

# NEUROMUSCULAR ADAPTATION

APK6118 | 3 Credits | Spring 2023

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## Course Info

### INSTRUCTOR

**Lan Wei-LaPierre, Ph.D.**  
Office: FLG Room 119  
Office Phone: 294-1754  
Email: [lweilapierre@ufl.edu](mailto:lweilapierre@ufl.edu)  
Preferred Method of Contact: Email through Canvas

### OFFICE HOURS

by appointment

### MEETING TIME/LOCATION

FLG 225, F Period 6-8 (12:50 PM - 3:50 PM)

**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. The instructor will use information from the text in some parts of the course. The instructor 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, several papers that are comprehensive reviews of topics will be provided for each course modules to serve as background material.

**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.

**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:** By the end of this course, students should be able to:

- **Understand** 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** the literature and to discuss it in the context of fundamental physiological principles.

## COURSE & 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."*

**PERSONAL CONDUCT POLICY:** Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Students are expected to join the lecture on time, but tardiness is acceptable when personal conflicts require the student to enter the lecture later than the scheduled time. Students are expected to be quiet and cause minimal disturbance to the class if entering the classroom late.

Laptop computers and tablet devices for note taking are allowed to use during the course. Upon entry into the lecture, please silence your cell phone and do not answer the phone or respond to a text message during class.

For open book exams or 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. Failure to adhere to the UF Honor Code will result in disciplinary action by the university. UF students are bound by The Honor Pledge which states, *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code"*. On all work submitted for credit by students at the University of Florida, the

following pledge is either required or implied: *“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”* Please review the UF Honor Pledge Code for students (<http://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 the instructor 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.

A student experiencing an illness should visit the UF Student Health Care Center or their preferred healthcare provider to seek medical advice and obtain documentation. If you have an illness, family emergency or death, please contact the Dean of Students Office ([www.dso.ufl.edu](http://www.dso.ufl.edu)) and follow the DSO Care Team procedures for documentation and submission of a request for make-up assignment (<https://care.dso.ufl.edu/instructor-notifications/>). The DSO will contact the instructor. Do not provide any documentation to the instructor regarding illness or family emergency. This is your personal and protected information. The DSO is qualified to receive and verify the documents you provide. The instructor will follow the recommendations from the DSO. 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 with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting their Get Started page at <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

**COURSE EVALUATIONS:** Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## GETTING HELP

### HEALTH & WELLNESS

- U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto: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 opti on 2) or e-mail to [Learning-support@ufl.edu](mailto: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/>

## INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY RESOURCES

For suggestions or concerns related to IDEA, please reach out to any of the following:

- Dr. Linda Nguyen, APK IDEA Liaison, [linda.nguyen@hnp.ufl.edu](mailto:linda.nguyen@hnp.ufl.edu)
- Dr. Rachael Seidler, APK Graduate Coordinator, [rachaelseidler@ufl.edu](mailto:rachaelseidler@ufl.edu)
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, [jahlgren@ufl.edu](mailto:jahlgren@ufl.edu)

## GRADING

Grades will be assigned based on points earned in the course. The point value of three examinations, presentation, participation and literature review are as follows:

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Exams (2)	35 pts each = 70 pts	70%
Assignments (10)	1 pts each = 10 pts	10%
Class Participation (1)	10 pts each = 10 pts	10%
Paper presentation (1)	10 pts each = 10 pts	10%

**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 70% 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 20% of the grade. A portion of these discussion points will be given just for showing up to class, and those who are more vocal in class will receive full credit.

## GRADING SCALE

Lecture exam scores and homework grades will be posted on the canvas course website typically within 48-96 hours after the date of the exam. Final grades in the class will be determined by the total points earned during the semester. Grades will be calculated to the nearest 2 decimal places. More detailed information regarding current UF grading policies can be found here:

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>. *Any requests for additional extra credit or special exceptions to these grading policies will be interpreted as an honor code violation (i.e., asking for preferential treatment) and will be handled accordingly.*

Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	94.00-100%	4.0
A-	90-93.99%	3.67
B+	87.00-89.99%	3.33
B	80.00-86.99%	3.0
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

Week	Dates	Topic
1	Jan 13	Introduction and organization
2	Jan 20	Quiz review and Muscle & Nerve didactics
3	Jan 27	Muscle Hypertrophy I-Growth factors
4	Feb 3	Muscle Hypertrophy II-Satellite Cells
5	Feb 10	Muscle Atrophy I-Atrogenes
6	Feb 17	Muscle Atrophy II-Autophagy
7	Feb 24	Muscle injury, Rhabdomyolysis
8	Mar 3	Take home exam 1 (Mid-term)
9	Mar 10	Muscle Plasticity I - Fiber types
10	Mar 17	<b>Spring Break- NO CLASS</b>
11	Mar 24	Muscle Plasticity II - Intracellular Signaling
12	Mar 31	Neural plasticity
13	Apr 7	Plasticity and microRNAs
14	Apr 14	Exercise and Neuromuscular conditions

15	Apr 19	Take home Exam 2 (Final)
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### **SUCCESS AND STUDY TIPS**

To ensure success of this course, all students are encouraged to read the course materials provided on CANVAS before class, attend the lectures, 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. Contact the instructor when having doubt on the materials and topics for each week.