

Spring 2024

BIOL 498-002: ST: The Neuron's Forgotten Sibling

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BIOL 498/698: The Neuron's Forgotten Sibling

COURSE SCHEDULE:	M, R: 2:30 -3:50 PM
ROOM:	CKB 214
INSTRUCTOR:	Prof. Jorge Golowasch (golowasch@njit.edu)
OFFICE HOURS:	M, R 4pm or by appointment
COURSE WEBSITE:	NJIT Canvas (https://canvas.njit.edu/)
TEXTBOOK:	None

COURSE SUMMARY

Recommended Book

“Glial Man, A revolution in Neuroscience” by Yves Agid & Pierre Magistretti (2021), Oxford University Press, ISBN 978-0-19-884767-0. It's a light account of some basic history of glia research and glia properties.

LEARNING GOALS

At the conclusion of this course students will have...

- Integrated prior knowledge, or developed new knowledge, of glial function and its relationship with the well-known function of neurons in the nervous system.
 - An understanding and ability to utilize concepts in cellular neuroscience, specifically related to the role of glia in the function of the nervous system.
 - Developed or improved literature searching skills.
 - Developed or improved critical thinking skills.
 - Developed or improved scientific writing skills.
 - Developed or improved the ability to understand, synthesize and present primary scientific literature and ideas.
 - Developed or improved critical discussion and debating skills.
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COURSE OUTLINE (This outline may change due to course pacing)

Week 1 (1/18): Introduction (assignments, grading, etc). How to perform literature searches.

Review of basic neuro concepts: action potentials, saltatory conduction, synaptic potentials, ion channels, primary and secondary transporters, intracellular calcium.

Assignment of first papers.

Week 2 (1/22, 25): Refresher continued

Types of glia/morphology/localization, glia across the animal kingdom/evolution of glia.

Paper annotations and abstract due. Presentation and abstract practice

Week 3 (1/29, 2/1): Glia wrapping (Oligodendrocytes, Schwann cell, Remak Schwann cells)

Paper annotations and abstract due. Presentations

Week 4 (2/5, 8): Glia in the peripheral NS – Schwann Cell biology & function; glia in the ENS.

Paper annotations and abstract due. Presentations

Week 5 (2/12, 15): Glia and extracellular milieu, homeostasis

Paper annotations and abstract due. Presentations

Week 6 (2/19, 22): Glia and signaling - Ca dynamics

Paper annotations and abstract due. Presentations

Week 7 (2/26, 29): Microglia – phagocytosis

Paper annotations and abstract due. Presentations

Week 8 (3/4, 7): Microglia – sleep, other

Paper annotations and abstract due. Presentations

Week 9 (3/18, 21): Gliotransmission, synaptic regulation: astrocytes, etc

Paper annotations and abstract due. Presentations

Week 10 (3/25, 4/1): Astrocytes and learning/synaptic plasticity/critical period, Perineuronal Nets (PNNs):

Paper annotations and abstract due. Presentations

Week 11 (4/1, 4): Glia and Blood Brain Barrier, glymphatic system and sleep

Paper annotations and abstract due. Presentations

Week 12 (4/8, 11): Glia and circadian activity

Paper annotations and abstract due. Presentations

Week 13 (4/15, 18): Glia and pathfinding.

Paper annotations and abstract due. Presentations

Week 14 (4/22, 25): Regeneration, diseases

Paper annotations and abstract due. Presentations

Week 15 (4/29): Regeneration, diseases

Paper annotations and abstract due. Presentations

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Weekly readings:

- One or two papers on the topic of the following week will be assigned to the class on the second day of a given week (starting on week 2)
- Each student will read the assigned papers, which will be discussed on Mondays, followed by a brief in-person quiz on them at the end of class.
- Every student will read and annotate the assigned paper(s) and then search from the literature 1 or more papers related to the topic. You will send the paper(s) you selected to me at the latest on Tuesday of that week for me to confirm that they are appropriate. The papers you choose will be discussed the following Thursday. **You will be leading the discussion!** Depending on the number of students this will be done in pairs or trios.
- Each student (separately from your partners) will then write a short abstract (see below) of the two papers (the assigned and the one you chose), integrating your observations and the papers' results and discussion into one cohesive narrative. This will be due at the end of each week and will be graded. This abstract should be a short description of the papers, how they relate to each other and the topic of the week, and what you learned from them. At a minimum this abstract should include: a) A statement of the goal and the significance of the topic, b) A short description of the methodology used, c) A short summary of the results, d) A brief statement about the conclusions, which should at the very least state if and how the original goal of the paper was reached. A critical discussion of the results and conclusions (where they may be wrong or misleading, for example, or where future directions are described) will earn extra points.

Presentations:

- Depending on the total number of students, there will 2-4 paper presentations every week.

Abstracts (end of the week)

- 500 words max. Summarize the main ideas described in the 2 papers chosen for the week. No figures. No other references. This is meant to summarize the important points of the papers, not of the entire field. These abstracts will be submitted via Canvas and checked by Turnitin for the originality of your work.

Final paper:

- The expectations will be discussed in class. There will be different criteria (and grading rubrics) for graduate and undergraduate students.
- ~5 pages or 2000 words (max), not including references or figure legends.
- There is no minimum for references or figures, but each statement in the paper must be backed by an appropriate reference. As a rule of thumb, a 2000 word scientific paper is typically backed by 12 or more references.
- One figure minimum that illustrates the main elements of the mechanisms involved are expected.

Presentations:

- Each week 2 or more students will present the paper found by them on the week's topic.
- They will be evaluated by students (with a rubric) and I will give feedback on that. This evaluation will be part of your participation grade.
- Final grade will be decided by me but using this input.

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Finally, I have created a Slack workspace for the class. This will have different channels (related to the weekly topics) and I expect it to be used to ask questions (about methods, background, terminology, etc) that I or fellow classmates can answer, and for discussions on the topics or the assigned papers. I will use your participation in this space for your 'Participation' grade.

Canvas is the official site for course materials. Thus, assigned papers and grades will be posted on our Canvas page, and all essay submissions will be through Canvas. Make sure you have access to it.

GRADING POLICY AND SCALE

Assignment	%
Weekly participation	15
Weekly quizzes	15
Weekly abstracts	20
Presentations	20
Final paper	30
TOTAL	100

Grading Scale		
	UGs	GRs
A	90.1 - 100	90.1 - 100
B+	84.1 - 90	84.1 - 90
B	76.1 - 84	76.1 - 84
C+	69.1 - 76	69.1 - 76
C	62.1 - 69	62.1 - 69
D	55.1 - 62	NA
F	0 - 55.	0-62

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IMPORTANT RULES AND POLICIES

- ❖ If you miss an exam due to a valid excuse, medical or other, you need to provide valid and verifiable documentation to the [Dean of Students Office](#) and ask them to inform the instructor. Make-up assignments will be determined on a case-by-case basis.
- ❖ There will be no makeup for missed quizzes. If you are late or not present without notifying the instructor **ahead of time** you will get a zero for that quiz.
- ❖ The use of cell phones and other two-way electronic devices during exam times is prohibited.
- ❖ Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the [academic code of integrity policy](#). Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office.

Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the [Dean of Students Office](#).

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- Course Repetition Policy: An NJIT student may take a single course no more than four times (counting NJIT and other institutions), including withdrawals. If an undergraduate course is repeated at NJIT or the course is transferred from another institution, only then the lowest of the grades is excluded in computation of the cumulative GPA. All grades are shown on the student's transcript.
 - Final exam conflict resolution rules: <http://www.njit.edu/registrar/exams/conflict.php>

NJIT SUPPORT RESOURCES

Emergency Support

Crises Happen: If you experience a life emergency and are unsure which support services to turn to, NJIT Public Safety can connect you to emergency support systems - call 973.596.3111. For medical, psychological or psychiatric emergencies you can also call: University Hospital Crisis, 973.623.2323.

If you want to report a concern about another students' well-being you can also reach out to the **NJIT CARE Team** (<https://www.njit.edu/care/>) or the Dean of Students Office (973.596.3466).

Mental Health and Stress Management

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Center for Counseling and Psychological Services (**C-CAPS**) is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available: <https://www.njit.edu/counseling/gethelp>

Special Accommodations

If you have a disability or a personal circumstance that will affect your learning in this course, please let your instructor know as soon as possible so that we can discuss the best ways to meet your needs. Any student who needs accommodation for disabilities should also contact the **Office of Accessibility Resources and Services (OARS)**: <https://www.njit.edu/studentsuccess/accessibility>