

**Hope College**  
**Department of Kinesiology**  
**KIN 383 – Mechanical Analysis of Human Movement**  
**Fall 2007**

<b>Instructor:</b>	W. Jeffrey Armstrong, Ph.D.	
<b>Office:</b>	2C07 DeVos Fieldhouse	
<b>Office Hours:</b>	MWF 8-9 AM, 3-4 PM; TTH 1-3 PM	
<b>Phone:</b>	616-395-7289	
<b>e-mail:</b>	armstrong@hope.edu	
<b>Lecture:</b>	MWF 2:00-2:50 PM	
<b>Text:</b>	Robertson, D. G. E., G. E. Caldwell, J. Hamill, et al. <i>Research Methods in Biomechanics</i> . Human Kinetics: Champaign, IL, 2004.	
<b>Course Description:</b>	Basic mechanical principles as they underlie efficient movement are explored and applied to fundamental physical skills and sport. Knowledge of physics will make this course more meaningful, but it is not a prerequisite. The utilization of mathematical formula is limited. In most cases the stress is on practical application of formula and not on computational procedures.	
<b>Course Objectives:</b>	<p>To provide the student with a fundamental understanding of human movement through the application of the laws of physics. Students will:</p> <ol style="list-style-type: none"> <li>1. learn a systematic approach to the analysis of human movement;</li> <li>2. understand the biomechanical fundamentals of human movement; and</li> <li>3. apply this knowledge to small-group, inquiry-based laboratory exercises which apply the basic principles of physics to human movement.</li> </ol> <p>Through a problem-based research project students will:</p> <ol style="list-style-type: none"> <li>1. identify questions and concepts that guide scientific investigations;</li> <li>2. design and conduct scientific investigations;</li> <li>3. utilize technology and mathematics to improve the investigation; and</li> <li>4. formulate and revise scientific explanations and models using evidence and logic.</li> </ol>	
<b>Student Evaluation:</b>	Final Exam	100 pt.
	Module Reports (5 @ 20 points)	100 pt.
	Worksheets (5 @ 20 points)	100 pt.
	Class Participation	100 pt.
	Research Project	<u>200 pt.</u>
		600 pt.

Final grades are based on the following conventional system:

A	558-600	C+	462-479	D-	360-377
A-	540-557	C	438-461	E	<360
B+	522-539	C-	420-437		
B	498-521	D+	402-419		
B-	480-497	D	378-401		

Incompletes ("I") will only be given in consideration of circumstances associated with the inability to complete the course requirements due to illness, military hardship, or death in the immediate family. Furthermore, this assumes that the major requirements of the course have been satisfactorily completed (i.e. grade of "C" or better) at the time the "I" is sought.

### **Class Conduct:**

1. Lectures and classroom activities are inquiry-based. Therefore, in-class experience is critical to learning the material. You are expected to attend and participate. Much of this experience cannot be made up outside of class.
2. **All assigned work is to be submitted for grading no later than the beginning of class the day the assignment is due.** Due dates for the Module Reports and Worksheets are as detailed in the Course Outline (see below) unless otherwise notified.
2. Notification of classes to be missed for athletics and other university events must be presented in writing *prior to the class(es) to be missed*. Note that there may be classroom experiences that cannot be made up. The student is, nevertheless, responsible for all material presented in class.
3. All cell phones, pagers, etc. will be turned off during class!!
4. Students are expected to do the assigned readings and the corresponding worksheet questions.
5. Students are expected to use care in the use of lab equipment, follow directions to the letter, and report any problems, breakage, misuse, etc. to the instructor.
6. Students are expected to participate fully in the group research projects. Individual, rather than collective group scores, will be assigned to the various aspects of the project.
7. Cheating will not be tolerated. Anyone caught cheating will automatically be given an "E" for the final course grade.
8. The academic dishonesty policy, covering plagiarism, substituting the work of another as your own, altering records, and assisting in any of these will be handled according to the Hope College policy.

## Tentative Course Outline:

<u>DATE</u>	<u>TOPIC</u>	<u>READING</u>
Aug. 29	Course Introduction; Biomechanical Instrumentation and Analysis	pp. 1-5
Aug. 31	Review of Terminology Used in the Mechanical Analysis of Human Movement	
Sept. 3	Biopac MP150	Handout
Sept. 5	Accu-Gait	Handout
Sept. 7	Principles of Kinematic Data Collection	Chap. 1-2
Sept. 10	Dartfish	Handout
Sept. 12	Ariel APAS-XP Motion Analysis Software	Handout
Sept. 14	Summary of Laboratory Instruments	
Sept. 17	Module 1	
Sept. 19	Module 1	
Sept. 21	Module 2	
Sept. 24	Module 2, <i>Module 1 Report is due</i>	
Sept. 26	Module 3	
Sept. 28	Module 3, <i>Module 2 Report is due</i>	
Oct. 1	Module 4	
<b>Oct. 3</b>	<b>Critical Issues Symposium</b>	
Oct. 5	Module 4, <i>Module 3 Report is due</i>	
Oct. 8	Module 5	
Oct. 10	Module 5, <i>Module 4 Report is due</i>	
Oct. 12	Module Summary, <i>Research Question is due</i>	
<b>Oct. 15</b>	<b>NO CLASS – Fall Recess</b>	
Oct. 17	Kinetics—Overview, <i>Module 5 Report is due</i>	Chap. 3-7
Oct. 19	Kinetics—Overview, <i>Summary of Research Article is due</i>	
Oct. 22	Kinetics—Free-Body Diagrams; Determining Center of Mass	
Oct. 24	Kinetics—Application of Newton’s Laws	
Oct. 26	<b>MIDWEST ACSM CONFERENCE – THE OHIO STATE UNIVERSITY</b>	
Oct. 29	Kinetics—Application of Newton’s Laws, <i>Research Project Proposal is due</i>	
Oct. 31	Kinetics—Angular Motion, <i>Worksheets 1-2 are due</i>	
Nov. 2	Kinetics—Angular Motion	
Nov. 5	Signal Processing, <i>Worksheet 3 is due</i>	Chap. 11
Nov. 7	Signal Processing	
Nov. 9	Projects, <i>Worksheets 4-5 are due</i>	
Nov. 12	Projects	
Nov. 14	Projects	
Nov. 16	Projects	
Nov. 19	Projects	
Nov. 21	Projects	
<b>Nov. 23</b>	<b>NO CLASS – Thanksgiving Recess</b>	
Nov. 26	Projects	
Nov. 28	Projects	
Nov. 30	Presentations, <i>Written Report of Research Results is due</i>	
Dec. 3	Presentations	
Dec. 5	Presentations	
Dec. 7	Wrap-up and Review for Final	

## FINAL EXAM:

*The above information is subject to change at the instructor’s discretion. Any amendments to the above document will be made in writing and provided to the students.*