easier for everyone I have set up a system for you to let me know when you want an appointment. You will complete a form with your available times. I will select a time

that also works for me and post appointments to the Canvas Calendar. You will select an appointment in the Calendar and then come to my office. I usually set up multiple appointments so others can also claim an appointment, if they want to, even if they did not make the original request.

3**) Academic integrity.** You and most students have and value academic integrity. Your integrity includes, but is not limited to, doing your own work (unless it is specifically open book and open neighbor or team work), citing (quoting) the work of others appropriately and correctly instead of plagiarizing, and doing your own work on exams. For homework for this class, you may work with other people and look up answers while you are studying. Your final submission must be in your own words from what you learned from your independent work and your collaboration with others. The point of the homework is to learn the material, so use homework to help you reach that goal. Knowing to get help during the learning phase is a sign of a good student, so this is not cheating. See Canvas for more information on the interesting topic of proper citation and how to avoid plagiarism.

You work to maintain your integrity. Our integrity as campus leaders means your instructors value your efforts and therefore take actions against those who violate the principles and rules of academic integrity. To maintain institutional integrity and protect the value of your grade as a student with integrity, in response to violations of the code of conduct we will apply consequences ranging from assigning zero points on an assignment, failing the course or being expelled from the University. These actions may be temporarily or permanently be added to your university record. The degree of the consequence will be determined and applied using the guidelines and due process procedures laid out in the Student Code of Conduct (doso.wayne.edu/assets/codeofconduct.pdf).

4) **Withdrawals:** January 17, 2020 is the last day you can drop the class and get your tuition refunded. The last day to drop this course is March 22, 2020. If you withdraw between January 18 and March 22, 2020, inclusive, you will receive a WN on your transcript if you never completed any assignment; a WP if you have greater than 60% of the points possible at the time of your request on exams, homework and class participation; or a WF if you have less than 60% of the points possible at the time of your request. No exams or other grades are dropped in this calculation. In Academica: select "Course Withdrawal" from the Registration Menu under Student Resources. A ***SMART Check*** is required. After the registrar processes your request they send it to your professor to assign a grade. This can take up to five business days. See wayne.edu/registrar/registration/calendar19-20/ for the academic and registration calendar.

5) University closures will be publicized through:
- the university emergency broadcast system (broadcast.wayne.edu),
- WSU Homepage (www.wayne.edu),
- the University Newsline (313) 577-5345, cxc
- WDET-FM (Public Radio 101.9)

If an exam is scheduled on a day when the University or lecture room is officially closed during class, the exam will be held during the next scheduled meeting of lecture that occurs when the University and room are open, or as indicated on our Canvas site. I will give you instructions through Canvas or WSU email as soon as possible if there is a closure or emergency.

6) For any and all issues not covered in this syllabus, refer to the "Student Code of Conduct," which can be found at doso.wayne.edu/assets/codeofconduct.pdf

7) Updates to this syllabus and schedule may be posted on the course Canvas website at canvas.wayne.edu. You are responsible for checking Canvas announcements and your University email account. I recommend checking at least once each business day of a semester in which you are enrolled.

Tentative Schedule

Week 1 (1/6-1/10)	Neurogenesis and Migration	Ch. 3; primary readings
Week 2 (1/13-1/17)	Neural Differentiation	Ch. 4; primary readings (e.g. Holder Pax6)
Week 3 (1/20-1/24)	*(No class 1/20/20, MLK Day)* Axonal Pathfinding	Ch. 5; modeling in NeuroLab
Week 4 (1/27-1/31)	Axonal Pathfinding, Synapse Formation and Maturation	Ch. 5; modeling in NeuroLab; primary readings (e.g. intracellular molecular mechanisms)
Week 5 (2/3-2/7)	Synapse Formation and Maturation Synthesis	Ch. 6; primary readings (e.g. chloride reversal)
Week 6 (2/10-2/14)	Synthesis and exam 1 (2/12/20)	
Week 7 (2/17-2/21)	Activity-guided Neural Development	Ch. 8; modeling
Week 8 (2/24-2/28)	Learning and Memory, Long-term potentiation/depression	Ch. 8; primary readings (e.g. Meister et al.)
Week 9 (3/2-3/6)	Learning and Memory, Long-term potentiation/depression	Ch. 8; primary readings (e.g. LTP/LTD)
(3/9-3/14)	*Spring Break*	
Week 10 (3/16-3/20)	Synthesis and Exam 2 (3/18/20)	
Week 11 (3/23-3/27)	Experience-guided Neural Development	Ch. 9; primary readings (e.g. Knudsen and prism goggle experiments)
Week 12 (3/30-4/3)	Socially-guided Neural Development; Disease and Recovery from Injury	Ch. 10; primary readings
Week 13 (4/6-4/10)	Aging, Popular "Fixes" to Aging – Gift or Gimmick?	Primary and popular readings and analysis
Week 14 (4/13-4/20)	Topics by Request and Synthesis	Primary readings
Finals (4/22-4/28)	Exam 3 (4/22/20 from 2:45 to 4:45 pm)	