NRSC 4413
Cellular Structure and Neurological Disorders

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Office Hours: Tuesdays 10-11am and by appointment
Class Location: TBD
Class Meeting Time: Tuesdays/Thursday 8:30am – 10:00am

Course Description:

Microtubules are dynamic cytoskeletal filaments that are crucial to the structure and function of neurons. From providing the scaffolding for the unique architecture of neurons, to guiding intracellular trafficking, to supporting neuronal migration and connectivity, microtubules are important for a variety of neuronal roles. Consequentially, the dysfunction of microtubules and microtubule-associated-proteins is associated with a number of nervous system disorders. This seminar will explore the role of microtubules in a number of neurobiological diseases and disorders including Neurodevelopmental disorders (ex. Fragile X, Lissencephaly), Neurodegenerative Disorders (ex. Alzheimer's and the Tauopathies, Hereditary Spastic Paraplegia), Psychiatric Disorders (Ex. Schizophrenia and Mood disorders), and also in Traumatic Brain Injury. We will use readings from the primary literature as a basis for lectures, student presentations, and papers.

Learning Objectives:

By the end of this course, students will:

- Understand how microtubules contribute to the overall function of the brain as well as to disorders of the nervous system
- Build their skills in reading, evaluating, critiquing, and discussing primary research articles from leading academic journals
- Hone their ability to present scholarly scientific research
- Learn how to independently identify notable scientific papers in the field and write about them in a real-world genre

Canvas: canvas.upenn.edu

Lecture slides, course materials, and announcements will be posted on this site.

Grading:

Your final grade in this class will be determined as follows:

Attendance and Participation: 25%
Student Presentations: 30%
Reading Pre-Questions: 20%
News and Views Article: 25%

Attendance and Participation Policy:

25% of your grade will come from Attendance and Participation. Attendance is required for this course. It is a small-discussion based class, so it is important to be present to participate in these discussions. Additionally, you are expected to be on time for the course. Repeated lateness will count as an absence for the course. Additionally, you will be expected to be an engaged participant in the class discussions. I will be looking for questions and comments that show that you have read the papers with a critical eye.

Class Structure:

There will be readings assigned for each class period. These readings will come from the scholarly literature and should be read before the class starts so that you are able to participate in discussions about the articles during class. During the first two weeks of class, class will consist of a lecture component along with discussions about the assigned readings for that class period. Starting on the third week of class, one of the class meeting periods (most typically a Tuesday) will have an instructor lecture portion, followed by a class discussion of the assigned readings. The other class meeting period that week (most typically a Thursday) will consist of two student presentations (presenting on the two assigned papers) with a discussion portion following each presentation (see additional details below).

Student Presentations:

Beginning on the third week of the semester, on one of the two class periods of the week, students will give presentations on an assigned journal article related to the class topic for that particular week. Presentations should include: background information to contextualize the paper, results of the paper – including a discussion of specific figures from the paper – and a discussion about the implications of the paper. Following the presentations, students in the audience will be encouraged to ask questions about the paper, and the presenters should be prepared to field these questions lead a discussion about the paper that they just presented. Presentations should be approximately 35 minutes in length and in a "Powerpoint presentation" style. There will be two presentations per class period (typically on Thursdays, but see the schedule below) and each student will give two presentations throughout the course of the semester (on different weeks).

Readings and Pre-Questions

Each class, readings of the scholarly literature will be assigned that correspond to the upcoming class's topic. These readings should be read before you come to class. As a way of promoting discussion and scientific inquiry (and making sure that you do the reading!), you will be required to write down one discussion question, curiosity question, or "I'm confused about ____" question about the paper that you were assigned to read. This question must be submitted in advance of the start of class on the day that it is due. I am looking for specificity and critical thought in these questions. These pre-questions will be submitted on Canvas.

News and Views Article

For the "News and Views" assignment, you will write a short article in the format of the journal *Nature's* "News and Views" section. These articles inform non-specialist readers about new scientific advances that have been reported in a recently published paper. For this exercise, the paper that you chose does *not* have to be JUST newly published, but *should* be relatively recent (within the past 10 years). The paper that you choose to write about should NOT be one of the papers that you have otherwise been assigned to read for this class. Instead, you should pick a paper of your own that interests you but relates to microtubules and neurobiological disorders.

The goal of a "News and Views" article is to introduce a significant new finding/paper to scientific community. As a result, these papers must convey the relevance and novelty of the paper, and its impact on the field. Additionally, these papers are written in a more casual journalistic tone that is appropriate for a non-specialist audience. Therefore, you should avoid specialized technical jargon. the News and Views articles are short – aim for 800-1,000 words. You will be provided with examples of News and Views articles on the Canvas site. Further details about the assignment will be posted to the Canvas site.

Academic Integrity:

Penn has strict rules on academic integrity (see www.upenn.edu/academicintegrity). Any violation of the rules will be reported to the Office of Student Conduct and will likely result in automatic failure of the course.

Course Absence Notice:

The Course Absence Notice (CAN) has been designed to provide a consistent way for students to notify course instructors of short-term absences for one or more courses. It also provides a method for advising offices to track absences and coordinate support for students who miss classes. The submission of a CAN does not excuse you from your course obligations; students are still responsible for following up with each instructor directly and adhering to course policies and procedures as outlined in the course syllabus. All students enrolled in a class can submit a CAN during the current term using Path@Penn.

Schedule

See following page

Date	Topics / Presentations	News and Views Assignment
8/29	Course Policies ; Introduction to Microtubules I	
8/31	Intro to Microtubules II : MT Dynamics & Post-translational Modifications	
9/5	Intro to Microtubules III : MT-Associated Proteins	
9/7	Microtubules in Neurodevelopment: Overview	
9/12	Neurodevelopment: Lissencephaly	
9/14	Presentations: Lissencephaly	
9/19	Neurodevelopment: Fragile X	
9/21	Presentations: Fragile X	
9/26	Neurodevelopment: Tubulinopathy Syndromes	
9/28	Presentations: Tubulinopathy Syndromes	
10/3	Microtubules in Neurodegeneration: Overview	
10/5	Neurodegeneration: Alzheimers	News and Views Topic Selection Du
10/10	Presentations: Alzheimers	
10/12	No Class - Fall break	
10/17	Neurodegeneration: Other Tauopathies	
10/19	Presentations: Other Tauopathies	
10/24	Neurodegeneration: Hereditary Spastic Paraplegia	
10/26	Presentations: Hereditary Spastic Paraplegia	
10/31	Neurodegeneration: ALS	
11/2	Presentations: ALS	
11/7	Neurodegeneration: Prions	News and Views Outline Due
11/9	Presentations: Prions	
11/14	Psychiatric Disorders: Schizophrenia	
11/16	Presentations: Schizophrenia	
11/21	News and Views Instructions and Sample Analysis	
11/23	No Class - Thanksgiving break	
11/28	Psychiatric Disorders: Mood Disorders	
11/30	Presentations: Traumatic Brain Injury	
12/5	Traumatic Brain Injury	
12/7	Presentations: Traumatic Brain Injury	News and Views Articles Due