

MOVEMENT NEUROSCIENCE

APK 4144 ~ 3 CREDITS ~ FALL 2021

INSTRUCTOR: Julia T. Choi, PhD
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Preferred Method of Contact: Email

OFFICE HOURS: Tuesday and Thursday period 7 or by appointment

MEETING TIME/LOCATION: FLG 0280, T periods 5-6 and R period 6

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; lower vs. upper motor neurons; cortical, basal ganglia and cerebellar regulation of movement; and posture.

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 (6th Edition). Edited by Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel LaMantia, Richard D. Mooney, Michael L. Platt, and Leonard E. White. Oxford University Press. ISBN: 9781605353807

This textbook is also available as an ebook from Redshelf.

<https://redshelf.com/book/813174/>

COURSE FORMAT: The course includes two meetings per week. One day of the week will be dedicated to HyFlex lectures and the other day the class will meet for a quiz review followed by active learning. Active learning sessions include discussion of questions in small peer groups. These discussions are designed to enhance critical thinking skills and facilitate detailed understanding and application of fundamental concepts. Students will be expected to present an answer to a question to the class based on their understanding of the neurophysiology.

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 as they pertain to movement.
- Elaborate how sensory systems including somatosensory, proprioception, pain, visual, and auditory 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 repair and regeneration, cognition and memory, speech and language motor control, as they relate to movement.
- Students should also be able to integrate across all of the above topics to demonstrate a holistic understanding of how the central nervous system controls movement.

COURSE AND UNIVERSITY POLICIES:

ATTENDANCE POLICY: Although there are no points for attendance, students will greatly benefit from regular class attendance. Make every effort to attend all class meetings. Missing classes will likely have an impact on discussion grade. The rubric for discussion points is included below under 'GRADING'. Students called for participation in lectures or discussion sessions and not present will receive a zero for discussion. Students who receive a zero in discussion for unexcused absence will not be able to earn full credit for discussion. Students who need to miss a class should communicate and discuss with the instructor, in advance of missing a class, to avoid penalties on discussion.

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.

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.

EXAM MAKE-UP POLICY: Make-up exams and other work can be requested given that there is a medical, family, or other emergency that deems the need for a make-up. 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. 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 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/>.

COVID-19 FACE-TO-FACE COURSE STATEMENT: In response to COVID-19, the following practices are in place to maintain your learning environment, to enhance the safety of our in-classroom interactions, and to further the health and safety of ourselves, our neighbors, and our loved ones.

- If you are not vaccinated, get vaccinated. Vaccines are readily available at no cost and have been demonstrated to be safe and effective against the COVID-19 virus. Visit this link for details on where to get your shot, including options that do not require an appointment: <https://coronavirus.ufhealth.org/vaccinations/vaccine-availability/>. Students who receive the first dose of the vaccine somewhere off-campus and/or outside of Gainesville can still receive their second dose on campus.
- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.
 - Sanitizing supplies are available in the classroom if you wish to wipe down your desks prior to sitting down and at the end of the class.
 - Hand sanitizing stations will be located in every classroom.
- If you sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
 - Course materials will be provided to you with an excused absence, and you will be given a reasonable amount of time to make up work.
 - If you are withheld from campus by the Department of Health through Screen, Test & Protect you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- Continue to regularly visit coronavirus.UFHealth.org and coronavirus.ufl.edu for up-to-date information about COVID-19 and vaccination.

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 recording and unauthorized sharing of recorded materials is prohibited.

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 and Wellness

- U Matter, We Care: If you or a friend is in distress, please contact 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
- Dr. Rachael Seidler, APK Graduate Coordinator, rachaelseidler@ufl.edu
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, jahlgren@ufl.edu

GRADING:

QUIZZES (15%)

DISCUSSIONS (10%)

EXAM 1 (25%)

EXAM 2 (25%)

EXAM 3 (25%) - NOT CUMULATIVE

****QUIZZES** – There will be a quiz administered using Canvas in each Module. The quiz will be available after each lecture, and students must complete the quiz before the discussion section for each Module. The quiz will cover materials that has been presented in lectures and/or assigned reading. Quizzes will include True/False, Multiple choice, Multiple answers, and Short answer questions. Students may use course materials and their own notes during the quizzes, but students must not use any other sources (e.g., web searches) during the quiz. The lowest quiz score will be dropped and not included in the final grade.

DISCUSSIONS – There will be in-class discussions throughout the semester. Students will work in small peer groups. Students may use course materials and their own notes. Communication with other groups or checking the web is prohibited. After small group discussions, each team will be asked to present their answers to the class. 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. In the event that lack of time limits the possibility for all students to participate, the instructor will rely on the answers submitted by the student to assign participation points. Rubric for assignment of discussion points are as follows:

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|------------|-------|---|
| Excellent | 5 pts | <ul style="list-style-type: none">- Defines, describes and illustrates concepts- Explains, assesses and criticizes ideas- Demonstrates preparation and reading of assignments |
| Good | 4 pts | <ul style="list-style-type: none">- Defines, describes, and illustrates concepts- Explains, assesses and criticizes ideas- Evidence of reading assignments, but not fully prepared |
| Reasonable | 3 pts | <ul style="list-style-type: none">- Defines and describes some concepts- Partially explains but cannot assess and criticize ideas- Evidence of incomplete reading of assignment and preparation |
| Basic | 2 pts | <ul style="list-style-type: none">- Defines and describes some concepts- Partially explains but cannot assess and criticize ideas- Clearly unprepared and lacking evidence of reading assignments |

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|--------------|------|---|
| Bare minimum | 1 pt | <ul style="list-style-type: none"> - Defines and describes some concepts - Unable to explain, assess or criticize ideas - Clearly unprepared and lacking evidence of reading assignments |
| Unacceptable | 0 pt | <ul style="list-style-type: none"> - Refuses to engage in discussion or answer questions when asked - Not present or no submission of answers to discussion |

****EXAMS** – Each exam will consist of 50 questions, plus 2 bonus questions 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 have 60 minutes to complete each 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 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 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.*

GRADE SCALE

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

WEEKLY COURSE SCHEDULE:

- Module 1 – Studying the nervous system
- Module 2 – Neuronal signaling
- Module 3 – Synapses
- Module 4 – Somatosensation
- Module 5 – Vision 1 (Retina)
- Module 6 – Vision 2 (Central visual pathways)
- 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

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

| Date | Class Activity/Assignment | Format |
|--------------|---|-------------------------------|
| August 24 | Course Introduction Lecture 1 (Module 1) | Hyflex |
| August 26 | Quiz 1 (Module 1) Lecture 2 (Module 2) | Hyflex |
| August 31 | Quiz 2 (Module 2) Discussion (Module 2) | Hyflex |
| September 2 | Lecture 3 (Module 3) | Hyflex |
| September 7 | Quiz 3 (Module 3) Discussion (Module 3) | Hyflex |
| September 9 | Lecture 4 (Module 4) | Hyflex |
| September 14 | Quiz 4 (Module 4) Discussion (Module 4) | Hyflex |
| September 16 | Lecture 5 (Module 5) | Hyflex |
| September 21 | Quiz 5 (Module 5) Discussion (Module 5) | Hyflex |
| September 23 | Review | Hyflex |
| September 28 | Exam 1 (Modules 1-5) | pen and paper exam in FLG0285 |
| September 30 | Lecture 6 (Module 6) | Hyflex |
| October 5 | Quiz 6 (Module 6) Discussion (Module 6) | Hyflex |
| October 7 | Lecture 7 (Module 7) | Hyflex |
| October 12 | Quiz 7 (Module 7) Discussion (Module 7) | Hyflex |

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| October 14 | Lecture 8 (Module 8) | Hyflex |
| October 19 | Quiz 8 (Module 8) Discussion (Module 8) | Hyflex |
| October 21 | Lecture 9 (Module 9) | Hyflex |
| October 26 | Quiz 9 (Module 9) Discussion (Module 9) | Hyflex |
| October 28 | Review | Hyflex |
| November 2 | Exam 2 (Modules 6-9) | pen and paper exam in FLG0285 |
| November 4 | Lecture (Module 10) | Hyflex |
| November 9 | Quiz 10 (Module 10) Discussion (Module 10) | Hyflex |
| November 11 | <i>Veteran's Day</i> | No class |
| November 16 | Lecture (Module 11) | Hyflex |
| November 18 | Lecture (Module 12) | Hyflex |
| November 23 | Quiz 11 (Module 11) Discussion (Modules 11) | Hyflex |
| November 25 | <i>Thanksgiving break</i> | No class |
| November 30 | Quiz 12 (Module 12) Discussion (Modules 11 & 12) | Hyflex |
| December 2 | Lecture (Module 13) | Hyflex |
| December 7 | Quiz 13 (Module 13) Review | Hyflex |
| December 14 | Exam 3 (Modules 10-13) | pen and paper exam in FLG0285 @ 7:30 – 9:30 am |

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:

- Go to class and participate in small-group discussions.
- Make sure you know the neuroscience vocabulary. Use the flashcard from Neuroscience, 6th edition 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)