UF | Department of Applied Physiology and Kinesiology
College of Health and Human Performance
UNIVERSITY of FLORIDA

Biomechanical Basis of Movement

APK3220C| Class # 10348,10349, 16219 | 3 Credits |Fall 2025

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Course Info

INSTRUCTOR

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OFFICE HOURS

T | 10:30 AM – 11:30 AM
W | 9:30 AM – 10:30 AM
Or by appointment

MEETING TIME/LOCATION

Class Number: 10348
T | Periods 5-6 (11:45 AM - 1:40 PM) Lar 239
R | Period 6 (12:50 PM - 1:40 PM) Tur L005
Primarily Classroom/Traditional
Final Exam: 12/12/2025 @ 7:30 AM - 9:30 AM

Class Number: 10349
M,W,F | Period 4 (10:40 AM - 11:30 AM) FLG265
Primarily Classroom/Traditional
Final Exam: 12/10/2025 @ 3:00 PM - 5:00 PM

Class Number: 16219
T | Period 1 (7:25 AM - 8:15 AM) FLG 265
R | Periods 1-2 (7:25 AM - 9:20 AM) FLG 265
Primarily Classroom/Traditional
Final Exam: 12/9/2025 @ 8:00 PM - 10:00 PM

COURSE DESCRIPTION

Fundamentals of kinematics and kinetics related to human movement. Basics of biomechanics applied to the concepts of injury prevention and performance improvement. Overview of various biomechanical data collection and analysis.

PREREQUISITE KNOWLEDGE AND SKILLS

Junior or senior standing; (APK 2100C or BSCX094+L or BSCX086+L or PETX322+L or ZOO3733c) and MAC 1140 with minimum grades of C); or PHY 2048 or PHY 2053 with minimum grade of C

** Having already taken Physics 1 and Anatomy will be **very helpful** in this course. You can be successful in this course if you have not taken physics and anatomy, but it will require significantly more effort to get comfortable with the physics concepts intrinsic to biomechanics and learn the structure and function of the musculoskeletal system.*

REQUIRED AND RECOMMENDED MATERIALS

Required Textbook:
Basic Biomechanics by Susan Hall 9th Edition

Required Software:

- Microsoft Word and Excel 2010 or later
- Muscle and Motion (online application – Login for you is provided)

COURSE FORMAT

This course meets live for 3 periods per week. 1-3 sessions per week will be lecture based presentation of material which will comprise most of the testable content for exams. 0-2 session per week the class is "flipped" such that there will be an in class learning activity/lab and you will be required to watch an online Play Posit lecture prior to coming.

COURSE LEARNING OBJECTIVES:

1. Identify biomechanical principles/concepts and describe the impact of biomechanics research on daily life
2. Describe and evaluate the situational applicability of the basic technology behind biomechanical instrumentation with a focus on motion capture
3. Apply qualitative and quantitative techniques to specific movements patterns to measure, describe, and analyze human movement
4. Solve biomechanical problems related to exercise, sport, and health using calculations related to:
    a. Linear and angular kinematic variables (including position, velocity, acceleration)
    b. Linear and angular kinetic variables (including force, torque, momentum, impulse, work, power, and energy)
    c. Estimating the center of mass position
5. Explain the basic mechanical properties, interactions, and functions of bones, tendons, ligaments, muscle, joints, and cartilage

University Policies

University policies can be found using the link here.

Course Policies

Grading

*Once a grade is posted students have **two weeks** to dispute an error in grading.*

Category	Percent
Exams (3)	**45.00%**
Quizzes (11)	**22.00%**
Homeworks (6)	**12.00%**
Play Posit Lectures (10)	**10.00%**
Labs (11)	**11.00%**

Extra Credit	**2.00%**
Total	**102.00%**

Because of unforeseen events such as hurricanes, assignments or lectures may be dropped but the categorical percentages list here will remain the same for final grading. For instance, even if a lab is cancelled and we only accomplish 10 labs, those 10 labs will be worth 11.00% of your final grade.

Exams (3)

There will be 3 lecture exams which consist of multiple-choice, true-false, short answer and free response problem solving questions. Students are not permitted access to any kind of materials or notes during these exams; however, a formula sheet will be provided. Exam questions are generated by the course instructor and the majority of focus should be given to the lecture notes, labs, muscle and motion videos, and problem sets when studying although supplementary readings/resources will also be helpful. Students will take exams in the same room where weekly meetings are held and will be allowed 50 minutes to complete the exam first 2 exams during their normal class time and 2 hours to complete the third exam during the university assigned final exam time listed on the registrar. The third exam is not intended to be explicitly comprehensive exam only insomuch as concepts and quantitative skills build throughout the semester. A **SCIENTIFIC** calculator will be permitted during exams. These exams will each be worth 15% of your final grade for a total of 45% of your final grade.

Homework

These homework assignments will be assessed via a Canvas Quiz submission but will be multiple attempts permitted to give you the opportunity to work through the problems to hone your quantitative skills. These homework assignments will contain problems regarding the current module content lectures and may also include movement analysis using Excel.

Quizzes

Quizzes will be based on module content/lecture including Muscle and Motion videos listed for the module. These are individual (i.e., not group) quizzes. Although typically you will not have questions beforehand, the quizzes are open notes/book/videos and will have a relatively relaxed time constraint. These quizzes are to be taken as an INDIVIDUAL and **1 attempt** will be permitted.

The countermovement movement jump lab is counted in this category rather than labs because it is a graded Canvas quiz taken asynchronous to the in class discussion.

Labs

Labs are interactive and formative classroom experiences that provide an opportunity for students to embody concepts, practice collecting and analyzing data, and build classroom community. The points for the labs are based on attendance and turning in a completed lab sheet if applicable. Grading is based on completeness and effort.

Some labs will take place in the gymnasium of Florida Gym and others will be hosted in the classroom. The location is noted in the schedule on Canvas.

**The exception to this description is the Countermovement Jump Lab for which attendance is not taken, and the lab deliverable is to be expressed as one of your 11 graded quizzes on Canvas taken asynchronously to the live lab. The lab is an opportunity for group discussion of all the quiz questions.

Play Posit Lectures

For some days (average of 1 meeting/lecture a week) the class will be flipped and students will watch an online lecture with embedded formative questions (3 attempts permitted) in Play Posit for which students will receive credit for questions answered in these lectures. Lectures will be due prior to the corresponding lab experience.

Attendance

Attendance may be taken on lab days if there is no lab worksheet for a particular lab.

Extra Credit

Students can earn up to 2% of extra credit in this course. Extra credit opportunities will be offered and detailed in class but will involve demonstrating a deeper academic investigation, class community engagement, and/or embodiment of a biomechanical topic(s) related to human movement. See Canvas page for more information.

GRADING SCALE

More detailed information regarding current UF grading policies can be found here: https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/.

Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	90.00-100%	4.0
A-		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	60.00-66.99%	1.0
D-		0.67
E	0-59.99%	0

Weekly Course Schedule

CRITICAL DATES & UF OBSERVED HOLIDAYS

- First week (Thurs August 21 and Friday August 22) of class is delivered only asynchronously online.
- Monday September 1 is Labor Day - no class
- Friday October 17 is UF Homecoming - no class

- Tuesday November 11 is Veterans' Day - no class
- December 4th and 5th are reading days - no class

This syllabus and schedule are intended to give the student guidance in what may be covered during the semester and will be followed as closely as possible. However, the professor reserves the right to modify, supplement and make changes as the course needs arise. This includes exam dates and lecture topics that may change depending on class progress.

CLASS AND EXAM SCHEDULE

Please note the exam schedule based on your section. Exams 1 & 2 are 50-minute exams administered during normal class time. The final exam (exam 3) is a 2-hour exam scheduled by the UF registrar. This schedule shows the module corresponding most (some overlap more than one week) and the right column shows the specific daily lecture or activity. A more detailed schedule that includes assignments is to be posted on the Canvas course shell.

Week	Dates (Week of Monday…)	Module
1	18-Aug	Introduction to Biomechanics (class begins Thurs Aug 21st) No live class - only online lectures this week
2	25-Aug	Fundamental Tools and Concepts
3	1-Sep	No Class - Monday - Labor Day Fundamental Tools and Concepts
4	8-Sep	Muscle Biomechanics
5	15-Sep	Upper Body
6	22-Sep	Upper Body Exam 1 (Thurs/Friday)
7	29-Sep	Kinematics 1
8	6-Oct	Lower Body
9	13-Oct	Lower Body No Class - Friday - Homecoming

10	**20-Oct**	**Lower Body** **Exam 2 (Thurs/Friday)**
11	**27-Oct**	**Kinematics 2**
12	**3-Nov**	**Kinematics 2**
13	**10-Nov**	**Kinetics 1** **No Class - Tuesday – Veterans' Day**
14	**17-Nov**	**Kinetics 2**
15	**24-Nov**	**No Class - Thanksgiving Break**
16	**1-Dec** **Finals Week**	**Kinetics 2** **No Class - Thurs and Friday - Reading Days**
17	**8-Dec** **Finals Week**	**Exam 3 (During University Assigned Timeslot)**

SUCCESS AND STUDY TIPS

- Do the Homework and hone a solution process for types of problem
- Explaining the material (out loud!) in your own words, from memory (no notes!)
- Come to office hours when you have questions/challenges
- Generate study questions to test yourself on conceptual information without the information in front of you
- Review old quizzes and homework to understand what and why mistakes were made
- (Re)watch recorded lectures as needed
- Relate course material to your real-life or your own personal examples/experiences