

Biomechanical Basis of Movement

APK3220C | Class # 10618, 21973 | 3 Credits | Spring 2023

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Course Info

INSTRUCTOR

Matt Terza Ph.D.

Office: FLG 135

Office Hours (Virtually on Zoom): T 9-11 AM or by Appointment

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MEETING

TIME/LOCATION

Class Number: 10618

Delivery: 100% Online

Final Exam – TBD but during Finals Week

Class Number: 21973

Delivery: 100% Online

Final Exam – TBD but during Finals Week

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
- Muscles and Motion (online application – Login for you is provided)

- Imagej: free image analysis obtained at <https://imagej.nih.gov/ij/download.html>

COURSE FORMAT

This course will be delivered asynchronously 100% online. The course is organized into module which have recorded lectures and readings. Each module will also have associated assignments/quizzes. Exam will be proctored online via Honorlock.

COURSE LEARNING OBJECTIVES:

1. Identify biomechanical principles/concepts and describe the impact of biomechanics research on daily life
2. Describe the basic technology behind biomechanical instrumentation with a focus on motion capture
3. Identify the planes of motion and axes of rotation involved in a given human movement pattern
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
 - d. Fluid mechanics
5. Describe how fluid forces influence human motion involving liquids and air
6. Explain the basic mechanical properties, interactions, and functions of bones, tendons, ligaments, muscle, joints, and cartilage

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. Outline for them exactly what that means in the context of your course

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 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](https://elearning.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.

Item	Qty.	Points Per	Category Points	Percent of Final Grade
Lecture Exams/Final	3	130	390	39 %
Homework	7	30	210	21 %
Module Quizzes	9	30	270	27 %
Engagement Activities and Discussions	TBD	Var	40	4 %
Labs	3	30	90	9 %
Course Total	N/A	N/A	1000	100 %

Lecture Exams

There will be 3 lecture exams that will be proctored as a Canvas Quiz via Honorlock. These assessments may 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. A **SCIENTIFIC (not a graphing)** calculator will be permitted during exams.

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 week's topics in the content lectures and may also include movement analysis using imagej and/or Excel.

Module Quizzes

Module quizzes based on lecture content and Muscles 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. Some larger (multi-week) modules may have more than one quiz associated with it.

Labs

Assignments based lecture, data based, and embodied movement activities. The deliverables for will be specific to each lab but may include a canvas quiz.

Engagement Activities and Discussion

Smaller engaging assignments and/or conversations throughout the semester to help connect with each other and the material.

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. Grading disputes or alleged technical issues with TopHat will not be considered after this point.

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.

EXAM SCHEDULE

Please note the exam schedule based on your section. Exams 1 & 2 are 50-minute exams administered during class time. The final exam is a 2-hour exam.

WEEKLY SCHEDULE

Week	Dates	Module
1	1/9/2023 - 1/13/2023	Introduction to Biomechanics
2	1/16/2023 - 1/20/2023	Fundamental Tools and Concepts
3	1/23/2023 - 1/27/2023	Fundamental Tools and Concepts Muscle Biomechanics
4	1/30/2023 - 2/3/2023	Muscle Biomechanics
5	2/6/2023 - 2/10/2023	Exam 1 (R/F) Tissue Loading and Spine Mechanics
6	2/13/2023 - 2/17/2023	Squat Lab Hip Joint Biomechanics
7	2/20/2023 - 2/24/2023	Knee Complex Biomechanics

8	2/27/2023 - 3/3/2023	Ankle and Foot Complex Biomechanics
9	3/6/2023 - 3/20/2023	Handstand Lab Exam 2 (M/T)
10	3/13/2023 - 3/17/2023	Spring Break
11	3/20/2023 - 3/24/2023	Linear Kinematics
12	3/27/2023 - 3/32/2023	Linear Kinematics Angular Kinematics
13	4/3/2023 - 4/7/2023	Angular Kinematics Linear Kinetics - Impulse and Momentum
14	4/10/2023 - 4/14/2023	Linear Kinetics - Energy Work and Power Jump Lab
15	4/17/2023 - 4/21/2023	Linear Kinetics - Equilibrium and Inverse Dynamics
16	4/24/2023 - 4/26/2023	Kinetics/Review No Class - Thurs and Friday - Reading Days
	5/1/2023 - 5/5/2023	Finals Week – Exam 3

SUCCESS AND STUDY TIPS

- Do the Homework and hone a solution process for types of problem

- Come to class prepared and 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 and homework (do NOT resubmit them as they will show up as late)
- (Re)watch recorded lectures as needed

PRIVACY

Our class/office hour sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized sharing of recorded materials is prohibited.