

University of Texas at El Paso
Department of Kinesiology
KIN 5374 – Measurement Techniques in Biomechanics
Spring 2019

General Information

Instructor: Jeff Eggleston, Ph.D.
Office: HSSN 450; LKD 102C
Email: jdeggleston@utep.edu
Office Hours: Tuesday and Thursday 9:00-11:00am
Course Textbook: Research Methods in Biomechanics, Second Edition
D.G.E. Gordon, G.E. Caldwell, J. Hamill, G. Kamen, S.N. Whittlesey; Human Kinetics
Class time: Tuesday, 5:30 – 8:20pm
Classroom: Larry K. Durham room 102

Course Description

This course will focus on techniques and instruments used in biomechanical research including data collection, analysis and written and visual presentation of information/data. Emphasis will be placed on developing an understanding of experimental techniques, capabilities, and limitations. Information presented will provide a historical and theoretical basis. In many instances, you will be referred to the literature to either support or refute a particular stance. The following topics will be covered:

- Traditional biomechanical research methods; methodological considerations
- Scientific writing
- Signal processing
 - Signal smoothing
 - Signal filtering
 - Interpolation
- Kinematic instrumentation
 - Optical motion tracking
 - Accelerometry
- Kinetic instrumentation
 - Force platforms
 - Strain gauges
- Electromyography
- Isokinetic dynamometer
- Inertial Measurement Units

Additional Resources

Throughout the semester, additional assignments, readings, and information will be posted on Blackboard. Because this is a movement based course and you are learning how to measure movements with various pieces of equipment, it is highly suggested that you wear or bring tight-fitting clothing to each class. At minimum, bring tight-fitting shorts.

Learning Objectives

The objectives of this course are:

1. Possess working knowledge regarding equipment limitations, capacities, and appropriate usage;
2. Demonstrate knowledge relative to biomechanical research tools available;
3. Be able to process signals/data from a multitude of biomechanical research tools

Course Evaluation

Final Exam 20%

Midterm Exam	15%
Semester Project (Presentation and Write-up)	25%
In-class projects/Activities/HWs	20%
Equipment Presentation	15%

Exams: There will be one mid-semester exam and one final exam for this course. Both exams will be 100 points each. The Final Exam will be cumulative; material from the entire semester can be on it. The midterm will be an out of class exam, meaning that the exam will not be administered in class. You can take the midterm anywhere you like, but you are **required to submit an electronic copy of your exam to me via email (jdeggleston@utep.edu) no later than 8:35pm on March 12.** The final exam will be a take home exam and will open in Blackboard on Monday, May 7th at 5:30pm. It is due by May 14 at 8:20pm via email.

Semester Project: The semester project will constitute your group conducting a biomechanically based experiment. Your experiment will need to include an appropriate research question derived from literature and appropriate methods to answer the question, results and a discussion/conclusion of what the results mean. You are **required to use at least two (2) pieces of equipment** that were covered in the semester to answer your question. You will be presenting your experiment in front of the class the week before the final exam. You will also need to submit a full written draft of your experiment, similar to a manuscript submission, to Blackboard. There is not a page limit, it simply needs to be done well without superfluous information. **The semester project accounts for the largest percentage of the course grade, be sure to follow the detailed description below closely.** The presentation is 100 points and written draft is worth 120 points.

Equipment Presentation: You will be required to present, as a group, on the technical aspects of a piece of equipment. The information in your presentation needs to be detailed and provide more than basic information about its function. Furthermore, if there are varying types of equipment (*i.e.* strain gauge vs. piezoelectric force platforms) you need to speak in detail about each and discuss the pros and cons of each. Lastly, it is highly encouraged that you perform an activity of some sort before or after your formal presentation to include a demonstration and learning component for your peers. You are not expected to have expert-level knowledge, but you should demonstrate working-level knowledge of the equipment.

In-class Projects/Activities: Homeworks/projects will be assigned throughout the semester which could include mathematical problems, scenarios to invoke critical thinking, discussion questions, movement analyses, and research or reading tasks. These activities will be aligned with the course progression, so stay current with course topics and material.

Semester Project Details

The purpose of the semester project is to demonstrate learned skills relative to the structure and execution of a biomechanics experiment. To adequately complete this, you will be required to understand how each piece of equipment works, and the information derived from them in an effort to sufficiently answer your research question. A successful experiment will require you to operate the appropriate equipment to obtain accurate data and sufficient processing skill to produce meaningful findings. Your project should consist of the following components; point allocations are indicated accordingly. The hard copy of your semester project will also have ***Writing Quality*** and ***References/Reference Formatting*** grading sections worth 10 points each.

- 1) Introduction (15 points)
 - a. Development of a research question from relevant literature
- 2) Methods
 - a. Participants (10 points)
 - b. Experimental procedures (30 points)
 - c. Data reduction (20 points)

- d. Statistical analysis (5 points)
- 3) Results (10 points)
 - a. Adequate displays of results
 - b. Statistical outcomes
- 4) Discussion/conclusion (10 points)

Grading Policy

A	≥ 90.0%
B	80.0%-89.9%
C	70.0%-79.9%
D	60.0%-69.9%
F	<59.9%

Grades will not be rounded

Attendance Policy

Attendance will not be taken. This is graduate school, you should be in class every week. If you have to miss class, ensure you obtain materials from a classmate.

No phones will be allowed as calculators, and calculators must not have any additional capabilities. All exams and quizzes will be written as such and will only require basic algebraic and trigonometric functions.

Behavior in class is expected to be conducive to creating a collaborative learning environment. Students may be asked to leave class if they disrupt others' learning environment.

Course Content

See the class schedule for approximate dates for each covered topic.

Exam Schedule

Midterm Exam	Tuesday, March 12 – Out of class exam
Final Exam	Take home exam, due May 14 by 8:20pm to me via email.

University Policies and Resources

Changes to this syllabus – The course schedule may be altered by the instructor, with sufficient notice being provided to students.

Cheating, Plagiarism, Scholastic Dishonesty, and Student Discipline: Cheating is obtaining a reward for ability by dishonest means. It is unethical and not acceptable. Plagiarism occurs whenever a student quotes, paraphrases or summarizes another person's work without providing correct citation. Plagiarism occurs whether the work quoted is a book, article, website, reader's guide like Cliffs Notes or SparkNotes, another student's paper, or any other source. An entire essay is fraudulent even if only a single sentence is plagiarized. *Do not submit work under your name that you did not do yourself, ever.* You may not submit work for this class that you did for another class. If you cheated or plagiarized, you will be subject to disciplinary action as stated in the UTEP undergraduate catalog policy.

“Scholastic dishonesty (which includes the attempt of any student to present the work of another as his or her own, or any work which s(he) has not honestly performed, or attempting to pass any examination by improper means) is a serious offense and will subject the student to disciplinary action. The aiding and abetting of a student in any dishonesty is held to be an equally serious offense. All alleged acts of scholastic dishonesty should be reported to the Dean of Students for disposition. It is the Dean of Students' responsibility to investigate each

allegation, dismiss the allegation, or proceed with disciplinary action in a manner which provides the accused student his or her rights of due process.” Refer to <http://www.utep.edu/dos/acadintg.htm> for further information.

UTEP has a site license for **Turnitin.com**, a plagiarism detection site that you can also use to check your own work for this or other classes to prevent getting in trouble. If you want to test your understanding of plagiarism, take the self-assessment at <http://education.indiana.edu/~frick/plagiarism> or visit <http://www.turnitin.com>

When an assignment specifies that you must perform a task individually, asking for your classmates’ help is **collusion** and thus scholastic dishonesty. Any instances of scholastic dishonesty will be reported to the Dean of Students Office.

Deadline Policy and Late Assignments: It is essential that you regularly visit the class Blackboard website prepared to work. Once a deadline has passed, you can no longer turn in your work for credit. Plan carefully to ensure you meet the deadlines. If you wait until the last minute, things that can go wrong often do. Start early so you have time to deal with problems and are still able turn in your assignments on time. Do not procrastinate!

Missed Tests: All assignments will strictly follow UTEP’s attendance policy. Any missed assignment that does not meet the requirements of an excused absence will be counted as a 0. If you are going to / or miss an assignment and you believe the absence is excusable, you must contact the Professor within 24 hours of the assignments due date. Emailing later in the semester about missing grades, even if the absence was excused, will not be accepted. It is the student’s responsibility to keep track of when assignments are due and also communicating to the Professor when absences happen.

Students in Need of Assistance: UTEP seeks to provide reasonable accommodations for all qualified individuals who need accommodations or support for their learning. This university adheres to all applicable federal, state, and local laws, regulations and guidelines with respect to providing reasonable accommodations as required, affording equal educational opportunity. It is the *student's responsibility* to register with the **Center for Accommodations and**

Support Services <http://sa.utep.edu/cass/> in the UTEP Union Bldg. East Wing, Room 106 *within the first two weeks of classes*, and inform the faculty member to arrange for appropriate accommodations or support.

The CASS Office can also be reached in the following ways: Web: <http://cass.utep.edu/>; Phone: (915) 747-5148 voice or TTY; Fax: (915) 747-8712; E-Mail: cass@utep.edu

Campus Safety and Emergencies Notifications: Information Technology at UTEP provides emergency notification via your mobile phone. Visit <http://www.utep.edu/it> for more information and registration. Check the UTEP website for health-related information and updates.