

NEU 460
Current Approaches in Cellular and Molecular Neuroscience
Spring 2025

Lectures: Mondays and Wednesdays 3:00 – 4:20 PM
Bessey Hall 316

Course Instructor

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Office Hours

Fridays 9:00 – 11:00 AM, Room 1403 Interdisciplinary Science and Technology Building (ISTB)

Please email Dr. Mazei-Robison to schedule appointments (in person or Zoom) outside of office hours.

Zoom: <https://msu.zoom.us/j/94528966120>

Passcode: HELP

Course Description

This is a one-semester course for advanced undergraduate Neuroscience majors. The main focus of this course is to provide an understanding of the current techniques used in molecular and cellular neuroscience and their application. The information will be presented in two ways: 1) lectures on the techniques delivered by the instructor, and 2) presentation and discussion of primary literature applying the technique that will be led by students. Students will be expected to participate vocally and consistently in paper presentations and discussions and the final grade will be dependent on this participation as well as assessment of learning through weekly quizzes.

Prerequisites: NEU 301 and 302

Course Learning Objectives

At the completion of this course, students will:

- Have a basic understanding of the processes used in the techniques covered
- Be able to describe why the technique is used and give an example of a question it can answer
- Be able to list the pros and cons of the technique
- Be able to succinctly convey scientific results (including determining the assay used, identifying controls, summarizing what the data show)
- Be able to present scientific information clearly and concisely (oral and written)

Course Requirements

Reading

There will be a weekly assigned journal article that will be required reading and will be the subject of in-depth class discussion. There may be additional handouts or reading assignments to accompany the lecture material. There is no textbook for this course.

Lectures

Lectures will occur on Wednesdays and the lecture topic is listed in the class schedule section below. Lectures will be held in person and students are encouraged to attend to facilitate discussion and ask questions. Lecture recordings will be posted to D2L.

Weekly Quizzes

There will be 12 quizzes throughout the semester, administered **in person** at the start of Wednesday sessions. Quizzes will occur every Wednesday and will cover the previous week's material. Quiz dates are listed in the Class Schedule section below.

- Quizzes cover the material presented in lecture and/or paper discussion from the previous week.
- Quizzes will contain a maximum of 10 questions. Various types of questions (e.g., multiple-choice, short-answer, and fill-ins) will be included.
- Students are allowed to drop their lowest quiz score (top 11 of 12 count toward final grade).

Exams

There will be no exams or final exam for the course.

Paper Discussions

Each Monday there will be a discussion of a journal article pertaining to the technique covered in the previous Wednesday lecture. Individual students will be assigned particular parts of the paper for presentation to the class (i.e., a figure(s)). Presentation grades will be determined based on the clarity and depth of presentation (grading rubric can be found in D2L) and each student will present twice during the semester. All students will be expected to participate vocally in discussion of each section presented. **To facilitate discussion, attendance will be taken.** Students are required to attend 10 of 13 sessions for full credit.

Figure Facts Submission

To facilitate discussion of journal club articles, every student will complete a Figure Fact document each week. Completed Figure Facts must be submitted to D2L prior to Monday class (must be submitted by **2:30 PM on Mon.**). Individual incorrect answers will not be penalized, but a lackluster attempt to complete the document (blanks, non-relevant information, etc.) will result in no credit. *While there are many great uses for AI (Chat GPT, etc.), completing figure facts is not one of them.* These programs will not be very useful, as the goal is for you to learn to interpret and summarize individual figure panels within papers (using a defined format). AI-derived answers that do not adhere to these guidelines will also result in no credit. Students are allowed to drop their lowest Figure Fact score (top 12/13 count toward final grade).

Grading

Grading Criteria

Grades will be based on weekly quizzes (55%), class presentations (26%), figure facts (12%) and class participation (7%).

Activity	Points
Quizzes (top 11/12, 10 points each) (55%)	110
Paper presentation (2 presentations x 26 points each) (26%)	52

Activity	Points
Figure Facts (top 12/13, 2 points each) (12%)	24
Paper Discussion Attendance (top 10/13, 1.4 point each) (7%)	14
Total	200

Grading Scale	Percentage Points	Points
4.0	≥ 90%	≥ 180 points
3.5	85 – 89%	170-179 points
3.0	80 – 84%	160-169 points
2.5	75 – 79%	150-159 points
2.0	70 – 74%	140-149 points
1.5	65 – 69%	130-139 points
1.0	60 – 64%	120-129 points
0.0	≤ 59%	≤ 119 points

Other Course Information

Attendance and Absence Policies

Regular attendance (in person) is critical for success in this course. There will be weekly in-class quizzes on Wednesdays and paper participation on Mondays. Paper discussions on Mondays will be led by students. It is important that students attend the discussion and interact with colleagues, thus **attendance will be recorded on Mondays and attendance at 10 of 13 sessions is necessary for full credit.** This means that students are allowed to miss 3 paper discussions for any reason (sick, appointment, transportation trouble, interview, etc.). Additional absences will not be excused, so there is no need to contact the instructor for a missed paper discussion.

There will be weekly in-class quizzes on Wednesdays and figure fact submissions (on D2L) on Mondays. Students are allowed to drop their lowest quiz and figure fact score. If you are going to miss a quiz or presentation, you must contact the instructor **before the activity** takes place, and you must produce a written excuse from your doctor or the Dean's office. If you miss an activity and you do not contact the instructor before the activity, you will receive a zero (0) for that activity. Details for use of grief absence and religious observance policies are listed in the “MSU Course Policies” section below.

Class Schedule

The lecture topic is tentative and subject to change. Any changes to the schedule will be announced ahead of time and posted to D2L.

Week		Date	Assessment	Topic
1	Mon.	13-Jan	n/a	Introduction to class and syllabus
	Wed.	15-Jan	n/a	How to read a scientific paper
2	Mon.	20-Jan	n/a	No class - MLK day
	Wed.	22-Jan	n/a	RT-PCR and western blot
3	Mon.	27-Jan	Figure facts 1	Paper: RT-PCR and western blot
	Wed.	29-Jan	Quiz 1	RNA sequencing
4	Mon.	3-Feb	Figure facts 2	Paper: RNA sequencing
	Wed.	5-Feb	Quiz 2	Transgenic mice

5	Mon.	10-Feb	Figure facts 3	Paper: Transgenic mice
	Wed.	12-Feb	Quiz 3	CRISPR/Cas9 gene editing
6	Mon.	17-Feb	Figure facts 4	Paper: CRISPR gene editing
	Wed.	19-Feb	Quiz 4	Microscopy
7	Mon.	24-Feb	Figure facts 5	Paper: Microscopy
	Wed.	26-Feb	Quiz 5	Neurotracers
8	Mon.	3-Mar	<i>n/a</i>	No class – Spring Break
	Wed.	5-Mar	<i>n/a</i>	No class – Spring Break
9	Mon.	10-Mar	Figure facts 6	Paper: Neurotracers
	Wed.	12-Mar	Quiz 6	Viral vectors
10	Mon.	17-Mar	Figure facts 7	Paper: Viral vectors
	Wed.	19-Mar	Quiz 7	Electrophysiology
11	Mon.	24-Mar	Figure facts 8	Paper: Electrophysiology
	Wed.	26-Mar	Quiz 8	Voltammetry and Microdialysis
12	Mon.	31-Mar	Figure facts 9	Paper: Voltammetry and Microdialysis
	Wed.	2-Apr	Quiz 9	Optogenetics
13	Mon.	7-Apr	Figure facts 10	Paper: Optogenetics
	Wed.	9-Apr	Quiz 10	Chemogenetics
14	Mon.	14-Apr	Figure facts 11	Paper: Chemogenetics
	Wed.	16-Apr	Quiz 11	Calcium imaging
15	Mon.	21-Apr	Figure facts 12	Paper: Calcium imaging
	Wed.	23-Apr	Quiz 12	Neuronal cultures - iPSC
exam week	Wed.	30-Apr	Figure facts 13	Paper: iPSCs

Honors Option

No Honors option is available for this course.

MSU Course Policies

Academic Integrity

The “Academic Freedom for Students at Michigan State University” document (found at <http://splife.studentlife.msu.edu>) is a legal document that you, as a member of the MSU community, should be familiar with. The welcome letter at the beginning reads, in part:

“As an academic community, it is necessary to set standards that will promote an environment conducive to learning. The first part of Spartan Life presents the policies, regulations and guidelines developed to provide an atmosphere that furthers opportunities for intellectual and personal development while protecting individual freedoms. As a student you are encouraged to exercise your rights and you are expected to meet your responsibility to adhere to the standards set. The second part of this guide serves to inform you of the rules, regulations, rights and responsibilities that have been established in the interest of all members of the University community.”

In addition, we will adhere to the policies on academic honesty as specified in General Student Regulations, *Protection of Scholarship and Grades* (found at <http://splife.studentlife.msu.edu/regulations/general-student-regulations>), the all-University Policy on *Integrity of Scholarship and Grades* (found at <http://splife.studentlife.msu.edu/regulations/selected/integrity-of-scholarship-and-grades>). Behavior that is disrespectful to the instructor or fellow students during class will not be tolerated. This includes exchanging electronic or other notes, web-surfing, talking amongst each other, playing with any electronic gadget, etc.

Inform Your Instructor of Any Accommodations Needed

From the Resource Center for Persons with Disabilities (RCPD): 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 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 **prior to the accommodation date (e.g., Quiz 1 is Wednesday January 29th, so forms must be submitted by Monday January 27th)**. Requests received after this date may not be honored.

Limits to Confidentiality

Students should be aware that University employees, including instructors, may not be able to maintain confidentiality when it conflicts with their responsibility to report certain issues to protect the health and safety of MSU community members and others. As the instructor, 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 or sexual harassment when they involve MSU students, faculty, or staff, 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 Center.

Grief Absence Requests

Course instructors are sensitive to and will accommodate the bereavement process of a student who has lost a family member or who is experiencing emotional distress from a similar tragedy so that the student is not academically disadvantaged in his/her classes. It is the responsibility of the student to: a) notify the Associate Dean of his/her college of the need for a grief absence prior to leaving campus, b) provide appropriate verification of the grief absence as specified by the Associate Dean, and c) complete all missed work as determined by the instructor. It is the responsibility of the Associate Dean or designee to a) determine with the student the expected period of absence – it is expected that some bereavement processes may be more extensive than others depending on individual circumstances, b) notify the faculty that the student will be absent, and c) receive verification of the authenticity of a grief absence request upon the student's return. It is the responsibility of the instructor to work with the student to: a) make reasonable accommodations and b) to include appropriate language describing

such accommodations in their course syllabus, so that the student is not penalized due to a verified grief absence.

Students who believe their rights under this policy have been violated should contact the University Ombudsperson.

For the Grief Absence Request form go to:

<https://reg.msu.edu/StuForms/Stuinfo/GriefAbsenceForm.aspx>.

<http://splife.studentlife.msu.edu/regulations/selected/grief-absence-policy>

Religious Observance Policy

Michigan State University is committed to the value of inclusion, and it has always been our policy to permit students, faculty, and staff to observe holidays set aside by their chosen religious faiths. To this end, attempts have been made to schedule quizzes and assignments to not conflict with dates listed in the [Religious Observance Calendar](#) . It is the responsibility of those students who need to be absent **to inform their instructor at least two weeks before the holiday**, make arrangements in advance with their instructor, and to catch up on any material discussed and assignments given during that class period.