

# Graduate Biomechanics

Department of Applied Physiology and Kinesiology  
University of Florida

## Course Description

### Course Information

APK6226C (Section 3824)  
Spring 2018: W 2-4 (11:45 AM-1:40 PM) R 6 (12:50-1:40)  
Lecture Location: WEIL 279  
12/12/2018 @ 3:00 PM - 5:00 PM Final Exam

### Instructor:

Matthew Terza Ph.D.  
Office: FLG 132-D  
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Office Hours: T,R 8 Period (or by appointment)  
Office Phone: 352-294-1716

This course will cover the application of the principles of kinematics and kinetics to the human body during movement regarding injury prevention and performance enhancement. It is aimed at applying the principles of statics, kinematics, and kinetics to kinesiological systems of the human body in movement and sports skills.

### General Purpose and Description

This course will cover the application of the principles of kinematics and kinetics to the human body during movement regarding injury prevention and performance enhancement. It is aimed at applying the principles of statics, kinematics, and kinetics to kinesiological systems of the human body in movement and sports skills. It covers basic analysis of biomechanical data.

### Prerequisites:

PET 2320C; MGF 1202 or MAC 1142.

### Course Objectives

Apply principles and methods of mechanics related to the quantification of human motion.  
Quantify and conceptualize the biomechanical properties of tissue  
Understand the basics of biomechanics with a view to gait, injury, sport performance, and prosthetics  
Analyze and evaluate human movement data

### Required Textbook

*Research Methods in Biomechanics* by Robertson et al. Human Kinetics

### **Recommended Textbooks**

*Biomechanical Basis of Human Movement* by Hammil and Knutzen  
*Basic Biomechanics of the Musculoskeletal System* Nordin, M. & Frankel, V.H. (2012). (4th Edition). Baltimore, Maryland. Lippincot Williams & Wilkins.

## **Course Policies**

### **Academic Honesty**

Cheating will not be tolerated in this course. All students are required to abide by the Academic Honesty Guidelines and Honor Code, which have been accepted by the University. Cheating is defined as the improper taking or tendering of any information or material, which shall be used to determine academic credit. Violations of the Honor Code will be handled according to the guidelines set by Student Judicial Affairs. 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 obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with me.

Homework is intended to be individual work. Discussion regarding solution processes and understanding of the material is permitted but copying work is not. Additionally, file sharing is expressly prohibited. Turning in files that are not your original work is also prohibited. It is the student's responsibility to seek clarification on policies or application of policies for specific assignments if necessary.

### **Class Attendance**

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:  
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Students are expected to attend all classes (including those during Drop/Add week) and to be appropriately prepared for class. Behavior that is less than preferred may result in being asked to leave.

### **Personal Conduct Policy**

You are expected to treat your fellow classmates, and the instructor with respect and politeness. Things that will not be tolerated include (1) inappropriate use of technology during class or lab (e.g. texting), (2) disrespectful language or actions (e.g. cursing), (3) honor code violations, and (4) personal conversations unrelated to the classroom discussions. Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>. Cell phones are only to be used for other in-class assignment related activity. **Any use, access, or handling of technology (e.g., a cell phone) during an assessment will result in an honor code violation and the potential of a failing grade.**

### **Exam Make-Up Policy**

*Unexcused missed assessments will result in a zero on the assessment (this includes contacting the instructor **after** the assessment if you are ill). Make-up assessments will be given at the discretion of the instructor. To schedule a make-up assessment, please fill out the **make-up exam request form** posted in CANVAS and submit it to your course instructor as soon as possible. Documentation will be required. If you have a serious emergency or life event, please contact the Dean of Students Office ([www.dso.ufl.edu](http://www.dso.ufl.edu)) and they will contact your instructor so that you do not have to provide documentation of the emergency/death in order to get a make-up assessment. Requirements for class attendance and make-up exams, assignments, and other work are consistent with the university policies that can be found at <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.*

### **Getting Help**

For issues with technical difficulties for CANVAS, please contact the UF Help Desk at:

- [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu)
- (352) 392-HELP - select option 2
- <https://request.it.ufl.edu/>

Any requests for make-ups due to technical issues MUST be accompanied by the ticket number received from Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request a make-up.

Other resources are also available for you:

- Library Help Desk <http://guides.uflib.ufl.edu/content.php?pid=86973&sid=686381>
- Counseling and Wellness  
<http://www.counseling.ufl.edu/cwc/Self-Help-Library.aspx>

### **Accommodations for students with disabilities**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### **Accommodation of Special Needs**

In accordance with university policy, I make every effort to accommodate unique and special needs of students with respect to speech, hearing, vision, seating, or other disabilities. Please notify the Office of Disability Services to register for services.

### **Online course evaluation process**

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu>. 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. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>. Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc/Default.aspx>, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies

The University of Florida has enacted a policy of allowing NO food or drink of any kind in any campus classroom. This policy will be enforced during the meeting times of this course.

## Course Assessment Methods

### Exams

There will be two semester exams (which are not explicitly comprehensive); however, the course material builds on itself. The exams will evaluate conceptual knowledge, critical thinking, and biomechanical quantitative analysis skills. **A scientific calculator will be needed for exams (Trig Functions).**

### Lab Reports

We will have up to 3 “lab” activities this semester for which there will be reports due.

### Paper Presentation

On most weeks we will have seminars for part of our meeting to discuss 1-2 papers relevant to the topic we are covering. Students will be responsible for presenting one paper this semester and for helping to facilitate discussion on two classmates’ presentations.

### Grading (Grades will not be rounded)

Grading Scale			
A	93.00	to	100.00
A-	90.00	to	92.99
B+	87.00	to	89.99
B	83.00	to	86.99
B-	80.00	to	82.99
C+	77.00	to	79.99
C	73.00	to	76.99
C-	70.00	to	72.99
D+	67.00	to	69.99
D	63.00	to	66.99
D-	60.00	to	62.99
E	<60.00		

**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 Breakdown**

Exam 1	20%
Exam 2	20%
Labs (3)	45%
Paper Presentation/Discussion	15%

Please use this link for the University Grades and Grading Policies  
<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Please bring pencil, paper, scientific calculator to class.

## Tentative Class Schedule

Week	Date	Lecture/Presentation		
1	22-Aug	Syllabus	Historical Background and Applications	Review Material
2	29-Aug	Vectors Coordinate Systems	Motion Capture	Overview of Biomechanics Instrumentation
3	5-Sep	Biomechanical Signal Processing	Numerical Methods in Data Analysis	Paper: Lower Body Injury
4	12-Sep	Kinematics		Paper: Upper Body Injury
5	19-Sep	Lab 1		
6	26-Sep	Kinetics	Inverse Dynamics	Problem Solving
7	3-Oct	Work and Power		Paper: Biomechanics of Squatting
8	10-Oct	Exam 1		
9	17-Oct	Measures of Stability	Biomechanics of Gait	Paper: Gait Rehabilitation/Pathologic Gait
10	24-Oct	Methods for Estimation of Center of Mass	Reaction Board Analysis	Paper: Upper/Lower Body Prosthetics
11	31-Oct	Tissue Mechanics		Paper: Joint Replacement/ACLR/OA
12	7-Nov	Lab 2		

13	14-Nov	Measuring Coordination and Movement Variability		Paper: Movement Variability
14	21-Nov	No Class		
15	28-Nov	Fluid Mechanics		Paper: Sports Performance in Fluid Medium
16	5-Dec	Lab 3		
	12-Dec	Exam 2		

**\*Please note that the instructor reserves the right to alter the syllabus/schedule if it is determined that such a change will benefit the course and the students.**

This syllabus is 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.