APPH6233/BIOS4803 Syllabus

Note: This syllabus is subject to change.

Aging Movement Control

3 credits

Class Date/Time: Tuesdays, Thursdays; 2:00 pm – 3:15 pm

Class Location: Boggs 1-23

Modality: In-person

Instructor Information

Instructor
Dr. Minoru "Shino" Shinohara, PhD
School of Biological Sciences

Email
shinohara@gatech.edu

Office Hours & Location
Room 1007, 555 14th St NW
By appointment

General Information

Description

Aging affects the neuromuscular and motor control systems, leading to declines in movement function and quality of life. This course explores the neural, physiological, and biomechanical changes in motor control and motor learning that occur with aging. Students will engage in lectures, paper readings, paper presentations, discussions, and mock proposal building, to understand and apply the mechanisms behind movement decline, as well as interventions aimed at maintaining or improving motor function in older adults. Through critical analysis and discussion of current research, students will gain various insights into the factors contributing to movement degradation and rehabilitation strategies in aging populations. This course is relevant to students interested in gerontology, neural engineering, physical therapy, occupational therapy, biomechanics, rehabilitation, and sports science.

Pre- &/or Co-Requisites

Undergraduates: Organismal Biology (BIOS 1108/1208) or Intro to Sport Science (BIOS 2500) or Systems Physiology (BMED 3100), or equivalent foundational courses in movement science or physiology.

Graduates: No pre- or co-requisites. A background in kinesiology, anatomy, physiology, or neuroscience will be helpful.

Course Goals and Learning Outcomes

Upon successful completion of this course, students will be able to:

- Describe the neuromuscular and biomechanical changes in aging
- Read, interpret, and critique scientific literature on aging-related movement decline, motor function assessment, and rehabilitation interventions
- Apply methods for assessing movement decline
- Evaluate intervention strategies
- Design a research proposal
    - Undergraduates: Develop a simple proposal on research or development as related to aging movement.
    - Graduates: Develop a research-based proposal or advanced intervention strategy, incorporating an in-depth understanding of the mechanisms of aging and movement decline.
- Graduates: Lead discussions and provide critical feedback

Course Topics

Muscle Mass and Strength Decline with Aging

Neuromuscular Adaptations with Aging

Proprioception and Sensory Changes in Aging

Balance and Postural Control

Bone Health and Movement Control

Central Nervous System Changes

Motor Learning and Skill Acquisition in Older Adults

Coordination and Interlimb Coupling

Fatigability in Aging

Sex and Fatigability in Aging

Gait Changes and Mobility Decline

Reaction Time and Movement Speed

Cardiorespiratory Fitness

Dual-Task Performance in Aging

Role of Executive Function in Movement Control

Course Requirements & Grading

Differences in graduate students than undergraduate students

Graduate students will 1) lead discussions in which undergraduates participate, 2) complete a more detailed written research proposal, 3) give a longer, more in-depth oral presentation on their proposal, and 4) have their course grades weighted differently to reflect these additional responsibilities.

Grading components

Component	Undergraduates	Graduates
Quizzes	10% of final grade	5% of final grade
Assignments & Paper Discussion	25% of final grade	40% of final grade
Midterm Exam	25% of final grade	15% of final grade
Final Exam	25% of final grade	15% of final grade
Written Research Proposal	10% of final grade	15% of final grade
Oral Presentation (Proposal)	5% of final grade	10% of final grade

Quizzes: Quizzes will be administered periodically during class to assess understanding of key concepts from lectures, discussions, and readings.

Assignments & Paper Discussion: Homework assignments will include data analysis, problem sets, short written responses to readings, and presentation slides. Assignments will be submitted through Canvas and graded on accuracy and clarity. Paper discussion will include the presentation of the assigned paper and leading the discussion. Paper discussion will be graded on accuracy, clarity, and integrity.

Midterm Exam: The midterm will consist of short-answer questions covering material from the first half of the course. It will assess the ability to recall important concepts and apply them to scenarios related to aging and movement control.

Final Exam: The final exam will consist of short-answer and synthesis questions on material from the second half of the course.

Graduate students will be expected to integrate advanced concepts or research critiques into their responses.

Research Proposal:

Undergraduates (10% of final grade): Undergraduates will write a simplified research proposal on a topic related to aging and movement control, focusing on an intervention, assessment method, or motor decline mechanism. The proposal should include a basic literature review, research question, and an outline of proposed methods.

Graduates (15% of final grade): Graduate students will write a more in-depth research proposal that includes a thorough literature review, clearly defined research hypotheses, detailed methodology, and potential implications for the field.

Oral Presentation:

Undergraduates (5% of final grade): Undergraduates will give a very brief oral presentation on their research proposal. The presentation should clearly summarize their research question, proposed methods, and expected outcomes. It will be graded on clarity, conciseness, and effective communication.

Graduate Students (10% of final grade): Graduate students will give a longer and more in-depth oral presentation on their research proposal, including background, methodology, potential results, and a critique of the current research landscape. This presentation will be graded on depth of analysis, engagement, and clarity.

Extra Credit Opportunities

Extra credit is typically not given in this class. If any opportunities for extra credit should arise, it will be announced in class as appropriate.

Grading Scale

Final average grades will be rounded to the nearest whole percentage point. Curving grades is rare and should not be expected. Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	0-59%

According to policy, grades at Georgia Tech are interpreted as follows:

A	Excellent (4 quality points per credit hour)
B	Good (3 quality points per credit hour)
C	Satisfactory (2 quality points per credit hour)
D	Passing (1 quality point per credit hour)
F	Failure (0 quality points per credit hour)

See https://registrar.gatech.edu/info/grading-system for more information about the grading system at Georgia Tech.

Course Materials

Course Text

Text suggestions:

Fundamental: Albert W. Taylor, Michel J. Johnson, Physiology of Exercise and Healthy Aging, Human Kinetics, 2022

https://us.humankinetics.com/products/physiology-of-exercise-and-healthy-aging-2nd-edition-epub

More advanced: Danielle R. Bouchard, Exercise and Physical Activity for Older Adults, Human Kinetics, 2021

https://us.humankinetics.com/products/exercise-and-physical-activity-for-older-adults-epub

Additional Materials/Resources

Provided during the class

More Support for Course Texts and Materials:

Contact the instructor if more support is needed.

Course Website and Other Classroom Management Tools

Canvas: https://canvas.gatech.edu

Course Expectations & Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Cheating, plagiarism, and all forms of academic dishonesty are expressly forbidden in this class, and by the university's Honor Code (http://honor.gatech.edu/content/2/thehonor-code). Any form of cheating will immediately earn you a failing grade for the entire course, and I will pursue further disciplinary actions according to Georgia Tech's policies and procedures (see http://honor.gatech.edu/plugins/faq/ for more information on this).

Attendance and Participation

Class participation is a very important part of the learning process. You are expected to attend and actively engage in the class sessions unless you have a compelling reason not to do so. Missing any class will put you at a serious disadvantage to complete the course requirements. If you are absent from class, you are still responsible for the work assigned for that day, as well as any information given out that day. For example, a missed quiz due to unexcused absence will result in a grade of zero. I encourage you to participate in class.

Collaboration & Group Work

I expect all students to adhere to the university's Honor Code. Your work on all assignments, quizzes and exams must be your own. During class, please leave as much space between you and the next student as possible to reduce temptation **or perception** of any violation of the Honor Code.

Extensions, Late Assignments, & Re-Scheduled/Missed Assessments

Assignments are due at 11:59 PM on their respective due dates. These items may be turned in after the deadline, but you will be eligible for fewer points once the deadline has passed: you will only be eligible for 90% of the total grade if it is submitted by 3 AM that night, and you will lose an additional 45% from the total for every 12-hour period it is late thereafter.

Exams and quizzes may be rescheduled for pre-approved excused absences (sick with doctor's note, car accident in route to test, hospitalization, death in your immediate family). You should not assume that an absence is automatically excused. Please contact us as soon as possible to ensure that the absence will be excused. **You must provide proof in writing** for any absence to be considered as excused.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or http://disabilityservices.gatech.edu/, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See http://www.catalog.gatech.edu/rules/22/ for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Student Use of Mobile Devices in the Classroom

Many students find it useful to have a mobile device on hand to access course materials or to take notes. Laptops and mobile devices will be allowed for class-related activity **if the sound is turned off**. Please do not abuse this privilege by checking email, Facebook, YouTube, web surfing, etc. during class. If this becomes a distraction in class, the right to deny this privilege to an individual or the entire class can be taken away at the discretion of the instructor(s).

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone's learning experience if your cell phone, pager, laptop, etc. makes noise or is visually distracting during class. The use of cell phones to make phone calls is not permitted during class time.

Digital Etiquette: When attending the class remotely, you are expected to turn on your camera and microphone available unless instructed otherwise.

Additional Course Policies

Institute-Approved Absences

As per Georgia Tech policy, you are permitted to be absent from class to participate in athletic events, official field trips, and religious observances. For planning purposes, please provide me with **written notice of your upcoming absence at least two weeks before the event, and ideally within the first two weeks of class**. When I receive this notice, I will discuss opportunities with you to make up any missed work in your

absence. Please see http://catalog.gatech.edu/rules/4/ for more information about receiving official notice from the Registrar about the nature and timing of your upcoming Institute-approved absence.

Food and Drink
We ask that you do not eat during class time as it could be a distraction for you and your classmates. Drink is allowed as long as it is in spill-free, covered containers.

Freedom of Expression and Guidelines for Discussion
I respect your right to freedom of speech and peaceful assembly. I am also committed to maintaining an orderly learning environment for all students and ensuring that all facilities are used in a way that facilitates teaching, learning, and research. Therefore, I encourage you to voice your opinions respectfully, as long as they are related to the content of this class and as long as doing so does not infringe unduly on the rights of others.

Re-grading and Re-submission
I try to be fair in my grading. As such, please consider carefully any requests you have for regrading other than obvious errors in calculating your grade. Requests for regrading of a homework assignment, quiz or exam may be submitted in writing via email to Dr. Shinohara within one week of the day the grades are given back to the class (regardless of whether or not you attend class that day). You must justify in writing the technical basis for the regrade. If the regrading request is accepted, your entire homework or exam may be regraded. Note that your grade may potentially decrease upon regrading, and you should not assume that your grade will always go up after regrading.

Campus Resources for Students

College can be stressful. In your time at Georgia Tech, you may find yourself in need of support. There are many on campus who are here to help in this regard. Below you will find some resources to support you both as a student and as a person.

Graduate Student Academic and Professional Success Resources: A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;
- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- Professional Development such as the programming from the Career Center and other professional development resources and events

Student Well-Being: At Georgia Tech, we are concerned about your overall physical, social, and mental well-being. A comprehensive list of wellness related resources has been compiled and maintained by the Office of the Vice President for Student Engagement and Well-being. https://students.gatech.edu/student-resource-guide

Statement of Intent for Inclusivity

As a member of the Georgia Tech community, we are committed to creating a learning environment in which all of our students feel safe and included. Because we are individuals with varying needs, we rely on your feedback to achieve this goal. To that end, we invite you to enter into dialogue with us about the things we can stop, start, and continue doing to make our classroom an environment in which you feel safe to participate in learning.