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 2024

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Course Info

INSTRUCTOR

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Email: mjt023@ufl.edu
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 class will meet in person weekly for lecture, labs, and seminar.

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 of biomechanics of joint function especially with respect to gait and sport

Course & University Policies

ATTENDANCE

Attendance is expected and participation will be reflected in your course grade in participation in discussions portion of the course (Grading for more details). Excused absences will be considered in accordance with the University of Florida's policies and guidelines.

PERSONAL CONDUCT & ACADEMIC INTEGRITY

Students are expected to exhibit behaviors that reflect highly upon themselves and our University.

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.

A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or guest lecturer during a class session. Publication without permission of the instructor is prohibited.

To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

EXAM MAKE-UP POLICY

Make-up assignments will be given at the discretion of the instructor. Late submissions are not accepted, as it is important to maintain fairness and consistency throughout the class. Please review "Grading" below for late submission or missed assessment policies (outside of documented and excusable scenarios).

Unexcused (including "inappropriate excuses") material cannot be made up and will result in a zero on that item. Please do **not** ask for an accommodation for inappropriate excuses, which include:

- Extracurricular activities

- Out of town/vacation
- Sleeping in
- Sports
- Technological issue due to procrastinated assignment upload
- Volunteering
- Work

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. Any variation of this statement is acceptable. More details are always helpful for our DRC-registered students.

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

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.

Grading

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

APK6226C Online Table 1: Grade Point Category					
Item	**Qty.**	**Points Per**	**Category Points**	**Percent of Final Grade**	
Lecture Exams/Final	3	140	420	42	%
Labs	3	40	120	12	%
Homework	12	30	360	36	%
YellowDig Discussion and Readings	N/A	100	100	10	%
Extra Credit	*N/A*	*30*	*30*	*3*	*%*
Course Total	**N/A**	**N/A**	**1000**	**100**	**%**

Lecture Exams (3) – There will be three lecture exams throughout the semester which will not be overtly cumulative (although some concepts build on previous ones). These lecture exams will available during the week they are assigned on the schedule. You can take them at the time that works best for your schedule, and they will be proctored via Honorlock. The allotted time for these exams will be 2 Hours. The exams will cover class content including both quantitative and conceptual content from recorded lectures and conceptual information from required readings. You will be provided the course formula sheet within the Canvas assessment for the exams. Do NOT print out or open your own from your desktop as this will flag your exam in Honorlock.

Labs (3) – This course includes 3 lab assignments which analysis of movement data and modeling of the Musculo skeletal system. These labs will partly be assessed by entry of your outcome into a Canvas quiz that will parallel the assignment deliverables.

Module Quizzes (12) – There will be 12 module quizzes which will be presented as Canvas quizzes. The constraints on the more quantitative quizzes will be more relaxed as to take on the quality of a graded homework rather than a high-pressure assessment. The quizzes will also draw from lecture, Muscle and Motion, and required reading content. These may have quantitative and qualitative components. These are meant to prompt deeper investigation of the content and help prepare you for the exams.

Yellowdig Discussion Posting – Yellowdig is a unique online tool aimed at prompting academic discussion in the style of something akin to social media platforms like Facebook. Your engagement with this tool will constitute participation points for the semester. Each week there will be a paper, topic, or prompt to respond to and post about. Your points are earned through original posts, commenting on others' posts, and receiving reactions and comments on your original posts. It's a bit of a game geared at yielding interactive discussion on mutually relevant topics in biomechanics. To be clear points within the Yellowdig platform are not the same as course points and reaching your target points within the Yellowdig platform will constitute reception of full participation points in the Canvas course. ***Required Reading*** – Some modules will have required research paper(s) that you are expected to read and discuss via Yellowdig.

Extra Credit - Because you can earn more than the target points for the semester in Yellowdig, you are given an opportunity to earn up to 3% extra credit on your final grade in the course through earning up to a maximum of 15000 Yellowdig points. The amount of points earned beyond the targeted 12000 will contribute the possible 3% extra credit added to your final grade.

Example: If you earn 14500 Yellowdig points that will equate to 1.875% added to your final grade in accordance with the following calculation.

*(Points earned above 12000)/(Points possible above 12000)*3% = ((14500-12000)/16000-12000)*3% = (2500)/(3000)*3%= 2.5%*

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.

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

- September 2 – Labor Day
- October 18 – Homecoming
- November 11 – Veterans' Day
- November 25-29 – Thanksgiving Break
- December 5 & 6 – Reading Days

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 (W)	Module
1	8/21/2024	Fundamental Concepts and Tools 1
2	8/28/2024	Fundamental Concepts and Tools 1
3	9/4/2024	Fundamental Concepts and Tools 2
4	9/11/2024	Muscle Biomechanics
5	9/18/2024	Planar Kinematics 1 Lab 1
6	9/25/2024	Exam 1
7	10/2/2024	Planar Kinematics 2
8	10/9/2024	Lower Body Joint Mechanics 1
9	10/16/2024	Lower Body Joint Mechanics 2
10	10/23/2024	Tissue Loading and Squatting Biomechanics 1 Lab 2

11	**10/30/2024**	**Tissue Loading and Squatting Biomechanics 2**
12	**11/6/2024**	**Exam 2**
13	**11/13/2024**	**Kinetics 1**
14	**11/20/2024**	**Kinetics 2** **Lab 3**
15	**11/27/2024**	**No Class Thanksgiving Break**
16	**12/4/2024**	**Kinetics 3**
17	**12/11/2024**	**Exam 3: 12/10/2024 - 12/12/2024**

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