

Biomechanics 1

Syllabus

Semester 1, 2008
Dr. Jon Sensinger

Description: Biomechanics is the application of mechanics to biological systems.

Objectives:

- Learn how to participate and to ask good questions
- Understand Mechanics Concepts
- Acquire a Mechanics paradigm for viewing problems
- Understand the Human Body
- Apply Mechanics to the Human Body
- Apply Biomechanics to Device Design

Textbook

Dr. Jon will follow the content and structure of *Fundamentals of Biomechanics*, by Ozkaya and Nordin, as well as *Engineering Mechanics: Statics*, by Bedford and Fowler. These books are not required by students; all required information will be presented in class, with adequate outlines provided in digital form.

Digital PDF's of all slides will be provided to students. They will be available for download by Saturday night at: www.jon.bartlab.org/biomechanics.html. Students are encouraged to print these slides out and write notes on them. Many of the images contained in these slides are protected by copyright laws and are limited to instructional use in a classroom setting. As a result, please do not duplicate these PDF's or post them on the internet outside of the setting of this course.

Outline

Week	Class Date	Topics	Review	Test	Midterm	Final	Presentation
1	2-Jun	Course Intro / Biomechanics Intro / Force Vector					
2	9-Jun	Moments and Torques					
3	16-Jun	Free Body Diagrams					
4	23-Jun	Statics in Equilibrium	W1-3				
5	30-Jun	Centroids & Center of Mass		W1-3			
6	7-Jul	Friction					
7	14-Jul	Application of Statics					
8	21-Jul	Virtual Work and Potential Energy	W1-7				
9	28-Jul	Intro to Deformable Mechanisms			W1-7		
10	4-Aug	Stress and Strain: Tension, Compression, Shear, Axial Loading, Torsion					Choose
11	11-Aug	Stress and Strain: Shear, Bending, Beams					
12	18-Aug	Multiaxial Deformation, Plane Stress	W8-10				
13	25-Aug	Moments of Inertia, Deflection of Beams, Statically Indeterminate Beams, Columns		W8-10			
14	1-Sep	Biological Tissue					Submit
15	8-Sep	Group Presentations	W1-14				Present
16	15-Sep	Final Exam				W1-14	

Policies

Office Hours

Dr. Jon will hold office hours for Biomechanics on Wednesday afternoons from 14:30-17:00 in the Biomedical Engineering Department, Room 6355. He will hold office hours for a different class on Thursday mornings (9:00-12:00). If students cannot attend the Biomechanics office hours they may

come to the Thursday morning office hours, although they are encouraged to come to the Biomechanics office hours. Dr. Jon is usually in his biomedical engineering office (Engineering building 3, 3rd floor, Room 6355) or his research laboratory (BART lab, Engineering building 2, 4th floor). Feel free to contact Dr. Jon at jsensinger@gmail.com or by phone: 089-092-7504.

Interactions

Please be courteous in your appearance and your interactions with other students and the professor. Towards that end, please turn off your cellular phone when you enter the classroom. Ringing cell phones in class will reduce your class participation grade.

Please actively participate in class. Your participation is critical to truly understanding the information for yourself *and* other students, and for providing feedback to the professor so that he can better teach the course. Students are encouraged to ask questions if they are confused or if they have forgotten a term or concept previously discussed. They are also encouraged to ask questions relating the topic to current news and events, research topics, or implications for other courses. Learning to ask good questions is a critical skill to learn in college, and class participation is accordingly a substantial portion of your grade – more than your midterm and almost more than your final exam. If you have difficulty participating in class, please prepare one or two questions beforehand based on the content of the lecture. Asking good questions is a skill that takes practice and experience, so please start to learn this skill during this course. Please do not say you understand a concept if you do not understand the concept.

Please work together to help each other learn. Students do much better when they study outside of class as a team, for two reasons. 1) You learn best by teaching others. 2) Members of a group may ask a question that you would not think to ask. Searching for the answer will strengthen your knowledge of that topic. This course is graded on a fixed scale, so helping others do better cannot hurt your grade, and will certainly improve both your grade and your understanding.

Submitted Documents

Students are encouraged to create one two-sided piece of paper containing useful information. This paper may be used on all tests, the midterm, and the final exam. This paper must be typed in size 12 font, in English, and must be submitted to the instructor at the end of every exam. The paper must contain your name in the top-left corner. Please consult the instructor if you are unsure if information is acceptable. The paper must be the original composition of each student: one student cannot produce copies for other students.

Students must write all exams in legible English.

Grading

All exams and projects are graded as a percentage. 100% is the highest grade that may be obtained on any exam. Final numeric grade is obtained from the weighted sum of each grade as follows:

Participation:	20%
Exam 1:	10%
Exam 2:	10%
Midterm:	20%
Final:	30%
Project:	10%

Course Letter Grade

A:	90 - 100%
B ⁺	86 - 89%
B	80 - 85%
C ⁺	76 - 79%
C	70 - 75%
D	65 - 69%
F	<65%

Project

Students will present a 10-minute group presentation on the application of biomechanics. The topic is their choice, and must be submitted to the professor by Week 10.

The presentation must be written in English, and may not contain more than 12 slides including a cover slide and reference slide. It should not contain an outline slide. All main text should be at least size 20 font (preferably 24 font), and references should be size 16 font or larger. No more than 4 images (preferably 3) or 2 figures/tables (preferably 1) should be on each slide. Each slide should contain minimal text. No slide should only contain text.

The presentation must include at least 2 appropriate references from peer-reviewed journals. The presentation should use mathematical concepts to illustrate at least one point. Presentations are due in digital Power-point or PDF format during Week 14. They should be scanned before hand to ensure they do not contain viruses. They will be presented during Week 15.

Ethics

Biomedical Engineers design equipment that directly affects the welfare of people. Failure on the part of biomedical engineers may result in serious injury or even death. The education of biomedical engineers is thus of paramount importance, and must be treated with respect, high standards, and substantial effort by both professors and students. Professors must teach biomedical courses in such a manner that students can easily identify which concepts are critical to the welfare of society and which concepts are more peripheral. Likewise students must make a concerted effort to frequently study terms to acquire true tacit understanding, rather than cramming for exams, and they must try to truly understand concepts and question the professor when they do not, rather than simply memorizing concepts to obtain a good grade.

Because the knowledge or ignorance of biomedical engineers can directly affect the lives of people or cause their death, cheating in any form will not be tolerated. This policy is not motivated by a desire to punish the student but to rather to protect the lives of the people of Thailand and to ensure the high standard of integrity required of the biomedical engineering profession. If cheating is clearly confirmed then students may be required to repeat the course. When considering cheating, please do not consider your grade – please consider the welfare of your country.