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

Biomechanics of Human Motion

Online

APK6226C | Class # 19491| 3 Credits | Fall 2023

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Course Info

INSTRUCTOR

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

OFFICE HOURS

Virtual Office Hours: W 4-5 PM, T 6-7 AM or by appointment

MEETING TIME/LOCATION

100% online and delivery is asynchronous.

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

★ 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

This is the required text for providing the "nuts and bolts" understanding of the mathematical/physics skills necessary for biomechanical analysis.

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-based texts.

COURSE FORMAT

This class will meet in person weekly for lecture 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 lower body joints especially with respect to gait and sport

Course & University Policies

ATTENDANCE POLICY

Course is delivered asynchronously. Excused absences (lateness in assignment completion) will be considered in accordance with the University of Florida's policies and guidelines.

PERSONAL CONDUCT POLICY

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

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, 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 or TA in this class.

EXAM MAKE-UP POLICY

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.

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 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/

CLASS LEARNING ENVIRONMENT

It is important to the me that you feel welcome and safe in this class; and that you are comfortable participating in class discussions and communicating with me on any issues related to the class. Please let me know if you are having a tough time in any capacity so that we can work together to generate a solution.

Together as a class we have a responsibility and opportunity to create a space that is inviting and respectful to every individual and create a learning environment that affords equal opportunity for all students to learn and succeed.

Additionally, if your preferred name is not the name listed on the official UF roll, please let me know as soon as possible by e-mail or otherwise. Please let me know how you would like to be addressed in class. You may also change your "Display Name" in Canvas. Canvas uses the "Display Name" as set in myUFL. The Display Name is what you want people to see in the UF Directory, such as "Ally" instead of "Allison." To update your display name, go to one.ufl.edu, click on the dropdown at the top right, and select "Directory Profile." Click "Edit" on the right of the name panel, uncheck "Use my legal name" under "Display Name," update how you wish your name to be displayed, and click "Submit" at the bottom. This change may take up to 24 hours to appear in Canvas. This does not change your legal name for official UF records. https://elearning.ufl.edu/student-help-faqs/

Grading

Grades will be based on a point system of 1000 total points coming from quizzes, exams, and assignments.

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

Table 1: Grade Point Category

Item	Qty.	Points Per	Category Points	Percent of Final Grade
Lecture Exams	3	140	420	42 %
Labs	2	60	120	12 %
Homework	12	30	360	36 %
Presentation & Discussion	1	100	100	10 %
Course Total	**N/A**	**N/A**	**1000**	**100** %

Assessment Proctoring Via Honorlock

Honorlock will proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.

To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install

When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.

Good luck! Honorlock support is available 24/7/365. If you encounter any issues, you may contact them by live chat, phone (855-828-4004), and/or email (support@honorlock.com).

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. There will be an allotted exam window in which you may begin the assessment at a time that works best for your schedule.

Labs (3) – This course includes lab assignments which analysis of movement data. The first lab will assess kinematics of 2D video recorded exercise movement data. Lab 2 will involve the kinematic and kinetic analysis of 3D motion capture gait data record via a Vicon motion capture system. These labs will be assessed by entry of your outcome into a Canvas quiz that will parallel the assignment deliverables.

Module Homeworks (12) – There will be 12 module homework which will be presented as Canvas quizzes. The constraints on these 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 and any required reading content. These may have quantitative and qualitative components. These are meant to 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 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

Grades will be based on a point system of 1000 total points coming from quizzes, exams, and assignments.

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

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 additional 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.

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

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

Module	Week	Dates	Module
1.1	1	8/21/2023 - 8/25/2023	Getting Started Fundamental Concepts and Tools 1
1.2	2	8/28/2023 - 9/1/2023	Fundamental Concepts and Tools 1

2	3	9/4/2023 - 9/8/2023	Muscle Biomechanics
3.1	4	9/11/2023 - 9/15/2023	Planar Kinematics 1
3.2	5	9/18/2023 - 9/22/2023	Planar Kinematics 2
E1	6	9/25/2023 - 9/29/2023	**Exam 1**
4	7	10/2/2023 - 10/6/2023	Hip Complex Biomechanics
5	8	10/9/2023 - 10/13/2023	Knee Joint Biomechanics
6	9	10/16/2023 - 10/20/2023	Ankle and Foot Complex Biomechanics
7	10	10/23/2023 - 10/27/2023	Tissue Loading and Squatting Biomechanics
E2	11	10/30/2023 - 11/3/2023	**Exam 2**
8	12	11/6/2023 - 11/10/2023	Forces Impulse and Momentum
9	13	11/13/2023 - 11/17/2023	Inverse Dynamics
10	14	11/20/2023 - 11/24/2023	Work, Energy and Power Thanksgiving Break (Wed - Friday)
10	15	11/27/2023 - 12/1/2023	Work, Energy and Power (continued)

10	16	12/4/2023 - 12/6/2023	Special Topics/Review
Finals	17	12/11/2023 - 12/15/2023	**Exam 3: 12/12/2023 - 12/14/2023**

SUCCESS AND STUDY TIPS

- Do the homework and hone a solution process for types of problem
- Don’t fall behind
- 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 (do NOT resubmit them as the will show up as late)
- (Re)watch recorded lectures as needed