

GEORGE MASON UNIVERSITY
School of Recreation, Health, and Tourism

EFHP 613 —Advanced Applied Biomechanics (3)
Spring 2012

DAY/TIME:	TR 12:00 p.m. –1:15 p.m	LOCATION:	Occoquan 318/SMART LAB
PROFESSOR:	Dr. Nelson Cortes	EMAIL ADDRESS:	ncortes@gmu.edu
OFFICE LOCATION:	Bull Run Hall 208C	PHONE NUMBER:	703-993-9257
OFFICE HOURS:	T 9:30–10:30 a.m. or by appointment	FAX NUMBER:	703-993-2025
Dept. Website	rht.gmu.edu / smartlab.gmu.edu	Class Website:	mymasonportal.gmu.edu

PREREQUISITES

Full admission to EFHP graduate program. Introductory Biomechanics, Basic Human Anatomy, and Physics or permission of instructor

COURSE DESCRIPTION

Focuses on kinetic and kinematic concepts and how they apply to the qualitative and quantitative assessment of human movement. Designed for advanced study of motion analysis techniques

COURSE OBJECTIVES

The course will introduce students to the basic concepts and analysis techniques used in biomechanics with a focus on the analysis of human movement. As a result of this course and its activities the student should:

1. Demonstrate the knowledge set-up, collection, and interpretation of 2-D motion analysis.
2. Demonstrate the knowledge set-up, collection, and interpretation of 3-D motion analysis.
3. Demonstrate the knowledge set-up, collection, and interpretation of force plate analysis.
4. Demonstrate the knowledge set-up, collection, and interpretation of electromyography
5. Demonstrate the ability to communicate effectively the quantitative analysis of complex motor movements.
6. Demonstrate a comprehensive understanding of human movement through biomechanical analysis.
7. Demonstrate the ability objectively quantify and evaluate movement tasks relevant to human motion.

COURSE OVERVIEW

This is a course to assist the human movement scientist (e.g., sports medicine clinician, exercise science, strength and conditioning) to enhance his/her ability to understand the nature of the structure and function of the human body through quantitative analysis of human motion. This course is intended to provide future clinicians/researchers with the necessary knowledge base to objectively evaluate human motion and to understand the theory, concepts and application of conducting analysis of human motion. The intent of this course is to provide students with an extensive knowledge concerning quantitative analysis of human motion and the concepts and equipment to collect objective quantifiable data to be used for clinical or research purposes. Lecture and laboratory concepts will be utilized to instruct students on the foundations of biomechanical data collection and major emphasis will be placed on using 2-D and 3-D motion analysis, forceplates, and electromyography. As is the case in any biomechanical analysis of human motion instrumentation course, each

student should expect to spend several additional hours each week in the laboratory over and above those scheduled as class time.

SPECIAL REQUIREMENTS

This course requires a laboratory fee of \$30.00 payable to George Mason University. This fee is due at the beginning of the **second class meeting (January 26, 2012)**. If you are paying by check you can make your check to George Mason University and in the Memo section write in "EFHP 613 Lab Fee." A receipt will be issued to you upon payment.

NATURE OF COURSE DELIVERY

This course is delivered through classroom instruction (face to face), and online assignments.

Attendance and Participation

Attendance is **required** for this class. Attendance will be taken during each class session. *Arriving to class late or leaving early will be counted as an absence.* Students are expected to be on time, attend all class meetings and be prepared for in class assignments and projects. The student is responsible for any information presented, discussed and assigned in class regardless of whether or not the student was present. Make-up tests, quizzes, assignments, or other grades will be granted for excused absences only: serious illness (doctor's note required), official university excused absences (with proper documentation and prior notification), extenuating circumstances (PRIOR approval should be obtained or direct contact made with the instructor within 24 hours of the event). For known upcoming absences, students must contact the instructor at least one week in advance to the missed class to make up work. At the next attended class meeting the student will discuss material that is to be completed. Students will have one week from the excused absence to complete any missed assignments. It is the student's obligation to pursue any make-up work. Please be aware that any student who does not attend the lecture during the initial drop/add phase and has not communicated with me is subject to being administratively dropped from the roster.

Academic Load

Although many students must work to meet living expenses, employment and personal responsibilities are not a consideration for missed classes, late or incomplete assignments, the course content, or the course schedule (see <http://catalog.gmu.edu>). Student employment does not take priority over academic obligations. I recognize that many students need to work in order to meet living expenses, however, there are distinct guidelines for students in terms of the number of credit hours which should be attempted based on how many hours per week a student has outside employment. For additional information on this subject, please see the GMU Academic Catalog (http://catalog.gmu.edu/content.php?catoid=5&navoid=104#Registration_attendance) for further information. Students who fail to observe these guidelines may expect no special consideration for academic problems arising from the pressures of employment.

Honor Code

Students are held to the standards of the George Mason University Honor Code (see <http://honorcode.gmu.edu> for details). Violations, including cheating and plagiarism, will be reported to the Honor Committee. Student assignments may be put through plagiarism detecting software.

Written Assignments

All assignments must be typed in Microsoft Word. Pay close attention to spelling and grammar as these will count towards your grade on written assignments. American Medical Association Manual (AMA) of Style (10th edition) format must be used for all written work in this class (e.g., in referencing, creation of tables, and formatting headers for paper sections). **Assignments must be turned in on Blackboard/MyMason Portal by**

the beginning of class on the specified date due. No late assignments will be accepted. It is recommended that students keep copies of all submitted work.

Class Material

I use a combination of approaches to assist your learning. These include reading assignments and discussion of the reading, learning activities that provide practical experience in biomechanics, analyzing research examples, and homework preparing various elements of a research project. You are encouraged to ask questions about the assigned reading, followed by discussion and learning activities. This means you must read the material before the class! Be prepared to be called on at random regarding the readings and any other material.

Technology Use During Class

As per GMU policy, all sound emitting technology is required to be turned off during the class meeting time. No sound emitting technology (e.g., cell phones, smart phones, iPads, Tablets, pagers, etc.) is allowed at any time during the class period. Students who are observed using any form of technology inappropriately (e.g., sending text messages from cell phones, visiting social networking sites from laptops, etc) will be dismissed from class for the day, counted as an absence, and not permitted to make up missed assignments. Additionally, no laptop computers (e.g., netbooks, notebooks, etc.) will be permitted for use during class time; the only exception is for use during presentations and projects and only with permission of the professor.

E-mail Correspondence

Only messages that originate from a George Mason University address will be accepted. The following is an appropriate professional format, and it should be used when contacting the professor:

Dear Dr. Cortes (*Beginning salutation*)

I have a question regarding one of the assignments. (*Text body*)

Regards, (*Ending Salutation*)

Dr. Cortes (*Your name*)

ACADEMIC INTEGRITY:

GMU is an Honor Code University; please see the University Catalog for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously and violations are treated gravely. What does academic integrity mean in this course? First, it means that when you are responsible for a task, you will be the one to perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and debate are encouraged in this course, the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives and traditions. When in doubt, please ask for guidance and clarification.

Instructional Procedures:

The course is designed as a combination of lecture and self-discovery guided learning experiences. It will be imperative that each student reviews the material from the preceding lectures and completes the assigned readings prior to lecture and laboratory sessions.

Facilities & Additional Information:

We are very fortunate to have our own human motion analysis equipment in the Sports Medicine Assessment Research & Testing (SMART) Laboratory. It is imperative that all people who utilize the labs treat the facilities and equipment with respect and care.

1. All laboratory equipment is highly sensitive and quite expensive. No horseplay will be allowed in the laboratory
2. If you are working with a piece of equipment and it breaks or something is not working properly, please notify one of the instructors immediately so it can be fixed.
3. Please make sure to turn off all equipment when you are finished even if it was on when you started. Lab doors should be locked and lights should be turned off when you exit the lab.
4. Computer data is highly sensitive to viruses, thus all disks must be “clean” and checked for viruses prior to utilization for laboratory experiments. It is each student’s responsibility to prevent computer malfunctions from occurring.
5. Eating, drinking, chewing gum and smoking are not permitted in the testing section of the laboratory.

REQUIRED READINGS

Hamill & Knutzen. Biomechanical basis of human movement. 3rd Edition, Lippincott Williams & Wilkins (2008)

SUPPLEMENTARY MATERIALS:

Supplementary materials will be used in class and posted on BlackBoard/MyMason Portal. Please print these materials and bring them to class so that you have access to them when needed.

EVALUATION

Students will be evaluated on content standards (knowledge gained) and performance (demonstration of the content). Content standards will be assessed via exams and written assignments.

This course will be graded on a point system, with a total of 100 possible points.

Course Requirements:

Requirements	%
Exam	
#1 Exam I	10
#2 Exam II	10
#3 Final Exam	20
<i>Attendance</i>	10
<i>Research Project: Neuromechanical Analysis of Sport Movement or Injury</i>	20
<i>Presentation of Project</i>	20
<i>Labs write-up</i>	10
TOTAL	100

Grading Scale

A	= 94 – 100	B+	= 88 – 89	C+	= 78 – 79	D	= 60 – 69
A-	= 90 – 93	B	= 84 – 87	C	= 74 – 77	F	= 0 – 59
		B-	= 80 – 83	C-	= 70 – 73		

Exams and Final Exam:

Each student will be required to complete two exams and a final exam. The final exam will be cumulative. The format for all exams will be multiple choice, true/false, short essays, and problem-solving questions. Examinations represent inquiries regarding student knowledge of fact regarding course content. Examinations demonstrate that the student can remember and apply facts as well as demonstrate a hierarchy of knowledge information.

Research Project:

The research project provides experience in developing an in-depth understanding of a movement with application of neuromechanical/biomechanical concepts. It enhances communication (oral and written) skills, as it is important in the development of the professional student. It also stimulates critical thought process to develop the methodology of a study to assess that problem. Research project format will be distributed on blackboard.

Research Project Presentation:

The intent of this assignment is for you to share your research project with your colleagues via a 10-minute PowerPoint presentation. This assignment will allow you to gain experience in oral presentation skills. As part of the experience, your colleagues & I may ask questions about your study, and I will offer a summary critique intended to help you improve your final written proposal.

EXAM REVIEWS:

As time allows in class and depending on class progress in each unit, a review *may be* offered before each exam. At that time, students can ask any content question that they would like. Students are not required to participate in the review, and can participate or leave as they choose. If there are no questions related to the content of the unit, the review session will be ended. Whether or not a review is conducted in class depends of class progress through the material for each unit *and* class participation in previous reviews. If there is no time to have a formal review or, if review sessions are not being utilized, students will need to come to office hours to address any questions on class material.

TENTATIVE COURSE SCHEDULE

Date	Topic	Chapter/Assignment Due Date
Jan 24	Introduction to EFHP 613 Introduction to course What's worth knowing? Questions and Answers	
Jan 26	Why study biomechanics Difference between Kinesiology & Biomechanics Instrumentation used in Biomechanics	Homework: Review chapters 1, 2, 5, 6 & 7
Jan 31	Linear Kinematics	Chapter 8
Feb 2	Linear Kinematics	Chapter 8
Feb 7	Linear Kinematics / Kinematic Data Collection (Observation, 2D, 3D) – <i>Pending Laboratory availability (Article Review)</i>	Chapter 8
Feb 9	Kinematics Laboratory – <i>Pending Laboratory availability (Article Review)</i>	
Feb 14	Angular Kinematics	Chapter 9
Feb 16	Angular Kinematics	Chapter 9
Feb 21	Angular Kinematics	Chapter 9
Feb 23	Kinematics Laboratory – <i>Pending Laboratory availability (Article Review)</i>	
Feb 28	EXAM I	
March 1	Linear Kinetics	Chapter 10
March 6	Linear Kinetics	Chapter 10
March 8	Linear Kinetics / Angular Kinetics	Chapter 10 & 11
March 13	<i>No Class – Spring Break</i>	
March 15	<i>No Class – Spring Break</i>	
March 20	Angular Kinetics / Kinetic Data Collection (Force Plates) – <i>Pending Laboratory availability (Article Review)</i>	Chapter 11
March 22	Angular Kinetics	Chapter 11
March 27	Angular Kinetics	Chapter 11
March 29	Kinetics Laboratory - <i>Pending Laboratory availability</i>	
April 3	Kinetics Laboratory - <i>Pending Laboratory availability</i>	
April 5	EXAM II	
April 10	EMG Data Collection – <i>Pending Laboratory availability</i>	

April 12	Electromyography (EMG) - <i>Pending Laboratory availability</i>	
April 17	VICON + EMG - <i>Pending Laboratory availability</i>	
April 19	In Class work	
April 24	In Class work	
April 26	In Class work	
May 1	Presentation	Research Project Due
		Research Project Presentations Due
May 3	Presentation	
May 15	Final Exam: 10:30AM – 1:15PM	

Note: The instructor reserves the right to make changes to the course syllabus and/or schedule at any time. Students will always be informed of any changes made.

Student Expectations

- Students must adhere to the guidelines of the George Mason University Honor Code [See <http://academicintegrity.gmu.edu/honorcode/>].
- Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See <http://ods.gmu.edu/>].
- Students must follow the university policy for Responsible Use of Computing [See <http://universitypolicy.gmu.edu/1301gen.html>].
- Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account.
- Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
- Students are expected to exhibit professional behaviors and dispositions at all times.

Campus Resources

- The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See <http://caps.gmu.edu/>].
- The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing [See <http://writingcenter.gmu.edu/>].
- For additional information on the College of Education and Human Development, School of Recreation, Health, and Tourism, please visit our website [See <http://rht.gmu.edu>].

CORE VALUES COMMITMENT: The College of Education and Human Development is committed to collaboration, ethical leadership, innovation, research-based practice, and social justice. Students are expected to adhere to these principles.



Student Acknowledgement of Syllabus

I, _____, by signing below, attest to the following:
(Print First and Last Name)

*I have read the course syllabus for EFHP 613 in its entirety, and I understand the policies contained therein. This syllabus serves as a binding contract for EFHP 613 between the instructor and me.

*I have a clear understanding of the due dates for assignments and examinations, and I accept responsibility for the material.

*I am aware that failure to submit assignments by the dates assigned will result in no points awarded, as late work will not be accepted.

*I understand that if I am using emitting sound technology or personal computers I will be dismissed from class for the day, counted as an absence, and not permitted to make up missed assignments

*I understand the instructor reserves the right to alter the provided schedules as necessary and I am responsible for the assignments and examination dates for the most current version of the syllabus schedule.

*I accept responsibility for reading announcements that are sent to me via e-mail through BlackBoard/MyMason Portal; it is my responsibility to access my Blackboard/MyMason Portal e-mail for messages, or forward Blackboard/MyMason Portal e-mail as per the directions provided in the syllabus.

(Signature)

(Date)

(Student Copy: This copy should remain attached to your syllabus)



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(Signature)

(Date)

(Instructor Copy: Submit to the instructor at the end of the first class meeting)