

NEUROMUSCULAR ADAPTATION

APK6118 ~ 3 CREDITS ~ SPRING 2020

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Preferred Method of Contact: email/in person at class

OFFICE HOURS: By appointment

MEETING TIME/LOCATION: Thursdays Period 6 - 8 (12:50 PM – 3:50 PM); FLG 250

COURSE DESCRIPTION: This course will combine a highly cellular and molecular approach to muscle and nerve function and then apply these to integrative views of muscle properties in the context of adaptation to exercise, disuse atrophy and disease states.

PREREQUISITE KNOWLEDGE AND SKILLS: Throughout the course we will review cell physiology and elementary biophysics as we enter into each topic. It is not required that students have an extensive background in advanced physiology, biophysics or biochemistry, but these will be incorporated in a "ground up" approach to understanding fundamental principles. Students taking the course and mastering the material should be prepared to enter into more advanced muscle physiology research or physical therapy research and will have a sufficient background to explore a wide range of topics from a cellular perspective in physiology. Although there is a heavy emphasis on skeletal muscle, the course will incorporate some introductory aspects of neuronal function and adaptation.

Students will be expected to be active participants through in class discussions and presentations.

REQUIRED AND RECOMMENDED MATERIALS: There is no required text for this course. All lectures and outside reading material will be in the form of review articles and research articles provided on the Canvas, e-learning platform. One text, which is not required, but has useful information for students of Muscle Biology is "Skeletal Muscle Structure, Function and Plasticity" by Richard L. Lieber, Third edition. I will use information from the text in some parts of the course. I will also use Molecular Biology of

the Cell by Alberts et al., Fourth edition for portions of the class, a standard text in cell biology. Finally, I will provide several papers that are comprehensive reviews of topics within the course modules that will serve of background material.

COURSE FORMAT: Lecture time will be generally divided among the following activities:

- 1) didactic presentations to provide background on the weekly topic
- 2) student presentations of the research papers
- 3) student discussion of the papers in the context of the weekly topic

Two take-home exams will be given in lieu of lecture.

COURSE LEARNING OBJECTIVES: Students will have met the course goals if they can:

- **Understand** of fundamental principles of muscle and neuromuscular adaptation to stresses imposed from exercise, stretch, injury, fatigue, and genetic disease.
- **Explain** methodology, terminology and instrumentation used in muscle research.
- **Critically review**, understand and appreciate a wide breadth of cellular and molecular physiology literature, largely related to striated muscle.
- **Interpret** this literature and to discuss it in the context of fundamental physiological principles.

COURSE AND UNIVERSITY POLICIES:

ATTENDANCE POLICY: Attendance is encouraged for all class time sessions. It will be part of the Class Participation grade (see below). You will be excused from class if you have a legitimate reason to be gone; please send an email before class starts as to why you need to miss the class. These will be kept on file for the semester. Please note: the University has specific reasons that are acceptable for missing class, which apply to both undergrad and grad students. You can find this at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>:

"In general, acceptable reasons for absence from or failure to participate in class include illness, serious family emergencies, special curricular requirements (e.g., judging trips, field trips, professional conferences), military obligation, severe weather conditions, religious holidays and participation in official university activities such as music performances, athletic competition or debate. Absences from class for court-imposed legal obligations (e.g., jury duty or subpoena) must be excused. Other reasons also may be approved."

In general, cell phones or computers are allowed in class, particularly to follow along with the lectures and assignments. However, please put your phone on "silent" or

airplane mode during class and do not answer the phone or respond to a text message during class. If whatever you are doing is disturbing the class, you will be asked to leave.

PERSONAL CONDUCT POLICY: For written assignments the instructor submits all material to TURNITIN.com, which is designed to determine whether what you have written is original material. Penalties for plagiarism will be enforced in this class. It may have extreme consequences such as receiving an F (failure) for the entire class, depending on the severity of the infraction. Understanding this aspect of scholarship is required to prepare you as a scientist, scholar and professional. Please review the UF Honor Pledge Code for students (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) which specifies a number of behaviors that are in violation of the code and possible sanctions. Furthermore, you are obliged to report any condition that facilitates academic misconduct in others. Please contact me directly if you have any concerns about ongoing misconduct.

EXAM MAKE-UP POLICY: If you miss an exam due to an excused absence, a make up exam will be scheduled at the earliest feasible date. If an exam is missed due to an unexcused absence, then a make up exam will be scheduled, but 10 points will be deducted from the final score for every 3 days of delay. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

ACCOMMODATING STUDENTS WITH DISABILITIES: Students requesting classroom accommodation must first register with the Dean of Student's Office. The Dean of Students Office will then provide documentation to the student who will provide this documentation to the instructor when requesting accommodation. We are very tolerant of special needs; please contact one of the course directors to discuss any issues or concerns. More information about the UF Disability Resource Center can be found at: <https://drc.dso.ufl.edu/>.

COURSE EVALUATIONS: Students in this class are participating in GatorEvals. This evaluation system is designed to be more informative to instructors so that teaching effectiveness is enhanced and to be more seamlessly linked to UF's CANVAS learning management system. Students can complete their evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Thank you for serving as a partner in this important effort. Good participation in these evaluations is extremely important for maintaining and improving the quality of coursework at UF. Consider it a privilege to participate in UF's future by doing your evaluations. The outcome of these is used in many ways to make this a better environment for you and future students.

GETTING HELP:

Health and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575
- Counseling and Wellness Center: <https://counseling.ufl.edu/>, 352-392-1575
- Sexual Assault Recovery Services (SARS) - Student Health Care Center, 392-1161
- University Police Department, 392-1111 (or 9-1-1 for emergencies)
<http://www.police.ufl.edu/>

Academic Resources

- E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>
- Career Connections Center, Reitz Union, 392-1601. Career assistance and counseling. <https://career.ufl.edu/>
- Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.
- Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <http://teachingcenter.ufl.edu/>
- Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers. <http://writing.ufl.edu/writing-studio/>
- Student Complaints On-Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> On-Line Students Complaints: <http://distance.ufl.edu/student-complaint-process/>

GRADING:

Exams: There will be a midterm and a final exam. The final will not be comprehensive. Both exams will be open book/notes. These exams will comprise 60% of the grade.

Assignments: Students will be asked to submit short assignments on the readings for each week. The format of the assignments will entail choosing a figure from one of the papers for discussion, and discussing the results, underlying methodology/analysis, and the context of the findings presented with respect to the whole paper. These assignments will be worth 10% of the final grade.

Class Participation/Presentations: A central part of learning in this course is discussion of the topics, and challenging each other (and the professor!) about statements or findings. IN addition, students will be responsible for paper presentations throughout the semester. Class discussion and student presentations will comprise 30% of the grade. A portion of these discussions points will be given just for showing up to class, and those who are more vocal in class will receive full credit.

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Exams	30 pts each = 60 pts	60%
Assignments	1 pts each = 10 pts	10%
Class Participation (1)	10 pts each = 10 pts	10%
Paper presentation (2)	10 pts each = 20 pts	20%

Papers: The primary literature forms the basis of fundamental concepts for physiology. Some concepts become sufficiently accepted to appear in textbooks, whereas others may not become substantiated enough to be part of the general knowledge. Further, in some areas of exercise physiology, there is a change in concepts, and so textbooks, which are many years behind in current knowledge, may not adequately address a new area. Thus, we will spend a large proportion of class time reviewing emerging concepts and classic papers in muscle and nerve physiology.

GRADING SCALE: Grades for quizzes will be uploaded into Canvas within 48 hours after completion. For the student BYOA project, routine review of the weekly assignments will be given so that students can revise these prior to the final assessment of the project at the end of the course. Grades will be calculated to the nearest 2 decimal places. Information on current UF grading policies for assigning grades can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	94.00-100%	4.0
A-	90.00-93.99%	3.67
B+	87.00-89.99%	3.33
B	84.00-86.99%	3.0
B-	80.00-83.99%	2.67
C+	77.00-79.99%	2.33
C	70.00-76.99%	2.0
D+	67.00-69.99%	1.33
D	60.00-66.99%	1.0
E	0-59.99%	0

WEEKLY COURSE SCHEDULE:

Date	Activity/Topic
6th January	Intro & Organization/ How to read a paper/How to present a paper/Quiz
16th January	Quiz review/ Muscle & Nerve Didactics
23rd January	Muscle Hypertrophy I - Growth Factors
30th January	Muscle Hypertrophy II - Satellite Cells
6th February	Muscle Atrophy I - Atrogenes
13th February	Muscle Atrophy II- Autophagy
20 th February	Neural Plasticity
27th February	Take home Exam 1
5th March	No Class (Spring Break)
12th March	Muscle Plasticity I - Fiber types
19th March	Muscle Plasticity II - Signaling
26th March	Muscle Plasticity III
2nd April	Muscle Plasticity IV
9th April	Emerging Topics
16th April	Take home Exam 2

SUCCESS AND STUDY TIPS:

All students are encouraged to ask questions during and after class, and engage in discussions during class. An important aspect of this is reading the papers for discussion so that participation is possible.