

## SYLLABUS for TOPICS IN CELL BIOLOGY AND NEUROSCIENCE (01:146:464) Fall 2021

**Course Director:** Martin Grumet, PhD [mgrumet@dls.rutgers.edu](mailto:mgrumet@dls.rutgers.edu)

**Course Faculty:** Patricia Morton, PhD [patricia.morton@rutgers.edu](mailto:patricia.morton@rutgers.edu)

Wise Young, MD/PhD [wisey@dls.rutgers.edu](mailto:wisey@dls.rutgers.edu)

**Guest Lectures:** Melitta Schachner, PhD [schachner@dls.rutgers.edu](mailto:schachner@dls.rutgers.edu)

Kelvin Kwan, PhD [kwan@dls.rutgers.edu](mailto:kwan@dls.rutgers.edu)

**Topics:** This course will focus on nervous system development and recovery after neural trauma.

Properties of stem cells will be discussed in particular as they relate to development and as a foundation for exploring roles they could play in developing therapies for diseases.

Classes will focus on:

1. The art of reading scientific literature, scientific investigation, oral presentation and writing.
2. Developing a grant proposal to test a hypothesis.
3. Early development of the embryo and the nervous system as a foundation for understanding roles of stem cells and their differentiation.
4. Differentiation of neural stem cells into neurons and glial cells during nervous system development and in the adult.
5. Spinal cord injury dogmas and mechanisms that promote regeneration after injury.
6. Diseases in the nervous and evolving treatments.
7. Development, degeneration, and regeneration of the inner ear.
8. Cell adhesion molecules in development, synaptic plasticity and regeneration.

**Learning Goals:** The learning goals for this course are consistent with general goals set by the Department of Cell Biology and Neuroscience, as well as the Division of Life Sciences.

They include:

1. Obtain factual and conceptual knowledge in neurodevelopment, neural trauma and stem cells, and explore therapies for treating neural disease.
2. Develop an ability to summarize, integrate and organize scientific literature.
3. Use scientific logic and literature to develop a hypothesis for research related to course subjects and prepare a grant proposal that will be presented orally to the class and in written form as a final paper.
4. Develop the ability to critique scientific literature from logical, feasible and ethical points of view for their relevance to human health and our society.

**Required Materials:** This course will be taught using Canvas and Zoom. Each student will need a high-speed internet connection and a webcam for class participation. There is no text for the course. Students are encouraged and will be trained to investigate scientific literature. Lectures will be recorded and made available on Canvas.

**Grading Policy:** The primary assignment for the course is a research project by each student formulated as a proposal to perform research. Each student will prepare an oral presentation to

be delivered in class and a final written paper submitted at the end of the semester. Grades are based on:

1. Oral presentation (40%): Provide appropriate background to understand your hypothesis/idea, explain its significance, provide a plan for experimental approaches, and discuss outcomes and future directions. Detailed rubrics will be provided.
2. Final paper (40%): Builds on your oral presentation to explain and document your project in more detail based on the scientific literature. Incorporate faculty suggestions made during the development of your proposal and following your oral presentation. Detailed rubrics will be provided.
3. Class participation (20%) and Extra Credit (up to 10%)
  - A. Student participation (representing 10% of grade) will be based on discussions with peers and faculty during live course sessions. Outstanding student participation with interesting comments will be awarded with as much as 5% extra credit towards their final grade. Students showing poor participation will be encouraged to participate more or may be called upon to participate. Repeated asking of trivial questions will not be considered as positive class participation.
  - B. Following each student's oral presentation, students will write a brief comment about each of their peers presentations (totaling <150 words) and submit them the next day (representing 10% of grade). Ideally, the comment should be an thoughtful question or highlight the significance of the project or its potential future directions. These written comments will be graded as outstanding (15), adequate (10) in-adequate (5) or 0 for no comments (includes un-excused absence or failure to submit on time). Each student's average score from all peer talks attended will represent 10% for this part of class participation. Students with scores above 10 will get as much as 5% extra credit towards their final grade.

**Schedule:** This course will be conducted synchronously online on Tuesday and Thursday afternoons (1:00-2:20 PM) using the live conference function in Canvas. Students are expected to attend in order to participate in discussions and interface with faculty and peers. Students should recognize that class participation represents 20% of their grade (and an additional 10% with maximal extra credit) and there is no make up for lack of participation. Office hours will be available at scheduled times to be set at the beginning to maximally accommodate students schedules. These conferences will be held online through Zoom. Students that require additional assistance will be able to schedule individual appointments. Students are expected to have experience using Canvas and should seek help from the help desk, if necessary. Any student who still has a technical problem participating should contact Dr. Martin Grumet.

**Class Organization:** This course is designed for no more than 20 students to encourage student participation and discussions during lectures. In many classes as much as half the time is allotted for discussions, first of methods for selecting student topics and then discussion of specific topics. Each student is expected to discuss their topics in class informally. Students who don't speak up will be called on to discuss potential topics. This process will be continued during office hours on a voluntary

basis first in groups, and, if necessary, in private sessions to obtain approval for each project. The course is divided into two major modules that will be taught by Drs. Martin Grumet and Wise Young, along with two minor modules by Drs. Kelvin Kwan and Melitta Schachner, all of whom are faculty in CBN and members of The WM Keck Center for Collaborative Neuroscience including Dr. Patricia Morton, who will host a guest speaker for a presentation *Living with Spinal Cord Injury*. Dr. Morton will attend all sessions and she plays a major role in administration of the course and communications with students.

Special Topics in Cell Bio & Neuro (01:146:464) Fall 2021

Tues/Thurs 1:00 – 2:20pm

Schedule of Classes

Class	Date	Lecturer	Topic
1	9/2	Grumet/Morton	<i>Introduction: Discussion of Student Topics Methods to Search for Topics</i>
2	9/7	Grumet	<i>Embryo Development &amp; Stem Cells Discussion of Student Searches and Topics</i>
3	9/9	Grumet	<i>Neural Development &amp; Adult Stem Cells Discussion of Student Topics</i>
4	9/14	Grumet	iPS & Reprogramming Neurons
5	9/16	Young	<i>The Art of Scientific Writing</i>
6	9/21	Young	<i>Spinal Cord Injury Dogmas</i>
7	9/23	Young	Spinal Cord Regeneration
	9/24		<b>Titles for projects due</b>
8	9/28	Young	<i>Stem Cells Paradigm Shift</i>
9	9/30	Young	Lithium Treatment and Mechanisms
10	10/5	Young	<i>Ethics of Clinical Trials</i>
	10/6		<b>First Draft of Outlines Due by 5:00 PM</b>
11	10/7	Grumet	<i>Discussion of Outlines</i>
12	10/12	Grumet	Neural Restricted Precursors
13	10/14	Grumet	Neuroinflammation & Multiple Sclerosis <b>Selection of Dates for Oral Presentations</b>
14	10/19	Grumet	Mesenchymal Stem Cells
15	10/21	Grumet	Stem Cells and Spinal Cord Injury
16	10/26	Grumet	Neural Stem Cells & Zika Virus Review for Presentations
17	10/28	Grumet	COVID-19 and the Nervous System
18	11/2	Schachner	Cell adhesion molecules in neural development
19	11/4	Schachner	Adhesion molecules in synaptic plasticity and recovery after trauma
20	11/9	Kwan	Development and Degeneration of the Inner Ear
21	11/11	Kwan	Regenerating Sensory Cells of the Inner Ear
22	11/16	Guest/Morton	Living with Spinal Cord Injury
	11/16		<b>Outlines Due by 11:00 PM</b>
23	11/18		<i>Review of Outlines</i>
24	11/23	Grumet/Morton	Student Presentations
	11/25		THANKSGIVING BREAK
25	11/30	Grumet/Morton	Student Presentations
26	12/2	Grumet/Morton	Student Presentations
27	12/4	Grumet/Morton	Student Presentations
28	12/9	Grumet/Morton	Discussion of Papers
	12/13		<b>Papers Due</b>

*Italics indicate skills training.*

## **Course Policies and Resources**

### **Academic Integrity Policy:**

<http://academicintegrity.rutgers.edu/academic-integrity-policy>

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.

### **Student-Wellness Services:**

Just In Case Web App

<http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884

17 Senior Street, New Brunswick, NJ 08901

[www.rhscaps.rutgers.edu/](http://www.rhscaps.rutgers.edu/)

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Crisis Intervention:

<http://health.rutgers.edu/medical-counseling-services/counseling/crisis-intervention>

Report a Concern: <http://health.rutgers.edu/do-something-to-help>

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181

3 Bartlett Street, New Brunswick, NJ 08901

[www.vpva.rutgers.edu](http://www.vpva.rutgers.edu)

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

## Disability Services

(848) 445-6800

Lucy Stone Hall, Suite A145, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 /

<https://ods.rutgers.edu>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation:

<https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

## Scarlet Listeners

(732) 247-5555

<http://www.scarletlisteners.com>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.