

## NEU 416 Nervous System Development (3 units)

[NEU416SyllabusFall2022Aug24.doc]

Instructor: Marc Breedlove (he/him), 240 Giltner Hall, [breedsm@msu.edu](mailto:breedsm@msu.edu). Hours by appointment.  
Assistant Instructor: Brianna Hicks, [hicksb10@msu.edu](mailto:hicksb10@msu.edu).

Lectures will be Tu Th 10:20-11:40am in Natural Science room 116.

Development of neurons and their connections, roles of both genetics and behavioral experience in shaping the nervous system. NOTE: if you want this course to appear in your transcript as IBIO 416, then contact the IBIO department *after* you complete the course.

**REQUIRED** text: As will be discussed in class and on D2L, the required electronic textbook will be available through D2L from Perusall.com. Do NOT buy a hardcopy because you will be required to buy 180 day access to the electronic version (\$58) so that you can gain credit for your questions, comments, and discussions in the electronic format. Also, when you purchase your electronic copy (through our D2L page offering a link to Perusall.com) be sure to only purchase the 180 day access (not the more expensive longer access), because 180 will more than cover the semester.

### **COURSE PREREQUISITES**

You must have either completed or be simultaneously enrolled in NEU 301 Introduction to Neuroscience. The course presumes that all students know the basics of the types of glia and neurons, structure of neurons, ionic bases of resting and action potentials, and the principles of synaptic transmission. PSY 209 would fulfill that role.

**COURSE OVERVIEW:** My hope for this class is that it will allow you to understand, at the cellular level, why brain development is crucially dependent on **both** genes and experience.

On the D2L site for the course, under "Content" you will find this syllabus, and various informational items. You'll also see a folder of class notes, PDFs of the powerpoint slides for each of the lectures, grouped together for each of the 10 chapters. You may wish to print out the class notes before the lectures so that you can make notes without having to redraw figures and graphs and the like.

Because I also wrote the textbook for this course, there is a close correspondence between the material in the lectures and in the book. If you find the lectures challenging, you might read the chapter beforehand. On the other hand, if reading the book is the challenge, listening to the lectures first might be better for you. My goal is to complete a new chapter for the second edition and make it available on D2L for you to read after we finish the current Chapter 7.

The course is divided into 3 units. The first unit will cover the Prologue and Chapters 1-3 before the first midterm. The second unit will cover Chapters 4-7 before the second midterm, while the final unit will cover the Interlude, Chapters 8-10, and the Epilogue for the Final Exam.

## TOPICS TO BE COVERED

## Reading

<i>Prologue</i> : Rationalist approaches to epistemology	Prologue
Metazoans and the problem of cell differentiation	Chapter 1
Development of a body plan in flies and everyone else	Ch 2
Neural migration	Ch 3
Neural differentiation	Ch 4
Axonal pathfinding	Ch 5
Synapse formation and maturation	Ch 6
Naturally occurring cell death (apoptosis)	Ch 7
Hormonally-guided neural development (Chapter 7.5)	Reading posted on D2L
<i>Interlude</i> : Empiricist philosophers and the tabula rasa	Interlude
Synapse rearrangement and the role of neural activity	Ch 8
The role of sensory experience in fine-tuning synaptic connections	Ch 9
The role of social experience in brain development	Ch 10
<i>Epilogue</i> : Immanuel Kant's Critique of Pure Reason	Epilogue

The D2L site provides an extensive list of Learning Objectives for each chapter.

**EXAMS**: there will be two midterms and a final exam (see the calendar on our D2L site). Exams will be multiple choice exams taken during a class meeting time on D2L, not in person. The Final Exam will also be via D2L and is scheduled for Thursday December 15, from 10am to noon.

## GRADES

Grading of exams will be based on the percentage of questions you get correct in the traditional manner: 90-100 = 4.0; 85-89 = 3.5; 80-84 = 3.0; 75-79 = 2.5; 70-74 = 2.0; 65-69 = 1.5; 60-64 = 1.0; <60 = 0.

In addition, we will have in-class projects where you will work together as a group, based on your reading pod—the group of students who can see and respond to each other's comments in the electronic textbook on Perusall. These 4 or 5 group projects will count for 10% of your grade.

**Attendance**: You are expected to attend lecture unless you are ill or have some other problem. When that is the case, email the instructor *before* class. Unexcused absences have the potential to hurt your grade in two ways: 1) you will get no credit for any in-class projects that happen that day, 2) you will get no credit for any Kahoot questions posed that day.

**Kahoot**: In virtually every class we will have review questions through Kahoot. This is a great way to test yourself on how well you understood the material just covered. Your answers on Kahoot will *not* be graded—there's no penalty for answering wrong. BUT, if you fail to answer more than 20% of the Kahoot questions when the term is over, your grade will be reduced by one grade level (e.g., from a 4.0 to a 3.5). To get credit for answering the Kahoot questions, be sure to use your MSU userid (the name that comes before "@msu.edu" in your email address) so we know you answered those questions.

## COURSE POLICIES

### Spartan Code of Honor Academic Pledge:

"As a Spartan, I will strive to uphold values of the highest ethical standard. I will practice honesty in my work, foster honesty in my peers, and take pride in knowing that honor in ownership is worth

more than grades. I will carry these values beyond my time as a student at Michigan State University, continuing the endeavor to build personal integrity in all that I do.”

### **Academic Integrity**

The goal of this course is for you to learn the basic principles and facts of neural development. Your integration of this core of knowledge will be tested on the assumption that your answers represent what you have learned without resource to any other person(s) during exams.

### **Mental health**

Let’s face it, college can be stressful (even without a pandemic), so it is important for you to look after your mental health. Anyone could benefit from occasionally talking with a counselor (as your instructor has at several stages of his life). Seeking counseling when you are troubled is a sign of *strength and maturity*. Mental health concerns or stressful events may hurt academic performance or your ability to participate in daily activities. Services are available to assist you with addressing these and other concerns you may be experiencing. You can learn more about the broad range of confidential mental health services available on campus via the Counseling & Psychiatric Services (CAPS) website at <https://caps.msu.edu/>

*If you are in crisis*, please call 911 or go to the nearest emergency room. CAPS crisis services are also available 24/7. Call (517) 355-8270 and press “1” at the prompt to speak with a crisis counselor.

### **RCPD Disability Accommodations**

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities at 517-884-RCPD or on the web at <https://www.rcpd.msu.edu/>. Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation (“VISA”) form. Please present this form to both the instructor AND the Assistant Instructor at the start of the term and/or **one week prior to the accommodation date** (test, project, etc.). Requests received after this date may be honored if possible.

### **Limits to Confidentiality**

Essays, journals, and other materials submitted for this class are generally considered confidential pursuant to the University's student record policies. However, you should be aware that University employees, including instructors like me, may not be able to maintain confidentiality when it conflicts with our responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructor, I am a “mandatory reporter,” which means I must report the following information to other University offices (including the Department of Police and Public Safety) if you share it with me:

- Suspected child abuse/neglect, even if this maltreatment happened when you were a child;
- Allegations of sexual assault, relationship violence, stalking, or sexual harassment; and
- Credible threats of harm to oneself or to others.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In almost all cases, it will be your decision whether you wish to speak with that individual. If you would like to talk about these events in a more confidential

setting, you are encouraged to make an appointment with the MSU Counseling and Psychiatric Services.

### **Tolerance and Civility**

MSU strives to build an academic community with living and learning environments that expects tolerance of viewpoints and civility toward others, whether at public forums, athletic events, in residential communities, classrooms or laboratories.

We call upon all who participate in university events to promote tolerance and civil behavior and to hold themselves to high standards that reflect the university's commitment to respect viewpoints that may be different from their own. Only by respecting individuals with diverse perspectives and ideas can we build an environment of civility that is conducive to advancing knowledge and transforming lives.

Oh, and the secret word is "regulation."