

## BIOMECHANICAL BASIS OF MOVEMENT

APK3220C ~ 3 CREDITS ~ SPRING 2022

**INSTRUCTOR:**

**Matt Terza Ph.D.**

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**TEACHING ASSISTANT:**

**Joanne Lee**

Office: Virtual Only

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**OFFICE HOURS:**

**Instructor:**

M | Period 3 (9:35 AM – 10:25 AM)

W | Period 4 (10:40 – 11:30 AM)

**Teach Assistant:**

TBD

**MEETING TIMES/LOCATION:**

**Class Number: 10645**

M, W, F | Period 2 (8:30 AM – 9:20 AM)

PRIMARILY CLASSROOM/TRADITIONAL – ROOM: FLG 265

FINAL EXAM: 4/27/2022 @ 3:00 PM - 5:00 PM

**Class Number: 23394**

M, W, F | Period 5 (11:45 AM – 12:35 AM)

PRIMARILY CLASSROOM/TRADITIONAL – ROOM: CSE E221

FINAL EXAM: 4/28/2022 @ 10:00 AM - 12:00 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 9<sup>th</sup> 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

**COURSE FORMAT:**

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

Supplementary asynchronous prerecorded lectures and other module content will be posted Monday mornings 8:30 AM. **Most** of these videos will be optional re-presentation of in class lecture content or additional examples in problem solving.

Mandatory videos (i.e., containing testable content not covered directly in class) will be noted overtly on the module page on Canvas).

**Module quizzes and homework typically will be due Tuesday evenings 11:59 PM (about a week and 2 days after being posted).**

#### **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

#### **CLASS LEARNING ENVIRONMENT**

It is important to the learning environment 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. 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. I welcome you to the class and look forward to a rewarding learning adventure together.

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://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/>

#### **COURSE AND UNIVERSITY POLICIES:**

**ATTENDANCE POLICY:**

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 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](http://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 requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

#### **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/>.

#### **PRIVACY:**

Our class 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 recording and unauthorized sharing of recorded materials is prohibited.

## **GETTING HELP:**

#### **HEALTH AND WELLNESS**

- U Matter, We Care: If you or a friend is in distress, please contact [umatter@ufl.edu](mailto: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 on 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/>

## GRADING:

Item	Qty.	Points Per	Category Points	Percent of Final Grade
Lecture Exams	3	100	300	30 %
Final Exam (Optional)	1	120	120	12 %
Homework	11	20	220	22 %
Quizzes	12	20	240	24 %
TopHat	N/A	N/A	120	12 %
<b>Course Total</b>	<b>N/A</b>	<b>N/A</b>	<b>1000</b>	<b>100 %</b>

**\*Note if you opt not to take the comprehensive your first three lecture exam scores will be averaged and that will be counted as your final exam grade worth 120 points. Therefore, your final course grade will still be calculated from a total of 1000 points.**

## COURSE COMPONENTS

### LECTURE EXAMS (3):

Exams 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 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** calculator will be permitted during exams.

#### OPTIONAL FINAL EXAM:

The final exam is a comprehensive for the semester and is optional for all students. If you decide not to take the final exam, the average of your lecture exam scores will be counted as your final exam score worth 100 pts. The final will be longer than the individual lecture exams and will be scheduled during your sections assigned timeslot during finals week. This exam will be in the same style as the preceding 3 lecture exams but cover content from across the semester.

#### QUANTITATIVE HOMEWORK:

These homework assignments will be assessed via a Canvas Quiz submission, but the assignments will be given to you before to work through at your leisure. 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. There will be multiple attempts permitted for these numeric assessments.

#### MODULE QUIZZES:

Module quizzes based on lecture content and Muscles and Motion videos listed for the week. 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.

#### TOP HAT QUESTIONS

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 participation based, but review questions may include an accuracy component in grading. Top Hat will also be used to facilitate in class discussions/assignments.

#### **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 information about UF's grading policies may 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.*

Grading Scale		
Letter Grade	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	90.00-100%	4.0
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
E	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.

Module	Week	Dates	Module
M1	1	1/3/2022 - 1/7/2022	<b>Prerecorded Syllabus Video</b> <b>Introduction to Biomechanics</b>
M2	2	1/10/2022 - 1/14/2022	<b>Fundamental Tools and Concepts</b>
M3	3	1/17/2022 - 1/21/2022	<b>Biomechanical Instrumentation</b> <b>No Class Monday 9/17 - President's Day</b>

M4	4	1/24/2022 - 1/28/2022	Muscle Biomechanics
E1/M5	5	1/31/2022 - 2/4/2022	<b>Exam 1 - Wednesday</b>
M5	6	2/7/2022 - 2/11/2022	Tissue Loading
M6	7	2/14/2022 - 2/18/2022	Hip Complex Biomechanics
M7	8	2/21/2022 - 2/25/2022	Knee Complex Biomechanics
M8	9	2/28/2022 - 3/4/2022	Ankle and Foot Complex Biomechanics
<b>N/A</b>	10	3/7/2022 - 3/11/2022	<b>NO CLASS SPRING BREAK</b>
E2/M9	11	3/14/2022 - 3/18/2022	<b>Exam 2 - Wednesday</b> Linear Kinematics
M9/M10	12	3/21/2022 - 3/25/2022	Angular Kinematics
M10/M11	13	3/28/2022 - 4/1/2022	Linear Kinetics
M11/M12	14	4/4/2022 - 4/8/2022	Equilibrium and Inverse Dynamics
M12/M13	15	4/11/2022 - 4/15/2022	Angular Kinetics
E3	16	4/18/2022 - 4/22/2022	<b>Exam 3 - Wednesday</b>

Finals	17	4/25/2022 - 4/29/2022	<b>Final Exam (Optional)</b> <b>Section: 10645 - 4/27/2022 @ 3:00 PM - 5:00 PM</b> <b>Section: 23394 - 4/28/2022 @ 10:00 AM - 12:00 PM</b>
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