

## BIOMECHANICAL BASIS OF MOVEMENT

APK3220C ~ 3 credits ~ FALL 2021

**INSTRUCTOR:** Blain Harrison, Ph.D, MSAT, CSCS\*D  
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Preferred Method of Contact: email

**OFFICE HOURS:** Office Hours are by appointment. You can use an app called Calendly to schedule: [calendly.com/bcharrison](https://calendly.com/bcharrison)

**MEETING TIME/LOCATION:** MWF 10:40 – 11:30AM; Rolfs Hall Room 0205

**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:** APK 2100C and MAC1140 with minimum grades of C; or PHY2048 or PHY2053 with minimum grade of C

**REQUIRED MATERIALS:**

Hall, S. *Basic Biomechanics 9<sup>th</sup> Edition*. McGraw-Hill. 2022.

Muscle and Motion anatomy application - [https://www.muscleandmotion.com/login\\_page\\_strength\\_training/](https://www.muscleandmotion.com/login_page_strength_training/) (username: jahlgren@ufl.edu password: 123)

**COURSE FORMAT:**

Students will complete weekly reading assignments accompanied by lectures given each scheduled meeting day. Practice assignments are completed during class and a graded quiz concludes each learning module.

### 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
5. 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
6. Describe how fluid forces influence human motion involving liquids and air
7. Explain the basic mechanical properties, interactions, and functions of bones, tendons, ligaments, muscle, joints, and cartilage

### COURSE AND UNIVERSITY POLICIES:

**ATTENDANCE POLICY:** This course will be administered via live lectures at the scheduled class time. Attendance to each class is mandatory. Unannounced practice assignments are completed during class time at random. Completion of the practice assignments will count towards the participation portion of the final grade. The following link outlines the UF Attendance Policy found in the undergraduate Catalog <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

**PERSONAL CONDUCT POLICY:** 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:** No make-up exams are offered. Students who will be unavailable on the day of an exam may provide the instructor with evidence of their excuse and may be permitted the opportunity to complete the exam early at the discretion of the instructor. 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 feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu> or directly in CANVAS. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open.

## 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 2) or e-mail to [Learning-support@ufl.edu](mailto: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:

Evaluation Components (number of each)	Points Per Component	Weighted % of Total Grade
Semester Exams	50 points each = 100pts	25%
Module Quiz (10)	100 pts	25%
Chapter Reading Questions	100 points	10%
Cumulative Final Exam	100 points	25%
Applied Biomechanics Assignments (10)	100 points	15%

**Module Quiz** - A total of 10 quizzes pertaining to learning module content are assigned throughout the course. Quizzes will be administered in class on Fridays during the weeks indicated on the course schedule. Students will NOT be allowed the use of any outside resources on the quizzes. Quizzes will have a 15min time. Students with DSO time accommodations should schedule a time to take the exam in the DSO office on the same day the exam is scheduled to be administered in the classroom.

**Chapter Reading Questions** - Ten of the learning modules contain a "Chapter Reading Questions" assignment. This assignment will randomly pull 10 questions from a question bank from the chapter you are expected to read in that module. You may complete these assignments as many times as you like. The highest score on any attempt by the last Friday of the classes will be used when calculating your final grade. Students should use these assignments to help prepare for exams and module quizzes.

**Semester Exams** – Two exams will consist of 25 multiple-choice questions each, 2 points per question. Questions may require the application of course material in both quantitative and qualitative scenarios. Students will complete the exams in the classroom on the day designated on the course schedule. Students will NOT be allowed the use of any outside resources on the exam. Students with DSO time accommodations should schedule a time to take the exam in the DSO office on the same day the exam is scheduled to be administered in the classroom.

**Applied Biomechanics Assignments** - A total of 10 Applied Biomechanics Assignments are assigned during the semester. The first 5 assignments may require the use of the Muscle and Motion website. These assignments consist of 10 multiple choice questions. Honorlock is not required to complete these assignments. These assignments will be completed during class time and students are expected to be present to complete them.

**Cumulative Final Exam** - A final exam with 100 objective questions, each worth 1 point, will be administered in the classroom on the day/time designated on the UF Final Exam Schedule. Questions may require the application of course material in both quantitative and qualitative scenarios. Students will NOT be allowed the use of any outside resources on the exam. Students with DSO time accommodations should schedule a time to take the exam in the DSO office on the same day the exam is scheduled to be administered in the classroom.

**GRADING SCALE:** All course assignments are administered and graded within the APK3220 Canvas course page, so students will have access to all grades as they submit assignments. Any assignment that requires the instructor to manually grade some aspect of it will be graded within one week of its due date, including the semester exams and final project. Final Grades will be rounded up at .5 and above.

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	Percent of Total Points Associated with Each Letter Grade	GPA Impact of Each Letter Grade
A	92.5-100%	4.0
A-	89.5 – 92.49%	3.7
B+	86.5-89.49%	3.33
B	82.5-86.49%	3.0
B-	79.5 – 82.49	2.7
C+	76.5-79.49%	2.33
C	72.5-76.49%	2.0
C-	69.5 – 72.49	1.7
D+	66.5-69.49%	1.33
D	62.5-66.49%	1.0
D-	59.5 – 62.49	0.7
E	0-59.49%	0

WEEKLY COURSE SCHEDULE: \* = Quiz @ = Applied Assignment

Week	Dates	Topic	Chapter
1	(8/23-8/27)	What is Biomechanics	1
2*@	(8/30 - 9/3)	Kinematic Concepts	2
3@	(9/6 - 9/10)	Kinetic Concepts; <b>Labor Day 9/6, No Class</b>	3
4*	(9/13 - 9/17)	Biomechanics of Bone *Module 3 Quiz Friday 9/17	4
5*@	(9/20 - 9/24)	Biomechanics of Joints	5
6*@	(9/27 - 10/1)	Biomechanics of Muscle;	6
7	(10/4 - 10/8)	Exam 1 Review <b>Exam 1: 10/6</b> <b>Homecoming 10/8 - No Class</b>	
8*@	(10/11 - 10/15)	Linear Kinematics	10
9*@	(10/18 - 10/22)	Angular Kinematics	11
10*@	(10/25 - 10/29)	Linear Kinetics	12
11*@	(11/1 - 11/5)	Equilibrium and Human Movement	13
12*@	(11/8 - 11/12)	Angular Kinetics	14
13*@	(11/15 - 11/19)	Fluid Mechanics	15
14	(11/22 - 11/26)	<b>Thanksgiving</b>	
15	(11/29 - 12/3)	Exam 2 Review <b>Exam 2: 12/1</b>	

**Final Exam: Friday, December 17 from 7:30 - 9:30am in the classroom**

## SUCCESS AND STUDY TIPS:

- Complete all assignments.
- Read textbook chapter carefully
- Practice math questions by replacing the numbers within the questions and solving the same type of questions with new numbers.

### **Covid-19 Implications:**

Due to the ongoing pandemic at the start of the Fall 2021 semester, students may choose to attend class in person or via Zoom each Monday and Wednesday of the week. Module quizzes are administered on Fridays and students must be in the classroom (or the DSO office) when taking any quiz or exam so that it may be proctored appropriately. Students may choose to leave the classroom upon completing the quiz or exam rather than stay for the remainder of the class time and participate in any remaining class activities via Zoom, if desired. Students are expected to wear masks while in the classroom. Students participating in class Monday and Wednesdays are expected to be present during the regularly scheduled class time. Class meetings will be recorded and posted to Canvas. The Zoom link is:

<https://ufl.zoom.us/j/2229465950>