FUNDAMENTALS OF NEUROBIOLOGY SYLLABUS

COURSE TITLE: FUNDAMENTALS OF NEUROBIOLOGY

COURSE CATALOG NUMBER: 01:146:245

SEMESTER: Fall; 3 credits

COURSE INSTRUCTOR AND CONTACT INFORMATION:

Faculty
Dr. Shu Chan Hsu
D410 Nelson Labs
Busch Campus
Hsu@biology.rutgers.edu

TA
Brandon Vaglio
Bjv42@gsbs.rutgers.edu

COURSE MEETING DAYS, TIMES, LOCATION, MODALITY:
In-person class.
Classes will meet at SEC 111 on Busch Campus on Mondays and Thurdays from 8:30 to 9:50 am.

OFFICE HOURS / STUDENT SUPPORT HOURS:
Weekly office hours with faculty and TA will be announced on course Canvas site.
Students can also schedule additional office hours with faculty instructors and the TA as needed.

COURSE DESCRIPTION:

This course is an intensive and demanding survey of neurobiology, intended for students who plan to major in CBN. It is the prerequisite for upper-level undergraduate courses in neurobiology and is required for students majoring in Cell Biology & Neuroscience. Other students with a strong background in the Biological Sciences may register for this course but are advised to take Essentials of Cell Biology & Neuroscience (01:146:295) instead. This course may be used to fulfill the elective requirements of the Biological Sciences major.

The primary focus is on the mammalian nervous system. After an introduction to basics of nerve cells and anatomy, the first module covers electrical and chemical signaling in the nervous system. This module requires a mastery of basic principles in physics and chemistry that apply to the molecular basis of signal generation within and between nerve cells.

The second module covers topics in neural systems, with an emphasis on sensory processing. Principles ranging from the molecular events underlying transduction to the neural pathways that process complex information will be covered for hearing, vision, touch, pain, smell, taste and motor control.

The third module includes lectures on developmental neurobiology and higher cognitive processes such as language, emotions and learning. In the end, the focus shifts to behavioral

aspects of neuroscience but the emphasis is still on biological mechanisms that are involved in cognition.

Course URL
The course makes use of Canvas, which is a password protected site that is used to post lecture notes, grades and supplementary information.

Prerequisites
General Biology 119:115-116 or 119:101-102
Knowledge of the basic principles of chemistry and physics is important to success in this course. This course is aimed at sophomores and juniors who plan on majoring in Cell Biology and Neuroscience. However, students who take this as their first biology course at Rutgers often struggle. This includes many transfer students plus some freshmen and sophomores with AP credit for General Biology.

REQUIRED TEXTS AND COURSE MATERIALS:
Optional ecommended textbook for this course:
Neuroscience 6th edition; Purves *et al*,
Sinauer Press
ISBN: 9781605353807

TECHNICAL / TECHNOLOGY REQUIREMENTS:
A laptop with internet access for accessing course materials and taking online exams.

Technology challenges:
Please visit the Rutgers Student Tech Guide page for resources available to all students. If you do not have the appropriate technology for financial reasons, please email Dean of Students deanofstudents@echo.rutgers.edu or complete the contact form for assistance. If you are facing other financial hardships, please visit the Office of Financial Aid at https://financialaid.rutgers.edu/.

COURSE LEARNING GOALS:
1. *Master factual and conceptual knowledge in cell biology and neuroscience that will provide a solid foundation for success in advanced training and professional careers.*
-Know key concepts underlying neural functions.
-Know the molecular and cellular components of the nervous systems.
-Know major landmark processes underlying neuronal development from zygote to brain.
2. *Develop an ability to summarize, integrate and organize information.*
-Understand how regulation of neurotransmission contribute to neural plasticity.
-Understand how components of the nervous systems integrate to mediate motor activities and sensation perception.
-Understand how coordination of molecular and cellular processes mediate the construction, maintenance and function of the nervous systems.

3. *Use scientific reasoning to evaluate the potential for current research and new discoveries to improve our understanding of cell biology and neuroscience and its relevance to human health and to our society.*
-Able to predict neuronal activities based on changes in neuronal properties.
-Able to identify neurocircuits that give rise to motor and sensory behaviors and dysfunctions.
-Able to diagnose how changes in molecular and cellular regulations can affect the nervous system development and functions.

DEPARTMENTAL LEARNING GOALS:
https://cbn.rutgers.edu/academics/undergraduate/learning-goals

1. Master factual and conceptual knowledge in cell biology and neuroscience that will provide a solid foundation for success in advanced training and professional careers.
2. Develop an ability to summarize, integrate and organize information.
3. Use scientific reasoning to evaluate the potential for current research and new discoveries to improve our understanding of cell biology and neuroscience and its relevance to human health and to our society.

GRADING SCALE:
A: 89.5% - 100%
B+: 84.5% - 89.4%
B: 79.5% - 84.4%
C+: 64.5% - 79.4%
C: 49.5% - 64.4%
D: 39.5% - 49.4%
F: < 39.5%

ASSESSMENT / GRADING COMPONENTS:
Weighting of Assessments:
A) 90% of the final grade will be based upon the average of the three non-cumulative module examinations. Final grades are curved when class exam averages fall below 75%

B) 10% of the grade is based on scheduled quizzes that test your knowledge in preparation for the exam. You need to achieve at least 50% of the maximum quiz score (1.25 pts for each quiz) in order to receive full credits for each quiz.

C) There will be three exams:
1) Neural signaling 2) Sensory and motor systems and 3) Brain function and development
The first two exams are given as scheduled, the last exam will be given during final exam week. The three exams are not cumulative and are weighed equally for the final grade.
No extra credits will be given.

D) Exam format:
Each exam lasts 80 minutes and will be administered either online through Canvas or on paper/scantron in class. In online, students are required to bring their laptops to class to take the exams at the specified dates and times.

All module exams in this course are closed-book exams. Consultation or access to course materials and web search during the exams (a.k.a. cheating) is not permitted and will result in a grade of 0 for the exam.

Make-up exam policy: make-up exams will only be given for serious illness.

SCHEDULE OF TOPICS:
Exam schedule:
Module 1 exam: Oct 9, 8:30 - 9:50am
Module 2 exam: Nov 9, 8:30 - 9:50am
Module 3 exam: Final exam week TBA,

Date	*Monday*	*Thursday*	*Chapter*	*Lecture Topic*
Module 1				
09/07		8:30 - 9:50 am	1	Organization of the nervous system
09/11	8:30 - 9:50 am		1	Cellular components of the nervous system
09/14		8:30 - 9:50 am	2-3	Electrical properties of neurons
09/18	8:30 - 9:50 am		6	Chemical properties of neurons
09/21		8:30 - 9:50 am	5	Presynaptic mechanisms of neurotransmission
09/25	8:30 - 9:50 am		4	Postsynaptic mechanisms of neurotransmission
09/28		8:30 - 9:50 am	7	Molecular Signaling in Neurons
10/02	8:30 - 9:50 am		8	Neuroscience of memory
10/05		8:30 - 9:50 am		Optional Review Session
10/09	8:30 - 9:50 am			Module I EXAM
Module 2				
10/12		8:30 - 9:50 am	9	Touch and Proprioception
10/16	8:30 - 9:50 am		10	Pain and temperature
10/19		8:30 - 9:50 am	11,12	The visual system
10/23	8:30 - 9:50 am		13	The auditory system

10/26		8:30 - 9:50 am	15	Chemical senses
10/30	8:30 - 9:50 am		16	The lower motor system
11/02		8:30 - 9:50 am		The upper motor system
11/06	8:30 - 9:50 am			Optional Review Session
11/09		8:30 - 9:50 am		Module II EXAM
Module 3				
11/13	8:30 - 9:50 am		22	Neural induction and proliferation
11/16		8:30 - 9:50 am	22	Neuronal migration
11/20	8:30 - 9:50 am		23	Development of Neural Circuits
11/21	8:30 - 9:50 am (Tuesday)		24	Synapse refinement
11/27	8:30 - 9:50 am		25	Neural maintenance and Regeneration
11/30		8:30 - 9:50 am	26, 27	Association cortical functions
12/04	8:30 - 9:50 am		28	Sleep and Wakefulness
12/07		8:30 - 9:50 am	29	Emotions, Addiction an Depression
12/11	8:30 - 9:50 am			Optional Review Session
TBA	Final exam week			Module III EXAM

POLICIES:

Course Closed?
If this course is closed, please use the appropriate form to add your name to the wait list at https://biology.rutgers.edu/ (at the bottom of this website). If you have any questions, please contact the Division of Life Science - Office of Undergraduate Instruction at b112@dls.rutgers.edu , access the OUGI virtual front desk at https://biology.rutgers.edu/40-biological-sciences/advising/478-ougi-front-desk or visit the undergraduate instruction office at Nelson Labs B112, Busch Campus.

Academic Integrity Policy:
Rutgers University takes academic dishonesty very seriously. By enrolling in this course, you assume responsibility for familiarizing yourself with the Academic Integrity Policy and the possible penalties (including suspension and expulsion) for violating the policy (http://academicintegrity.rutgers.edu/academic-integrity-policy) . As per the policy, all suspected violations will be reported to the Office of Student Conduct. Academic dishonesty includes (but is not limited to):

- *Cheating (accessing outside websites or course notes during the exam)*
- *Plagiarism*
- *Aiding others in committing a violation or allowing others to use your work*
- *Fabrication*
- *Using another person's ideas or words without attribution, including re-using a previous assignment Unauthorized collaboration*
- *Sabotaging another student's work*

If you are ever in doubt, consult your instructor.

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/
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
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.

** All information is subject to change at the discretion of the course coordinator.