

NEUROMUSCULAR ADAPTATION

APK6118 | 3 Credits | Spring 2025

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Course Info

INSTRUCTOR

Lan Wei-LaPierre, Ph.D.

Office: FLG Room 119

Office Phone: 294-1754

Email: lweilapierre@ufl.edu

Preferred Method of Contact: Email through Canvas

OFFICE HOURS

Will be posted on Canvas

MEETING TIME/LOCATION

FLG 235, F Period 6-8 (12:50 AM - 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

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 & ACADEMIC INTEGRITY

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 lecture hall 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.

APPROPRIATE USE OF AI TECHNOLOGY

The UF Honor Code strictly prohibits *cheating*. The use of any materials or resources prepared by another person or Entity (inclusive of generative AI tools) without the other person or Entity’s express consent or without proper attribution to the other person or Entity is considered *cheating*. Additionally, the use of any materials or resources, through any medium, which the Faculty / Instructor has not given express permission to use and that may confer an academic benefit to a student, constitutes *cheating*.

The use of any AI enabled tool (such as, AI-assisted Grammarly and ChatGPT) in course assignments and exams substantially compromises the student’s ability to achieve the stated learning objectives and are strictly prohibited throughout the entirety of the course.

IN-CLASS RECORDING

Students are allowed to record audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session. Publication without permission of the instructor is prohibited.

To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

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) 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.ua.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://my-ufl.bluera.com/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

GETTING HELP

HEALTH & WELLNESS

- **U Matter, We Care:** If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.
- **Counseling and Wellness Center:** Visit the [Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- **Student Health Care Center:** Call 352-392-1161 for 24/7 information to help you find the care you need, or visit the [Student Health Care Center website](#).
- **University Police Department:** Visit [UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).
- **UF Health Shands Emergency Room / Trauma Center:** For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; or visit the [UF Health Emergency Room and Trauma Center website](#).
- **GatorWell Health Promotion Services:** For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

ACADEMIC RESOURCES

- **E-learning technical support:** Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- **Career Connections Center:** Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- **Library Support:** Various ways to receive assistance with respect to using the libraries or finding resources.

- **Teaching Center:** Broward Hall, 352-392-2010 or to make an appointment 352- 392-6420. General study skills and tutoring.
- **Writing Studio:** 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers.
- **Student Complaints & Grievances:** Students are encouraged to communicate first with the involved person(s), but [here](#) is more information on the appropriate reporting process.

APK ADMINISTRATORS

For suggestions or concerns related to APK courses or programming, please reach out to any of the following:

- Dr. David Vaillancourt (he/him), APK Department Chair, vcourt@ufl.edu
- Dr. Demetra Christou (she/her), APK Department Vice Chair, ddchristou@hwp.ufl.edu
- Dr. Steve Coombes (he/him), APK Graduate Coordinator, rachaelseidler@ufl.edu
- Dr. Joslyn Ahlgren (she/her), APK Undergraduate Coordinator, 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. A detailed grading rubric for this assessment will be posted in CANVAS.

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 respectfully ignored.

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 17	Introduction and organization
2	Jan 24	Quiz review and Muscle & Nerve didactics
3	Jan 31	Muscle Hypertrophy I-Growth factors
4	Feb 7	Muscle Hypertrophy II-Satellite Cells
5	Feb 14	Muscle Atrophy I-Atrogenes
6	Feb 21	Muscle Atrophy II-Autophagy
7	Feb 28	Muscle injury, Rhabdomyolysis
8	Mar 7	Take home exam 1 (Mid-term)
9	Mar 14	Muscle Plasticity I - Fiber types
10	Mar 21	Spring Break- NO CLASS
11	Mar 28	Muscle Plasticity II - Intracellular Signaling
12	Apr 4	Neural plasticity
13	Apr 11	Plasticity and microRNAs
14	Apr 18	Exercise and Neuromuscular conditions
15	Apr 23	Take home Exam 2 (Final)

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.