

# Movement Neuroscience

APK4144 | Class # 10568 | 3 Credits | Fall 2022

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## Course Info

### INSTRUCTOR

**Shahab Vahdat, PhD**

Office: 132-F

Office Phone: (352) 294-1618

Email: svahdat@ufl.edu

Preferred Method of Contact: **Message via Canvas**

### OFFICE HOURS

office hours are Thursdays period 4 or by appointment

### MEETING TIME/LOCATION

FLG 245, T | Period 7 (1:55 PM - 2:45 PM)

FLG 245, R | Period 7 – 8 (1:55 PM - 3:50 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

**Neuroscience Sixth Edition** - Editor: Purves et al.

This textbook is also available as an ebook from Redshelf: <https://redshelf.com/book/813174/>

Textbook website with animations, flashcards, etc: [https://oup-arc.com/access/neuroscience-sixth-edition-student-resources#tag\\_animations](https://oup-arc.com/access/neuroscience-sixth-edition-student-resources#tag_animations)

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

## COURSE FORMAT

This class is primarily lecture-based with additional in-class demonstrations, discussions, and short videos.

## **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**

Although there are no points for attendance directly, students will greatly benefit from regular class attendance. There will be 12 in-class quizzes throughout the semester to promote attendance and keeping up with reading assignments. Hence, to take weekly quizzes student are required to attend the class to be able to participate.

### **PERSONAL CONDUCT POLICY**

Students in this class must adhere to the UF Student Honor Code and will be reported for failure to do so. 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, as students in this course, 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 in this class. It is important to the learning environment that you feel welcome and safe in this class; and that you are comfortable participating in class discussions and communicating with me on any issues related to the class. If your preferred name is not the name listed on the official UF roll, please let me know as soon as possible by e-mail or otherwise. I would like to acknowledge your preferred name, and pronouns that reflect your identity.

### **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 requesting accommodation for disabilities must first register with the Dean of Students Office (<https://disability.ufl.edu/students/get-started/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

## 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 can 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.bluera.com/ufl/>. Thank you for serving as a partner in this important effort.

## PRIVACY

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 lecturer during a class session.

Students are allowed to record video or 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.

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.

## 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 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/>

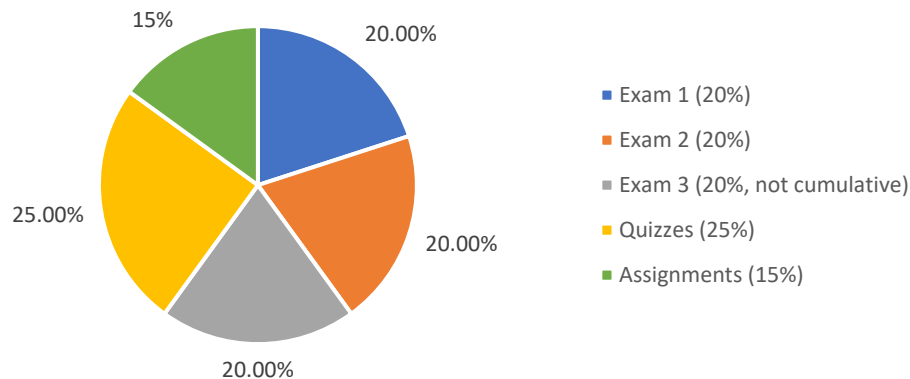
## INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY RESOURCES

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

Grade Breakdown



**ASSIGNMENTS** - There will be 13 assignments throughout the semester. If time allows, students will work in small peer groups during the Discussion time in class, but the final answers should be written individually by each student. The assignments are due by 5pm on the day before the next class. Students may use course materials and their own notes. The answer to each question should be in a paragraph form, keeping writing as concise as possible. The lowest assignment score will be dropped and not included in the final assignment grade. Rubric for assignment points are as follows:

Satisfactory	2 pts	<ul style="list-style-type: none"> <li>- Defines, describes and illustrates concepts</li> <li>- Explains, assesses and criticizes ideas</li> <li>- Demonstrates preparation and reading of assignments</li> </ul>
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Basic	1 pts	<ul style="list-style-type: none"> <li>- Defines and describes some concepts</li> <li>- Partially explains but cannot assess and criticize ideas</li> <li>- Clearly unprepared and lacking evidence of reading</li> </ul>
Unacceptable	0 pt	<ul style="list-style-type: none"> <li>- Refuses to engage in discussion/answer questions</li> <li>- Not present or no submission of answers to discussion</li> </ul>

**QUIZZES** – There will be 12 quizzes administered in class using Canvas. The quiz might address a topic that has been presented through video or live lectures, discussed during the module, 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. No class materials, notes, or other sources can be used during the quizzes. The lowest quiz score will be dropped and not included in the final quiz grade.

\* All Quizzes and Exams include True and False, Multiple choices. Using your ebook or textbook is NOT ALLOWED.

**Extra Credit** - Students can earn up to 10 points (equal to 1.0% of total grade) of extra credit in this course. Extra credits can be used to make up for a missed assignment or quiz (not exam). Extra credit can be earned for participating as a subject in an approved research study. Approved studies will be posted in CANVAS. If you do participate in a study, the study coordinator will give your name and extra credit points to your instructor at the *end of the semester*. Any discrepancies must be brought to my attention before 5pm on the final exam day.

## GRADING SCALE

The instructor will make every effort to post quiz and exam scores on canvas within one week of the assessment.

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 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.*

<b>A (4.0)</b>	<b>93 – 100%</b>	<b>C (2.00)</b>	<b>73 – 76.99%</b>
<b>A- (3.67)</b>	<b>90 – 92.99%</b>	<b>C- (1.67)</b>	<b>70 – 72.99%</b>
<b>B+(3.33)</b>	<b>87 – 89.99%</b>	<b>D+(1.33)</b>	<b>67 – 69.99%</b>
<b>B (3.00)</b>	<b>83 – 86.99%</b>	<b>D (1.00)</b>	<b>63 – 66.99%</b>
<b>B- (2.67)</b>	<b>80 – 82.99%</b>	<b>D- (0.67)</b>	<b>60 – 62.99%</b>
<b>C+(2.33)</b>	<b>77 – 79.99%</b>	<b>E (0.00)</b>	<b>LESS THAN 60%</b>

## Weekly Course Schedule

Dates	Lecture topic	Quiz	Assignment
Aug 25	Orientation Module 1 – Studying the Nervous System, CH 1		Assignment 1
Aug 30	Module 2 – Neural Signaling, CH 2		
Sep 1	Module 2 – Neural Signaling, CH 2 Module 3 – Synapses, CH 5	<b>Quiz 1 (M.1)</b>	Assignment 2

Sep 6	Module 3 – Synapses, CH 5		
Sep 8	Module 3 – Synapses, CH 5 Module 4 – Somatosensation, CH 9-10	<b>Quiz 2 (M.2)</b>	Assignment 3
Sep 13	Module 4 – Somatosensation, CH 9-10		
Sep 15	Module 4 – Somatosensation, CH 9-10	<b>Quiz 3 (M.3)</b>	Assignment 4
Sep 20	Module 5 – Vision 1, CH 11		
Sep 22	Module 5 – Vision 1, CH 11 Module 6 – Vision 2, CH12	<b>Quiz 4 (M.4)</b>	Assignment 5
Sep 27	<b>Exam 1 Review</b>		
Sep 29	<b>Exam 1 (covers Modules 1-4)</b>		
Oct 4	Module 6 – Vision 2, CH12		
Oct 6	Module 6 – Vision 2, CH12 Module 7 – Hearing, CH 13	<b>Quiz 5 (M.5)</b>	Assignment 6
Oct 11	Module 7 – Hearing, CH 13		
Oct 13	Module 7 – Hearing, CH 13 Module 8 – Balance and Posture, CH 14	<b>Quiz 6 (M.6)</b>	Assignment 7
Oct 18	Module 8 – Balance and Posture, CH 14		
Oct 20	Module 8 – Balance and Posture, CH 14 Module 9 – Lower Motor Neurons, CH 16	<b>Quiz 7 (M.7)</b>	Assignment 8
Oct 25	Module 9 – Lower Motor Neurons, CH 16		
Oct 27	Module 9 – Lower Motor Neurons, CH 16 Module 10 – Upper Motor Neurons, CH 17	<b>Quiz 8 (M.8)</b>	Assignment 9
Nov 1	Module 10 – Upper Motor Neurons, CH 17		
Nov 3	Module 10 – Upper Motor Neurons, CH 17 Module 11 – Basal Ganglia, CH 18	<b>Quiz 9 (M.9)</b>	Assignment 10
Nov 8	<b>Exam 2 Review</b>		
Nov 10	<b>Exam 2 (covers Modules 5-9)</b>		
Nov 15	Module 11 – Basal Ganglia, CH 18		
Nov 17	Module 11 – Basal Ganglia, CH 18 Module 12 – Cerebellum, CH 19	<b>Quiz 10 (M.10)</b>	Assignment 11
Nov 22	Module 12 – Cerebellum, CH 19		
<b>Nov 24</b>	<b>Thanksgiving break</b>		
Nov 29	Module 12 – Cerebellum, CH 19	<b>Quiz 11 (M.11)</b>	Assignment 12

Dec 1	Module 14 – Cognitive Functions, CH 27 Exam 3 Review		Assignment 13
Dec 6	Exam 3 Review	Quiz 12 (M.12)	

**\*\*Exam 3 (covers Modules 10, 11, 12, 14)** will occur during Final Exam time scheduled for this course on 12/15/2022 @ 10:00 AM - 12:00 PM.

### SUCCESS AND STUDY TIPS

Students that perform best in this class have high attendance, prepare well for each weekly quiz, and complete the readings and assignments prior to class. Make sure you prepare for and actively participate in Exam Review sessions before each exam. In addition, students that do not look at their phones or open their laptops during class tend to perform better.