

# Movement Neuroscience

APK4144 | Class # 10633 | 3 Credits | Spring 2023

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## Course Info

### INSTRUCTOR

**Zheng Wang, Ph.D.**  
Office: FLG 146  
Office Phone: 352-273-6450  
Email: zheng.wang@ufl.edu  
Preferred Method of Contact: **Business email**

### OFFICE HOURS

Thursday 4:00 PM – 5:30 PM

### MEETING TIME/LOCATION

**Flipped-classroom format**  
**In-person session (Jan-9 ~ April-26):**

- FLG 0265, T | Period 2 - 3 (8:30 AM - 10:25 AM)
- FLG 0265, R | Period 3 (9:35 AM - 10:25 AM)

#### Online materials:

- Canvas on UF e-Learning (<https://elearning.ufl.edu/>) & the Canvas Mobile App by Instructure

## 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

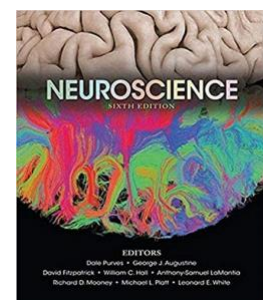
**Textbook: Neuroscience Sixth Edition** - Editor: Purves et al.

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)

Lecture slides and video recordings are on the CANVAS course website.



## COURSE FORMAT

All course lectures are pre-recorded and posted on Canvas. The course includes two meetings per week, a 2-hour “long session” and a 1-hour “short session”. All students shall read the directed book chapter(s) and watch the video lecture(s) before attending the long session. The long session is divided into two halves. Attendance in the first half is required, which is dedicated to active learning. Active learning sessions include discussion of questions in small peer groups followed by an in-class assignment. The discussions are designed to enhance critical thinking skills and facilitate detailed understandings of fundamental concepts. Attendance in the second half of the long session is optional, including a Q/A session and/or lab demonstration. On the 1-hour short session, the class will meet for a quiz followed by an introductory lecture.

## COURSE LEARNING OBJECTIVES:

The course provides an 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 above mentioned topics to demonstrate a holistic understanding of how the central nervous system controls movement.

## Course & University Policies

### ATTENDANCE POLICY

- **Attendance (7 in total) will be randomly checked throughout the semester.** Only students with seven attendances will receive 15 extra credit points at the end of the semester.
- **There will be 12 in-class quizzes and 13 in-class assignments throughout the semester** to promote attendance and keeping up with reading assignments. Hence, there will be a quiz or assignment during almost every session. **Students are required to attend the class to be able to participate.**
- Students who need to miss a class should communicate and discuss with the instructor in advance to avoid penalties for participation.
- **No late submissions of in-class quizzes and assignments** There will be NO make-up exams unless exceptional conditions occur (as defined in the University of Florida Undergraduate Catalog). Please see this link for more information:  
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>. Prior permission from the professor is required.
- **The lowest score from in-class quizzes and assignments will be removed from the final score calculation.**

### PERSONAL CONDUCT POLICY

Students are expected to exhibit behaviors that reflect highly upon themselves and our University. Students will be expected to engage in class discussions in a manner that demonstrates respect for their peers and their instructor.

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 several 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

There will be NO make-up exams unless exceptional conditions occur (as defined in the University of Florida Undergraduate Catalog). Please see this link for more information: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>. Prior permission from the professor is required.

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

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/>

### 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@hhp.ufl.edu](mailto:linda.nguyen@hhp.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

### **NON-CUMULATIVE EXAMS (60%)**

**EXAM 1 (20%)**

**EXAM 2 (20%)**

**EXAM 3 (20%)**

### **QUIZZES (25%)**

### **ASSIGNMENTS (15%)**

**QUIZZES** – There will be 14 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 Multiple choices. Using your ebook or textbook is **NOT ALLOWED**.

**ASSIGNMENTS** - There will be 15 in-class assignments throughout the semester. Students will work in small peer groups during the Discussion time in class, and then each student will be assigned to answer one question in a paragraph form, keeping writing as concise as possible. Students may use course materials and their own notes. Communication with other groups is prohibited. 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>
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 assignments</li> </ul>
Unacceptable	0 pt	<ul style="list-style-type: none"> <li>- Refuses to engage in discussion or answer questions when asked</li> <li>- Not present or no submission of answers to discussion</li> </ul>

**Extra Credit** – Attendance (7 in total) will be randomly checked throughout the semester. Only students with seven attendances will receive 15 extra credit points at the end of the semester. All extra credit points will be uploaded to the gradebook prior the final exam.

## 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/>.

## GRADE SCALE

<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>

## CRITICAL DATES & UF OBSERVED HOLIDAYS

- **January 16:** Martin Luther King, Jr. Day (Monday)
- **March 11 – 18:** UF Spring Break (Monday - Friday)
- **April 27-28:** UF Spring Semester Reading Days (Thursday – Friday)
- Complete list available here: <https://catalog.ufl.edu/UGRD/dates-deadlines/2022-2023/#spring23text>

## WEEKLY SCHEDULE

Dates	Lecture topics	Quizzes	Assignments
<b>Jan 10</b>	Orientation Module 1 – Studying the Nervous System, CH 1	Test Quiz	Assignment 1
<b>Jan 12</b>	Intro to Module 2	<b>Quiz 1 (M.1)</b>	
<b>Jan 17</b>	Module 2 – Neural Signaling, CH 2		Assignment 2
<b>Jan 19</b>	Intro to Module 3	<b>Quiz 2 (M.2)</b>	
<b>Jan 24</b>	Module 3 – Synapses, CH 5		Assignment 3
<b>Jan 26</b>	Intro to Module 4	<b>Quiz 3 (M.3)</b>	
<b>Jan 31</b>	Module 4 – Somatosensation, CH 9-10		Assignment 4
<b>Feb 2</b>	<b>Exam 1 Review</b>	<b>Quiz 4 (M.4)</b>	
<b>Feb 7</b>	<b>Exam 1 (covers Modules 1-4)</b>		
<b>Feb 9</b>	Intro to Module 5		
<b>Feb 14</b>	Module 5 – Vision 1, CH 11		Assignment 5
<b>Feb 16</b>	Intro to Module 6	<b>Quiz 5 (M.5)</b>	
<b>Feb 21</b>	Module 6 – Vision 2, CH12		Assignment 6
<b>Feb 23</b>	Intro to Module 7	<b>Quiz 6 (M.6)</b>	
<b>Feb 28</b>	Module 7 – Hearing, CH 13		Assignment 7
<b>Mar 2</b>	Intro to Module 8	<b>Quiz 7 (M.7)</b>	
<b>Mar 7</b>	Module 8 – Balance and Posture, CH 14		Assignment 8
<b>Mar 9</b>	Intro to Module 9	<b>Quiz 8 (M.8)</b>	
<b>Mar 14</b>	<b>Spring Break</b>		
<b>Mar 16</b>	<b>Spring Break</b>		
<b>Mar 21</b>	Module 9 – Lower Motor Neurons, CH 16 <b>Exam 2 Review</b>		Assignment 9
<b>Mar 23</b>	Intro to Module 10	<b>Quiz 9 (M.9)</b>	
<b>Mar 28</b>	<b>Exam 2 (covers Modules 5-9)</b>		
<b>Mar 30</b>	Module 10 – Upper Motor Neurons, CH 17		Assignment 10
<b>Apr 4</b>	Intro to Module 11	<b>Quiz 10 (M.10)</b>	

<b>Apr 6</b>	Module 11 – Basal Ganglia, CH 18		Assignment 11
<b>Apr 11</b>	Intro to Module 12	<b>Quiz 11 (M.11)</b>	
<b>Apr 13</b>	Module 12 – Cerebellum, CH 19		Assignment 12
<b>Apr 18</b>	Intro to Module 14	<b>Quiz 12 (M. 12)</b>	
<b>Apr 20</b>	Module 14 – Cognitive Functions, CH 27		Assignment 13

\*\***Exam 3** (covers Modules 10 – 12, and 14) will occur during Final Exam time scheduled for this course on 5/3/2023 @ 3:00 PM - 5:00 PM.

### SUCCESS AND STUDY TIPS

Students that perform best in this class have high attendance, watch the lecture videos and complete the readings prior to class. In addition, students that do not look at their phones or open their laptops during class tend to perform better.

**Privacy:** Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized sharing of recorded materials is prohibited.

For in-class recording, the following statement related to Florida’s House Bill 233 is suggested but not mandatory:

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.

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.

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.