

 FLORIDA ATLANTIC UNIVERSITY	COURSE CHANGE REQUEST Undergraduate Programs	UUPC Approval <u>11-16-20</u> UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____
	Department <u>Biology</u> College <u>Science</u>	

Current Course Prefix and Number <u>PCB4832C</u>	Current Course Title <u>Neurophysiology</u>
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Syllabus must be attached for ANY changes to current course details. See Checklist. Please consult and list departments that may be affected by the changes; attach documentation.

Change title to: RI: <u>Neurophysiology</u> Change prefix From: _____ To: _____ Change course number From: _____ To: _____ Change credits* From: _____ To: _____ Change grading From: _____ To: _____ Change WAC/Gordon Rule status** Add <input type="checkbox"/> Remove <input type="checkbox"/> Change General Education Requirements*** Add <input type="checkbox"/> Remove <input type="checkbox"/> <small>*Review <u>Provost Memorandum</u></small> <small>**WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to this form. See <u>WAC Guidelines</u>.</small> <small>***General Education criteria must be indicated in syllabus and approval attached to this form. See <u>GE Guidelines</u>.</small>	Change description to: <u>Research intensive designation.</u> Change prerequisites/minimum grades to: Change corequisites to: Change registration controls to: Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade (default is D-).
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Effective Term/Year for Changes: <u>Spring 2021</u>	Terminate course? Effective Term/Year for Termination: _____
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Faculty Contact/Email/Phone Dr. Jennifer Krill, jkrill@fau.edu, 772-643-1599

Approved by Department Chair <u>Sarah L. Milton</u> College Curriculum Chair <u>Jerry Haky</u> College Dean <u>[Signature]</u> UUPC Chair <u>Jerry Haky</u> Undergraduate Studies Dean <u>Edward Pratt</u> UFS President _____ Provost _____	Date <u>9-14-2020</u> <u>11-6-20</u> <u>11/6/2020</u> <u>11-16-20</u> <u>11-16-20</u> _____ _____
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Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.



RI: NEUROPHYSIOLOGY

PCB 4832C-Section 002-CRN 15064

3 credits

COURSE PREREQUISITES:

Biological Principles (BSC 1010 and BSC1010L) and an interest in Neuroscience.
Permission of Instructor.

LOGISTICS:

PERIOD/SEMESTER Spring 2021 (Jan 9-May 7)

LOCATION: Jupiter Campus, EC104

CLASS HOURS: Monday 8:00AM-4:50PM

CONTACT INFORMATION:

Instructor: Dr. Jennifer Krill

Office: EC221i

Email: jkrill@fau.edu

Office hours: Wednesday/Friday 10:00-11:00AM

TA: Juan Lopez

Office: SC 294

juanlopez2016@fau.edu

TBA

COURSE DESCRIPTION:

Neurophysiology will bring the students closer to understanding neurophysiological signaling at the cellular level and whole animal by using actual wet laboratory experiences supplemented with lectures. We will look at signaling from the perspective of the electrical properties of neurons and their signaling, the basis for all neuronal function. The students will learn through both theory and practical laboratory experiences and then translate their findings into modular reports. This is a research-intensive course.

RI designated course:

This course contains an assignment or multiple assignments designed to help students conduct research and inquiry at an intensive level. If this class is selected to participate in the university-wide assessment program, students will be asked to complete a consent form and submit electronically some of their research assignments for review. Visit the Office of Undergraduate Research and Inquiry (OURI) for additional opportunities and information at <http://www.fau.edu/ouri>.

By the end of this course, students will acquire technical skills in electrophysiology as well as the ability to apply those skills to the process of research and scientific inquiry. Students will develop the skills necessary to design an experiment to answer their own unique research question as well as communicate their experimental findings in the format of a scientific journal article that include written communication of experimental purpose, design, methods, results and scientific significance.

COURSE OBJECTIVES:

Students will examine the concepts and principles of neurophysiological techniques, including:

- [1] Knowledge of Neurophysiological processes and extracellular techniques.
- [2] Use of Neurons in Action V2 simulator.
- [3] Use of the earthworm as a neurophysiological preparation.
- [4] Communicate [1] through [3] through written explanation.

STUDENT LEARNING OUTCOMES:

SLO 1: Knowledge. Students will demonstrate content knowledge, core principles, and acquired technical skills in neurophysiology. Competency in concepts of action potential threshold, conduction velocity, and the effect of temperature, frequency, and drugs on these neuroelectric properties will be demonstrated in laboratory reports. Students will also gain mastery of the technical skills of electrophysiology required to gather and analyze data on such concepts.

SLO 2: Formulate Questions. Students will formulate their own independent research projects that integrate of fundamental principles and knowledge of electrophysiology to a novel and unique question.

SLO 3: Plan of Action. Students will develop and implement a plan of action to address research and inquiry questions using the electrophysiology techniques mastered in the lab. This will include the development of the student's own methods for carrying out the experiment to answer their independent research question in SLO1.

SLO 4: Critical Thinking. Students will apply critical thinking skills to evaluate and integrate information from published scientific journals with predicted outcomes of experiments from simulations and experimental data gathered in lab. This will include analysis of the data from their laboratory experiments and their own independent research question in SLO1.

SLO 5: Ethical Conduct. While this laboratory utilizes invertebrate model organisms, it is recommended that students complete the Responsible conduct of research (RCR) certificate through the CITI training of academic research on-line at <http://www.fau.edu/graduate/events/citi-training.php>. Students are also encouraged to attend FAU OURI workshops on topics related responsible conduct of research. Information on OURI workshops can be found here http://www.fau.edu/ouri/student_workshops.php

SLO 6: Communication. Students will convey all aspects of their research and inquiry in laboratory reports that follow the format of primary scientific articles. Students are also encouraged to share their independent research findings by submitting their paper to the Florida Atlantic University Undergraduate Research Journal (FAURJ) or at Florida Atlantic University's Undergraduate Research Symposium held at Florida Atlantic University (Boca Raton campus) each Spring Semester. Use the following links for information: journal submissions- https://www.fau.edu/ouri/ug_research_journal.php, symposium submissions- http://www.fau.edu/ouri/undergrad_symposium.php.

ASSIGNMENT DESCRIPTIONS

Quizzes: For each lab a short 5 question quiz will be posted on Canvas. Questions will come from the lab that the students are going to perform that day. Questions will be short answer, fill in the blank and true/false. The purpose of the quizzes is that students review the lab prior to class time. All quizzes will be available on Canvas from Monday of the week of the lab until Friday at 7:59am.

Neurons in Action (NIA) Report: Students will use a simulation to investigate different properties of neurons to gain a better understanding of how neurons function at a cellular level and the factors that affect their function. Students will investigate and modify properties like internal and external ion concentrations, threshold, conduction velocity, refractory period and the differences between passive potentials and action potentials as well as the effects of drugs, axon diameter and changes in temperature on these neuronal properties. Students will use the simulation throughout the semester to predict expected results of experiments. Students will compare observed results from the wet lab experiments to the expected results of the simulation and include a discussion of their findings, including reasons why their empirical data could differ.

Lab Reports: Students will conduct experiments using crickets and earthworms to investigate neuroscience principles of cellular neuroscience. Students will gain knowledge and experience in neurophysiology techniques in these experiments so that will culminate in answering a unique student question for the independent project. When conducting these experiments, students will learn how to conduct scientific research, collect and analyze data, and generate a laboratory report in the format of a scientific journal publication with an introduction, materials and methods, results, discussion and citations. Students will also conduct literature searches to gather primary source publications to synthesize a discussion of their results and the relevance of their results with regard to previously published literature. Students will critically analyze their data in relation to expected results gathered from simulations as well as previously published literature and learn how to create publication-worthy figures and graphs. This research-intensive activity will help develop your skill in scientific manuscript preparation as we build toward the other research-intensive activity, the independent project.

Independent Project: Students will apply the knowledge and technical skills learned in the experimental laboratories and literature searches to develop their own independent hypothesis. Students will design an experiment using the techniques learned in the experimental labs to answer their unique question. Students will relay their findings in a report in the format of a scientific journal publication.

EVALUATION METHOD

Lab Report 1: NIA	58
Lab Report 2: Equipment & Calibration	50
Lab Report 2: Threshold	136
Lab Report 3: Conduction Velocity	139
Lab Report 4: Refractory Period/Freq	143
Lab Report 5: Temperature Q10	134
Lab Report 6: Drugs, Ions	137
Independent Project Report	118
Attendance and Participation	130
Quizzes 6 @ 5 points each	30
Total	1,075

Grading scale:

A = 100-93%
A- = 92-90%
B+ = 89-87%
B = 86-83%
B- = 82-80%
C+ = 79-77%
C = 76-73%
C- = 72-70%
D+ = 69-67%
D = 66-60%
F = <59

EVALUATION METHODS

- Weekly Conceptual Quizzes 3%
- Neuronal Simulation Exercises 5%
- Attendance and Participation 12%
- Laboratory Reports – Research Intensive 69%
- Independent Research Project – Research Intensive 11%

LATE ASSIGNMENTS/MISSED CLASSES:

Attendance: Students are expected to attend all classes and participate in activities and discussions. If a student misses a class, he/she is responsible for all material covered during that class, including lecture material and rules and regulations about the course (such as penalties for late assignments, etc.) and must make up the work on their own time by the due date. If you know in advance that you will be absent, or need accommodations for religious reasons, contact the TA to make necessary arrangements. *Reasonable accommodation will also be made for students participating in a religious observance.* Assignments are due at the beginning of class (both a hard copy and Canvas). Late assignments will be penalized 10% per day and none will be accepted after 5 days.

CLASSROOM ETIQUETTE:

All FAU students are expected to behave according to accepted norms that ensure a professional climate wherein all can exercise their right to learn. Questions from students will be recognized at the discretion of the lecturer in a manner that is minimally disruptive to the lecture. Cell phones should be shut off during lectures. Stations must be cleaned up and shut down at the end of the day for full participation credit. Disruptive behavior is not acceptable in the classroom. Students engaging in such behavior may be asked to leave or may be moved from the class by security personnel. Actions such as violence, shouting, use of cell phones, using profanity, interrupting classes, and any other behavior that the instructor believes creates an unpleasant environment in the classroom will be grounds for withdrawal from the course, disciplinary/judicial proceedings, or failure of the course.

STUDENT ATTENDANCE POLICY:

Students are expected to attend all their scheduled University classes and to satisfy all academic objectives. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations, or participation in University-approved activities. If a student misses a class, he/she is responsible for all material covered during that class, including lecture material and rules and regulations about the course (such as penalties for late assignments, etc.) and must make up the work on their own time by the due date. If you know in advance that you will be absent, or need accommodations for religious reasons, contact the TA to make necessary arrangements.

Reasonable accommodation will also be made for students participating in a religious observance.

Assignments are due at the beginning of class (both a hard copy and Canvas). Late assignments will be penalized 10% per day and none will be accepted after 5 days.

DISABILITY STATEMENT:

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie, and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

COUNSELING AND PSYCHOLOGICAL SERVICES (CAPS) CENTER:

Life as a university student can be challenging physically, mentally, and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>.

CODE OF ACADEMIC INTEGRITY POLICY:

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high-quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

https://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf

ARTICULATION TO UNIVERSITY MISSION: This course addresses both the university mission statement as well as the strategic plan by offering a high quality academic curriculum in a caring environment, stimulating creative initiative utilizing some problem-based learning, critical thinking, and the development of both written and oral competencies. This course fosters motivated, self-directed analytical thinking. Students in this course will develop an awareness of the contributions of scientists and practitioners from diverse domestic and international backgrounds as well as biomedical and health issues that impact those living within and outside of our community. These goals are attained by providing quality instruction, class discussions or debates, attendance at special seminars, exams, and written reports to help students attain their goals.

2020 FAU Course Syllabi - COVID 19 Statement

All students in face-to-face classes are required to wear masks during class, and students must sanitize their own workstations upon entering the classroom. Taking these measures supports the safety and protection of the FAU community. Students who do not adhere to these rules will be asked to leave the classroom and/or be removed from the course. Students experiencing flu-like symptoms (fever, cough, shortness of breath), or students who have come in contact with an infected person should immediately contact FAU Student Health Services (561-297-3512).

TEXTBOOKS:

Neurophysiology, 3rd edition- required, **provided***

Neuroscience: Exploring the Brain, 4th Edition

Neurons in Action V2 – **provided***

Please note- the lab manual, Neurophysiology, will be provided to students in a pdf format on laboratory computers. Students can bind their lab manuals if desired using the University printing service. The **Neurons in Action V2 text will be provided on laboratory computers. Students can purchase personal copies from \$30-\$40. (ISBN-13: 978-1605353913 ISBN-10: 9781605353913, ISBN-13: 978-0878935482 ISBN-10: 0878935487 are all useable formats).*

*The textbook **Neuroscience: Exploring the Brain, 4th Edition** is available for pdf download at reasonable prices of around \$5-\$10. We will only use a few chapters from this text for the lab course. This text will be useful if you pursue a degree in neuroscience so a decision to purchase a hardcopy is on a student-to-student basis. (ISBN-13: 978-0781778176 ISBN-10: 0781778174)*

COURSE OUTLINE:

Introduction to the theory behind neurophysiological techniques taught in the course. Extracellular recording, waveform analysis, data analysis, and computer simulation.

Instrumentation overview and analysis software training.

The use of animals in research.

Cricket and Earthworm Anatomy and dissection.

Compound action potential identification and mechanistic understanding.

Action potential threshold and conduction velocity.

The effect of temperature, refractory period, frequency, and pharmacological and ionic manipulation on action potential threshold and conduction velocity.

METHODS OF TEACHING:

Laboratory exercises both using computer simulation and invertebrates

Lectures and students' discussions

Audio-visuals: power point presentations

COURSE SCHEDULE:

Class Schedule	Assigned Reading	In Class	Out of Class
WEEK 1: 1/15/21	Lab: NIA	Lecture Sample Quiz Lab: NIA	Report for Lab: NIA
WEEK 2: 1/22/21	Lab: Equipment, Calibration, and Data Analysis	Quiz #1 Lecture Lab: Equipment, Calibration, and Data Analysis	Due: NIA Report Report for Lab Equipment, Calibration, and Data Analysis
WEEK 3: 1/29/21	Lab: Equipment, Calibration, and Data Analysis	Lecture Lab: Equipment, Calibration, and Data Analysis	Report for Lab: Equipment, Calibration, and Data Analysis
WEEK 4: 2/5/21	Lab: Animal Prep & Threshold How to write a lab report	Quiz #2 Lecture Lab: Threshold	Due: Equip, Cal, and Analysis Report Report for Lab: Threshold
WEEK 5: 2/12/21	Lab: Threshold	Lab: Threshold	Report for Lab: Threshold
WEEK 6: 2/19/21	Lab: Conduction velocity	Quiz #3 Lecture Lab: Conduction velocity	Due: Threshold Report Report for Lab: Conduction velocity
WEEK 7: 2/26/21	Lab: Refractory period/Freq	Quiz #4 Lecture Lab: Refractory /Freq	Due: CV Report Report for Lab: Refractory period/Freq
WEEK 8: 3/5/21	Lab: Temperature	Quiz #5 Lecture Lab: Temperature	Due: RP/Freq Report Due: Research Summary Report for Lab: Temperature
WEEK 9: 3/12/21	Spring Break (no class)		
WEEK 10: 3/19/21	Lab: Temperature	Lab: Temperature	Due: Exp. Design Report for Lab: Temperature

WEEK 11: 3/26/21	Lab: Drugs/Ions	Quiz #6 Lecture Lab: Drugs/Ion	Due: Temp Report Report for Lab: Drugs/Ion
WEEK 12: 4/2/21	Lab: Drugs/Ions	Lab: Drugs/Ion	Due: Project Proposal Report for Lab: Drugs/Ion
WEEK 13: 4/9/21	Design an Experiment	Lab: Design an Experiment	Due: Drugs/Ion Report Report for Lab: Indep. Project
WEEK 14: 4/16/21	Design an Experiment	Lab: Design an Experiment	Report and Presentation for Lab: Indep. Project
WEEK 15: 4/23/21	Independent Project Presentations		Report for Lab: Indep. Project Due April 28th

IMPORTANT DATES:

Friday, Jan. 15 th	Last Day to Drop/Add
Monday, Jan. 18 th	MLK Holiday (University closed, no classes)
Tuesday, Jan. 19 th	Last Day to Pay Without Late Fees
Monday, Feb. 8 th	Last Day to Drop w/25% Tuition Adjustment
Mar. 5 th -12 th	Spring Break (University closed, no classes)
Friday, Mar. 26 th	Last Day to Drop with a "W"
Monday, Apr. 26 th	Classes End
Apr. 27 th - 28 th	Reading Days
Apr. 29 th - May 5 th	Final Exams