

Movement Neuroscience

APK4144 | Class # 29115 | 3 Credits | Fall 2024

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Course Info

INSTRUCTOR

David Arpin, PhD
Office: FLG 106E
Email: david.arpin@ufl.edu
Preferred Method of Contact: **Email or Canvas**

OFFICE HOURS

Office hours are Tuesday periods 3-4 or by appointment

MEETING TIME/LOCATION

FLG 280, M,W,F | Period 8 (3:00 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

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 three meetings per week. 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

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 & ACADEMIC INTEGRITY

University of Florida students are bound by the Honor Pledge. On all work submitted for credit by a student, the following pledge is required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The [Student Honor Code and Conduct Code \(Regulation 4.040\)](#) specifies a number of behaviors that are in violation of this code, as well as the process for reported allegations and sanctions that may be implemented. All potential violations of the code will be reported to Student Conduct and Conflict Resolution. If a student is found responsible for an Honor Code violation in this course, the instructor will enter a Grade Adjustment sanction which may be up to or including failure of the course.

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*.

IN-CLASS RECORDING

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.

More information regarding in-class recording policies can be found online (<https://aa.ufl.edu/policies/in-class-recording/>).

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) and follow the DSO Care Team procedures for documentation and submission of a request for make-up assignment (<https://care.dso.ufl.edu/instructornotifications/>). 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 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

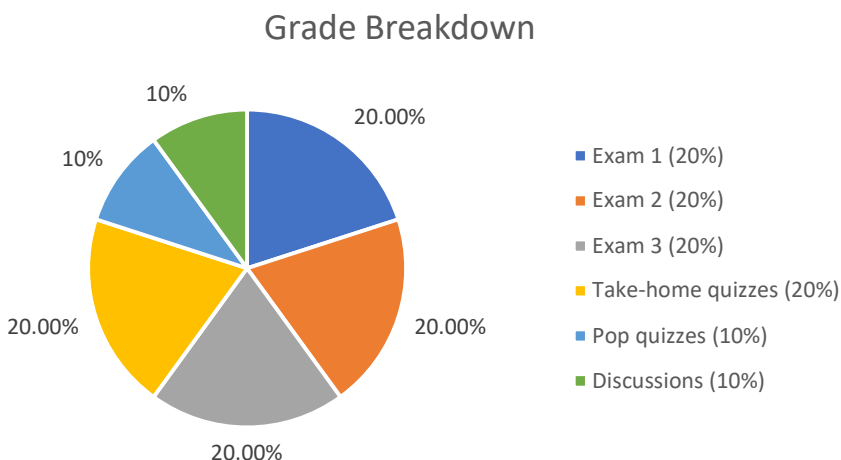
- **E-learning technical support:** Contact the [UF Computing Help Desk](#) at 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- **Career Connections Center:** Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services.
- **Library Support:** Various ways to receive assistance with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



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 13 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 50 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 respectfully ignored.

Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	93.00-100%	4.0

A-	90.00-92.99%	3.67
B+	87.00-89.99%	3.33
B	83.00-86.99%	3.0
B-	80.00-82.99%	2.67
C+	77.00-79.99%	2.33
C	73.00-76.99%	2.0
C-	70.00-72.99%	1.67
D+	67.00-69.99%	1.33
D	63.00-66.99%	1.0
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 – Cognitive Functions

CRITICAL DATES & UF OBSERVED HOLIDAYS

- September 2: Labor Day
- October 18 - 19: Homecoming
- November 11: Veterans Day
- November 25 - 30: Thanksgiving Break

WEEKLY SCHEDULE

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

Week	Dates	Assigned Module & Schedule Notes	Assessments Due
1	August 22 – 23	Course Introduction Module 1 (Ch. 1)	
2	August 26 – 30	Module 2 (Ch. 2)	Quiz 1
3	September 2 – 6	Module 3 (Ch. 5)	Quiz 2

4	September 9 – 13	Module 4 (Ch. 12)	Quiz 3
5	September 16 – 20	Module 5 (Ch. 13) Exam 1 Review	Quiz 4
6	September 23 – 27	Exam 1 (Modules 1-4) Sept 23rd Module 5 continued (Ch. 13)	Exam 1 (Modules 1-4)
7	Sept 30 – Oct 4	Module 6 (Ch. 9)	Quiz 5
8	October 7 – 11	Module 7 (Ch. 11)	Quiz 6
9	October 14 – 18	Module 8 (Ch. 16)	Quiz 7
10	October 21 – 25	Module 9 (Ch. 17) Exam 2 Review	Quiz 8
11	Oct 28 – Nov 1	Exam 2 (Modules 5-8) Oct 28th Module 9 continued (Ch. 13)	Exam 2 (Modules 5-8)
12	November 4 – 8	Module 10 (Ch. 18)	Quiz 9
13	November 11 – 15	Module 11 (Ch. 19)	Quiz 10
14	November 18 – 22	Module 12 (Ch. 27)	Quiz 11
15	November 25 – 29	Thanksgiving Break	
16	December 2 – 6	Exam 3 (Modules 9-13) Dec 4th	Quiz 12 Exam 3 (Modules 9-13)

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).