

# Movement Neuroscience

APK4144 | Class # 19214 | 3 Credits | Spring 2024

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## Course Info

### INSTRUCTOR

**Julia Choi, PhD**  
Office: FLG 132C  
Office Phone: (352) 294-1720  
Email: [juliachoi@ufl.edu](mailto:juliachoi@ufl.edu)  
Preferred Method of Contact: Email or Canvas

### OFFICE HOURS

office hours are Thursday periods 4-5 or by appointment

### MEETING TIME/LOCATION

WEIM 1094, T | periods 2-3 (8:30 AM – 10:25 PM)  
WEIM 1094, R | period 3 (9:35 PM – 10:25 PM)

## COURSE DESCRIPTION

Covers both anatomical and physiological aspects of movement-related components of the nervous system from a functional perspective. Topics include: neuronal signaling; synaptic transmission, somatosensation; proprioception; nociception; vision and eye movements; vestibular; audition; lower vs. upper motor neurons; cortical, basal ganglia and cerebellar regulation of movement; and cognition.

## PREREQUISITE KNOWLEDGE AND SKILLS

APK 2100C and APK 2105C (with minimum grades of C) and (sophomore standing or higher) and Applied Physiology and Kinesiology major.

## REQUIRED AND RECOMMENDED MATERIALS

The following textbook is required:

### Neuroscience

Seventh Edition

Edited by George J. Augustine, Jennifer M. Groh, Scott A. Huettel, Anthony-Samuel LaMantia, Leonard E. White, and Emeritus Purves

Publication Date - 01 March 2023

ISBN: 9780197616246

Copies of the lecture slides will be posted on the CANVAS course website.

## COURSE FORMAT

The course includes two meetings per week, a 2-hour “long session” and a 1-hour “short session”. All students must read the directed book chapter(s) before attending the **lecture** for each module. Most of the modules will include a discussion (active learning) session, where students work in small peer groups. These **discussions** are designed to enhance critical thinking skills and application of fundamental concepts. Students will be expected to present their answers to the class at the end of the discussion session. Weekly **take-home quizzes** will cover the module discussed in the prior week. In addition, there will be unscheduled **pop quizzes** given in class.

## COURSE LEARNING OBJECTIVES:

The course provides an in-depth overview and treatment of the sensory and motor systems of the nervous system responsible for regulating movement. By the end of this course, students should be able to:

- Describe electric signaling of nerve cells and synaptic transmission as they pertain to movement.
- Elaborate how sensory systems including somatosensory (proprioception, touch, pain), visual, auditory, and vestibular systems, relate to movement.
- Discuss each sensory system’s peripheral anatomy and physiology, as well as central brain physiology for processing each type of sensory signal.
- Define the function of lower motor neurons, upper motor neurons, cortical physiology of movements, basal ganglia physiology, cerebellar physiology, posture, and eye movements.
- Understand mechanisms of higher-level cognitive function, speech and language motor control, as they relate to movement.

Students should also be able to integrate across all the above topics to demonstrate a holistic understanding of how the central nervous system controls movement.

## Course & University Policies

### ATTENDANCE POLICY

Please make every effort to attend all class meetings. Students will receive points for participation in Discussion sessions (see Rubric below). Students who receive a zero in discussion for unexcused absence will not be able to earn full credit for discussion. Missing a class may also result in missing pop quizzes. Students who need to miss a class should communicate and discuss with the instructor in advance.

### PERSONAL CONDUCT POLICY

Students are expected to exhibit behaviors that reflect highly upon themselves and our 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.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions.

Furthermore, you are obliged to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult the instructor or TA in this class.

### EXAM MAKE-UP POLICY

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

Please let me know if you are experiencing any personal or academic difficulties this semester. In addition, the following resources are available:

## 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 option 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/>

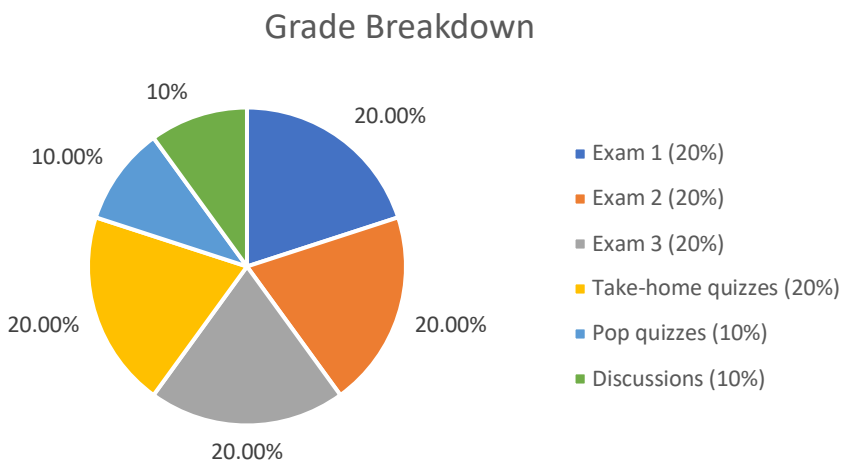
## ASSESSIBILITY AND COMMUNITY RESOURCES

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

- Dr. Ashley Smuder, APK Culture and Engagement Committee Chair, [asmuder@ufl.edu](mailto:asmuder@ufl.edu)

- Dr. Stephen Coombes, APK Graduate Coordinator, [scoombes@ufl.edu](mailto:scoombes@ufl.edu)
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, [jahlgren@ufl.edu](mailto:jahlgren@ufl.edu)

## Grading



**Discussions** – Most of the modules will include a discussion (active learning) session, where students work in small peer groups. Students may use course materials and their own notes. Checking the web is prohibited. Students will receive discussion points for presenting their understanding of concepts, complementing comments from other students, or responding question from the instructor following the rubric outlined below. Regular contributions to weekly discussions are highly encouraged. If the instructor calls a student who is absent, the student will receive a zero unless the absence is justified according to UF policies. Rubric for assignment of discussion points are as follows:

Satisfactory	3 pts	- Defines, describes, and illustrates concepts - Explains, assesses, and criticizes ideas - Demonstrates preparation and reading of assignments
Basic	2 pts	- Defines and describes some concepts - Partially explains but cannot assess and criticize ideas - Evidence of incomplete reading of assignment and preparation
Bare minimum	1 pts	- Defines and describes some concepts - Unable to explain, assess or criticize ideas - Clearly unprepared and lacking evidence of reading assignments
Unacceptable	0 pts	- Refuses to engage in discussion or answer questions when asked - Not present or no submission of answers to discussion

**\*Quizzes** – There will be 12 take-home quizzes administered using Canvas. Students must complete the quiz individually. The quizzes will address a topic that has been presented through lectures, discussions, and/or assigned reading. You must answer each question before moving on to the next question. You CANNOT go back and change answers to questions.

**\*Pop quizzes** – A total of 3-5 pop quizzes covering recent course materials will be given during unannounced class periods. You must be present when a pop quiz is administered to take the quiz and receive a score. Missing a class, or a portion of the class, in which a quiz is administered will result in a zero score for that quiz. No class

materials, notes, or other sources can be used during the pop quizzes. There are no make-up pop quizzes. The lowest pop quiz score will be DROPPED and not included in the final grade.

**\*Exams** – Each exam will consist of 40 questions, plus bonus question(s) at the end. Exams will include True/False, Multiple choice, Multiple Answers and Short Answer questions. Students are not permitted access to any kind of materials or notes during these exams. Students will take exams in the same room where weekly meetings are held and will be allowed 60 minutes to complete the exam.

\*Quizzes and Exams will consist of the following types of questions:

- True/False
- Multiple choice: choose ONE answer that is BEST.
- Multiple answers: select ALL correct answers to get full points. Partial points will be given based on % items correct.
- Short answer (fill in the blanks, single sentence, or short paragraph)

## GRADING SCALE

The instructor will make every effort to post quiz and exam scores on canvas within one week of the assessment. Students should contact the instructor as soon as possible if they feel there is an error in the gradebook. The lowest quiz score will be dropped in the final course grade. Final grades will NOT be rounded. 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 Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	93-100%	4.0
A-	90.00-92.99%	3.67
B+	87.00-89.99%	3.33
B	83.00-86.99%	3.00
B-	80.00-82.99%	2.67
C+	77.00-79.99%	2.33
C	73.00-76.99%	2.00
C-	70.00-72.99%	1.67
D+	67.00-69.99%	1.33
D	63.00-66.99%	1.00
D-	60.00-62.99%	0.67
E	0-59.99%	0

## Weekly Course Schedule

Module 1 – Studying the nervous system

Module 2 – Neuronal signaling

Module 3 – Synapses

Module 4 – Touch and proprioception

Module 5 – Pain and temperature

Module 6 – Vision

Module 7 – Vestibular System

Module 8 – Lower motor neurons

Module 9 – Upper motor neurons

Module 10 – Basal ganglia

Module 11 – Cerebellum

Module 12 – Eye movement

Module 13 – Cognitive Functions

### CRITICAL DATES & UF OBSERVED HOLIDAYS

- January 15: Martin Luther King Jr. Day (Monday)
- March 9-16: Spring Break

### WEEKLY SCHEDULE

Tentative dates and course plan are below. Any changes to this schedule will be posted in CANVAS as an announcement.

Date	Class Activity	Assessments Due
January 9	Course Introduction Lecture 1 (Module 1)	
January 11	Lecture 2 (Module 2)	<b>Quiz 1</b>
January 16	Discussion (Module 2)	
January 18	Lecture 3 (Module 3)	<b>Quiz 2</b>
January 23	Discussion (Module 3)	
January 25	Lecture 4 (Module 4)	<b>Quiz 3</b>
January 30	Discussion (Module 4)	
February 1	Exam 1 review	<b>Quiz 4</b>
February 6	<b>Exam 1 (Modules 1-4)</b>	<b>Exam 1 (Modules 1-4)</b>
February 8	Lecture 5 (Module 5)	
February 13	Discussion (Module 5)	

February 15	Lecture 6 (Module 6)	<b>Quiz 5</b>
February 20	Discussion (Module 6)	
February 22	Lecture 7 (Module 7)	<b>Quiz 6</b>
February 27	Discussion (Module 7)	
February 29	Lecture 8 (Module 8)	<b>Quiz 7</b>
March 5 March 7	MARCH BREAK	
March 12	Discussion (Module 8)	
March 14	Review Exam 2	<b>Quiz 8</b>
March 19	<b>Exam 2 (Modules 5-8)</b>	<b>Exam 2 (Modules 5-8)</b>
March 21	Lecture (Module 9)	
March 26	Discussion 9 (Module 9)	
March 28	Lecture 10 (Module 10)	<b>Quiz 9</b>
April 2	Discussion (Module 10)	
April 4	Lecture 11 (Module 11)	<b>Quiz 10</b>
April 9	Discussion (Module 11)	
April 11	Lecture 12 (Module 12)	<b>Quiz 11</b>
April 16	Lecture 13 (Module 13)	
April 18	Review Exam 2	<b>Quiz 12</b>
April 23	<b>Exam 3 (Modules 9-13)</b>	<b>Exam 3 (Modules 9-13)</b>

## SUCCESS AND STUDY TIPS

Success in any university course requires dedication and hard work on the part of the student. Attending class regularly and studying on a daily basis is essential to excel in learning movement neuroscience. Here are my tips for learning in this course:

- Complete the readings *prior* to class.
- **Go to class** and **participate** in small-group discussions.
- Make sure you know the neuroscience vocabulary. Use the flashcard from Neuroscience Textbook Student Resources to remember these neuroscience terms.
- Practice **drawing** diagrams and figures to help **understand** and **analyze** neural circuits and processes.
- Read quiz and exam questions carefully *before* answering.
- **Ask** the instructor questions if you don't understand a concept presented in class.
- Study daily. Review material in small sections (don't get overwhelmed by reading the entire chapter).