

Biomechanical Basis of Movement

APK3220C | Class # 10477,10478,17720 | 3 Credits | Fall 2024

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Course Info

INSTRUCTOR

Matt Terza Ph.D. CSCS

Office: FLG 135

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

OFFICE HOURS

W | Period 6 (12:50 PM – 1:50 PM)

R | Period 5 (11:40 AM – 12:40 PM)

Or by appointment

MEETING TIME/LOCATION

Class Number: 10477

T | Periods 5-6 (11:45 AM - 1:40 PM) TUR L011

R | Period 6 (12:50 PM - 1:40 PM) WEIM 1094

Primarily Classroom/Traditional

Final Exam: 12/12/2024 @ 7:30 AM - 9:30 AM

Class Number: 10478

M,W,F | Period 4 (10:40 AM - 11:30 AM) FLG265

Primarily Classroom/Traditional

Final Exam: 12/10/2024 @ 10:00 AM - 12:00 PM

Class Number: 17720

T | Period 1 (7:25 AM - 8:15 AM) FLG210

R | Periods 1-2 (7:25 AM - 9:20 AM) FLG210

Primarily Classroom/Traditional

Final Exam: 12/10/2024 @ 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
- Muscles and Motion (online application – Login for you is provided)
- Imagej: free image analysis obtained at <https://imagej.nih.gov/ij/download.html>
- TopHat - \$33 for semester subscription

COURSE FORMAT

This course meets live for 3 periods per week. 2-3 sessions per week will be lecture based presentation of material which will comprise most of the testable content for exams. 0-1 session per week will include in class lab activities/assignments and discussions.

There will be some mandatory videos (i.e., containing testable content not covered directly in class) which will be noted overtly on Canvas).

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

Course & University Policies

ATTENDANCE

Attendance is expected and participation via TopHat will be reflected in your course grade. 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.

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Exams (3)	410	41.41%
Homework (7)	140	14.14%
Quizzes (9)	210	21.21%
TopHat (~Daily)	100	10.10%
Labs	100	10.10%
Extra Credit	20	2.02%
TOTAL	960	100%

Lecture Exams (3) (Please carefully review the course schedule and note when your section is scheduled to take exams)

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 and 2 hours to complete the third exam. 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. The first 2 exams will be worth 130 pts and the 3rd exam will be worth 150 pts as it is a longer exam covering more material.

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.

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 on in class interactive activities. The deliverables for will be specific to each lab but may include a canvas quiz and may require the analysis of data. Attendance of the lab is mandatory for full credit on the assignment.

Attendance, Participation, and TopHat

Top Hat questions will be mainly administered during class time, and you must be in attendance of class to answer these questions. New content questions will be mainly participation based, but review questions or questions based on an assigned video may include an accuracy component in grading. Top Hat may also be used to facilitate class discussions/assignments and to take attendance which is part of the same grading category.

Check the TopHat.com gradebook regularly to ensure your responses are being recorded. Technical issues with TopHat should be noted and resolved as they arise. If you have an issue during class with submission you need to talk to me at the end of class and ALSO send me an email to correct the error. Persistent issues should be addressed with TopHat support <https://success.tophat.com/s/contact-main>. I will not make grade changes to TopHat for request made more than two weeks after a missed day/question.

Extra Credit

Students can earn up to 20 points of extra credit in this course. Extra credit opportunities will be offered and detailed in class but will involve demonstrating a deeper investigation 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

- 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.

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 schedule by the UF registrar.

Week	Dates (Week of Monday...)	Module
1	8/19/2024	(No Class MTW) Introduction to Biomechanics
2	8/26/2024	Fundamental Tools and Concepts Friday Class Online
3	9/2/2024	Fundamental Tools and Concepts Monday Holiday - No Class Handstand Lecture (Online)
4	9/9/2024	Muscle Biomechanics

		Handstand Lab
5	9/16/2024	Muscle Biomechanics Exam 1 (Thursday/Friday)
6	9/23/2024	Hip Joint Biomechanics Knee Complex Biomechanics
7	9/30/2024	Knee Complex Biomechanics (cont) Ankle and Foot Complex Biomechanics
8	10/7/2024	Ankle and Foot Complex Biomechanics Squat Lab
9	10/14/2024	Exam 2 (Wednesday and Thursday) No Class Friday (Homecoming)
10	10/21/2024	Linear Kinematics
11	10/28/2024	Angular Kinematics
12	11/4/2024	Linear Kinetics - Impulse and Momentum
13	11/11/2024	Linear Kinetics - Energy Work and Power No Class Monday - Veterans Day
14	11/18/2024	Linear Kinetics - Equilibrium and Inverse Dynamics Linear Kinetics - Jump Lab
15	11/25/2024	

		THANKSGIVING BREAK
16	12/2/2024	<p>Kinetics</p> <p>Acroyoga Lab</p> <p>No Class - Thurs and Friday - Reading Days</p>
	12/9/2024	<p>Finals Week</p> <p>10478 Final Exam: 12/10/2024 @ 10:00 AM - 12:00 PM</p> <p>10477 Final Exam: 12/12/2024 @ 7:30 AM - 9:30 AM</p> <p>17720 Final Exam: 12/10/2024 @ 10:00 AM - 12:00 PM</p>

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