

# BIOMECHANICAL INSTRUMENTATION

APK6225 | Class # 10596 | 3 Credits | Spring 2024

Connect with



## CLASS INSTRUCTORS:

- **DIEGO L. GUARIN, PH.D.**  
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- **MATTHEW J. TERZA, PH.D.**  
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## OFFICE HOURS

Wednesday 3:00 – 5:00 PM

## MEETING TIME/LOCATION

FLG0235, Thursday Period 6 - 8 (12:50 PM - 3:50 PM)

## COURSE DESCRIPTION

The overarching goal of this course is to develop students' knowledge and appreciation of the instrumentation used to evaluate human movement and function. We will provide a general overview of data collection techniques in biomechanics and electrophysiology of muscle. Additionally, hands on experience will be gained through laboratory experiences using Inertial Sensor, EMG, motion capture, and eye tracking. The course is broken into modules for each of the techniques in the course.

## REQUIRED AND RECOMMENDED MATERIALS

All lecture material will be posted on Canvas.

The following book can help to cement some of the content provided in class:

- Robertson, D., Caldwell, G., Hamill, J., Kamen, G., & Whittlesey, S. (2013). Research methods in biomechanics 2nd ed. Boston (USA): Human Kinetics.

Acquiring this textbooks is not required.

## COURSE FORMAT

We will one time a week, during some meetings we will have standard lectures directed by the instructor, in some of the meetings we will have lab activities to practice the concepts described in class. We will have four take home assignments covering the topics discussed in class, and one final exam covering all the class content.

## COURSE LEARNING OBJECTIVES:

Upon completion of this course, the student will be able to:

1. Knowledge: Discuss, explain, and defend subject matters relevant to collecting and analyzing data with various biomechanical instruments.
2. Skills: Discuss, explain, and compare specific skills related to collecting and analyzing data with various biomechanical instruments.
3. Professionalism: Present and explain vital, relevant concepts for various biomechanical data recording and analyzing techniques in a professional manner

## Course & University Policies

### ATTENDANCE POLICY

Make every effort to attend all lectures. As this class include many practical components, attendance is mandatory and will count 10% towards your final grade. Each unexcused absence will result in 3% drop.

### PERSONAL CONDUCT POLICY

**Technology:** The use of cell phones\* (and the like) is strictly prohibited during lectures and exams. Any cell phone or other electronic device used during a quiz or exam will be considered a violation of the student honor code (i.e., cheating) and will result in stiff penalties. Laptop computers are welcome in class as long as you are using it for class- related work. Surfing the web, checking your email, using social media sites, or anything of that nature is strictly prohibited. Violation of this policy will result in point deductions at the discretion of the instructor.

**Communication:** You are responsible for checking announcements and course postings on Canvas. This is how your course instructor will communicate with you. All course grades will be posted on Canvas. Any discrepancies should be pointed out to the instructor on or before the last day of finals week.

**Academic Honesty:** 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."

Any student found violating this honor code will receive a zero for that exam or assignment and may be assigned other educational sanctions at the instructor's discretion. <https://sccr.dso.ufl.edu/process/student-conduct-code/>

### EXAM MAKE-UP POLICY

Unexcused absences will result in 3% drop of your grade. If you are ill or have an emergency that prevents you from attending class, it is your responsibility to contact the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). Documentation of the illness or emergency will be required. The Dean of Students Office will contact me directly and inform if they approved/rejected your request. 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/>.

## Getting Help

### HEALTH & 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/>

### INCLUSION, DIVERSITY, EQUITY, AND ACCESSIBILITY RESOURCES

For suggestions or concerns related to IDEA, please reach out to any of the following:

- Dr. Linda Nguyen, APK IDEA Liaison, [linda.nguyen@hnp.ufl.edu](mailto:linda.nguyen@hnp.ufl.edu)
- Dr. Rachael Seidler, APK Graduate Coordinator, [rachaelseidler@ufl.edu](mailto:rachaelseidler@ufl.edu)
- Dr. Joslyn Ahlgren, APK Undergraduate Coordinator, [jahlgren@ufl.edu](mailto:jahlgren@ufl.edu)

## Grading

Evaluation Components (number of each)	Points Per Component	Approximate % of Total Grade
Attendance	10 pts	10/100 = 10%
Laboratory Activities (x4)	10 pts each = 40 pts	40/100 = 40%
Final Exam (1)	50 pts each = 50 pts	50/100 = 50%

### GRADING SCALE

The total points earned from the exam, lab assignments, and participation will be summed. There is no curve for this course. I reserve the right to round up grades for students who show exceptional participation in class.

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	≥ 93.00	93.00-100%	4.0
A-	90.00-93.00	90.00%-92.99%	3.67
B+	87.00-89.99	87.00%-89.99%	3.33
B	80.00-86.99	80.00%-86.99%	3.0
C+	77.00-79.99	77.00%-79.99%	2.33
C	70.00-76.99	70.00%-76.99%	2.0
D+	67.00-69.99	67.00%-69.99%	1.33
D	60.00-66.99	60.00%-66.99%	1.0
E	0-59.99	0%-59.99%	0

### Weekly Course Schedule

This approximates what the semester will consist of. This outline is subject to change at any point during the semester.

#### WEEKLY SCHEDULE

	Day	Date	Content	Note
Week 1	Thursday	12-Jan	Introduction   Signals and Fourier Transform	
Week 2	Thursday	19-Jan	Signals and Fourier Transform	
Week 3	Thursday	26-Jan	Introduction to Python	
Week 4	Thursday	2-Feb	Inertial Sensors	
Week 5	Thursday	9-Feb	Electromyography	Inertial Sensors assignment due
Week 6	Thursday	16-Feb	Electromyography	
Week 7	Thursday	23-Feb	Electromyography	

Week 8	Thursday	1-Mar	Motion Capture	Electromyography assignment due
Week 9	Thursday	8-Mar	Motion Capture	
Week 10	Thursday	15-Mar	NO CLASS	
Week 11	Thursday	22-Mar	Motion Capture	
Week 12	Thursday	29-Mar	Motion Capture	
Week 13	Thursday	5-Apr	Eye Tracking	Motion Capture Assignment due
Week 14	Thursday	12-Apr	Eye Tracking	
Week 15	Thursday	19-Apr	Eye Tracking	
Week 16	Thursday	26-Apr	NO CLASS - Final Exam Provided	Eye Tracking Assignment due
Final Exam		1-May	Final Exam Due at 12:00 pm	