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

Biomechanics of Human Motion

APK6226C | Class # 10543 | 3 Credits | Fall 2025

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Course Info

INSTRUCTOR

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Preferred Method of Contact: email directly at mjt023@ufl.edu

OFFICE HOURS

Monday 11:45 AM – 1:45 PM (virtual on Zoom)
Go the meetings tab on the Canvas shell

MEETING TIME/LOCATION

%100 Online Asynchronous hosted on Canvas

COURSE DESCRIPTION

Applying the principles of statics, kinematics, and kinetics to kinesiological systems of the human body in movement, activities of daily living, and sports skills.

PREREQUISITE KNOWLEDGE AND SKILLS

PET 2320C; MGF 1202 or MAC 1142.

REQUIRED AND RECOMMENDED MATERIALS

Required Textbook and Software

★ Robertson, D. G. E., Caldwell, G. E., Hamill, J., Kamen, G., & Whittlesey, S. N. (2014). Research methods in biomechanics. ISBN-13: 978-0736093408 & ISBN-10: 0736093400

Microsoft Excel (free to UF students)

Muscle and Motion Application (free to students in the course)

Recommended Textbooks

★ Levangie, P. K., Norkin, C. C., & Levangie, P. K. (2011). *Joint structure and function: A comprehensive analysis*. Philadelphia: F.A. Davis Co. ISBN 9780803658783

This text is not required but is the text that most underlies the joint modules of this course and is great resource for understanding the mechanical function of joints at a specific anatomical level

Other Helpful Textbooks

★ Levine, D., Richards, J., Whittle, M., & Whittle, M. (2012). Whittle's gait analysis. Edinburgh: Churchill Livingstone Elsevier. ISBN-13: 978-0702042652 & ISBN-10: 070204265X

This text is a great book for understanding gait and its abnormalities. Information from this book shows up in the Gait Kinematics module and is sprinkled throughout the kinetic modules.

David A. Winter Biomechanics and Motor Control of Human Movement, Fourth Edition, 17 September John Wiley & Sons, Inc. 2009 Print ISBN:9780470398180 |Online ISBN:9780470549148

Another text on technical methods in performing biomechanical data collections and analyses. David Winter is a notable author for his seminal work in biomechanical research methods.

Biomechanical Basis of Human Movement by Hammil and Knutzen, ISBN 13: 9781451177305

Basic Biomechanics of the Musculoskeletal System Nordin, M. & Frankel, V.H. (2012). (4th Edition). Baltimore, Maryland. Lippincot Williams & Wilkins. ISBN-13: 978-1609133351

Introductory Biomechanical Texts that are helpful in conceptualizing content with less dense math compared to the research methods text.

COURSE FORMAT

This course and associated lectures will be asynchronously delivered online.

COURSE LEARNING OBJECTIVES:

1. Collect, quantify, analyze, explain, interpret, and predict kinematic, kinetics and neuromuscular aspects of human motion during gait, exercise, and sports using a biomechanical approach.
2. Explain the biomechanics of joint function especially with respect to gait and sport

CASCE STANDARD INCLUDED IN THIS COURSE

Kinesiology/Biomechanics
a. Biomechanics of resistance exercise
b. Skeletal musculature
c. Anatomical planes and major body movements
d. Human strength and power
e. Sources of resistance to muscle contraction
f. Joint biomechanics: Concerns in resistance training

University Policies

Please review the University Policies by clicking the link here.

Course Policies

GRADING BREAKDOWN

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

Grading Category Percentages		
Item	**Qty**	**Percent**
Exams	3	42%
Quizzes	9	18%
Homework/Labs	13	26%
Play Posit Week Lectures	13	13%
About me	1	1%

Lecture Exams (3)

Lecture exams will be based on module content which may include recorded lectures, assigned Muscle and Motion videos, homeworks, and quizzes. These exams will be 2-part exams taken as Canvas quizzes made available during the scheduled week of the exam with some flexibility in when the exam may be taken to accommodate the asynchronous nature of the class. Part 1 of the exams will be strongly quantitative and as such be open book, notes, and calculator with a more relaxed time allotment for completion. This portion of the exam may involve data analysis using Excel.

Part 2 will be strongly conceptual and will be Honorlock proctored online with tighter time allotment, closed book/notes, and no calculator. The questions for this part of the exam will be multiple choice, true false, free response.

Quizzes (9)

There will be 9 “module” quizzes that are 1 attempt individually quizzes that are open book/notes. These are meant to challenge you to apply and recall the concepts and skills

Homework (12)

There will be 12 homework/lab assignments that are somewhat diverse in nature. These are formative assignments that will prompt exploration and application of biomechanical skills and concepts. Many homework assignments are quantitative homework problems aimed at sharpening the math and physics skills delivered during lecture. As such the associated Canvas quiz will be unlimited attempts. These may include performing data analysis using Excel. However, other homeworks include collecting video or photograph “data” of human motion (don’t worry phone cameras are sufficient), practice in applied anatomy, conceptual planning and analysis in biomechanics of movement, and reflections/critique of your and your classmate’s work. Although the quantitative homeworks are ultimately based on correctness, these will be graded based on completeness/effort.

Play Posit Lectures with Embedded Questions

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. These lectures will be the bulk of the content delivered in the class.

About me

This is an introductory assignment just to help us get to know each other in the online space.

Extra Problem Sets

Some modules will have additional practice problems with solutions available that **are not for credit** but meant to help prepare you for exams if you need more practice in with quantitative skills.

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	Points Needed to Earn Each Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	≥ 900	90.00-100%	4.0
A-			3.67
B+	870-899	87.00-89.99%	3.33
B	830-869.99	83.00-86.99%	3.0
B-	800-829.99	80.00- 82.99%	2.67
C+	770-799.99	77.00-79.99%	2.33
C	730-769.99	73.00-76.99%	2.0
C-	700-729.99	70.00-72.99%	1.67
D+	670-699.99	67.00-69.99%	1.33
D	600-679.99	60.00-66.99%	1.0
D-			0.67
E	≤ 599.99	0-59.99%	0

Weekly Course Schedule

CRITICAL DATES & UF OBSERVED HOLIDAYS

- 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.

WEEKLY SCHEDULE

Week	Dates (Week of Monday…)	Module	Assignments
1	18-Aug	Introduction to Biomechanics	HW 1
2	25-Aug	Fundamental Tools and Concepts 1	HW2
3	1-Sep	Fundamental Tools and Concepts 2	HW3, Quiz 1
4	8-Sep	Muscle Biomechanics	HW4, Quiz 2
5	15-Sep	Shoulders, Stability, and Balance	HW5, Quiz 3
6	22-Sep	Exam 1 (2 Parts)	Exam 1 Part 1, Exam Part 2
7	29-Sep	Kinematics 1	HW 6
8	6-Oct	Kinematics 1	HW 7, Quiz 4
9	13-Oct	Lower Body Joints and Tissue Loading	HW 8, Quiz 5
10	20-Oct	Lower Body Joints and Tissue Loading	Quiz 6
11	27-Oct	Exam 2 (2 Parts)	Exam 2 Part 1, Exam 2 Part 2
12	3-Nov	Kinematics 2	HW 9, Quiz 7
13	10-Nov	Kinetics	HW 10
14	17-Nov	Kinetics	HW 11, Quiz 8
15	24-Nov	Thanksgiving	Break Week
16	1-Dec	Kinetics	Hw 12, Quiz 9
17	8-Dec	Exam 3 (2 Parts)	Exam 3 Part 1, Exam 3 Part 2

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