

ME487: Introduction to Cell Mechanics (3-0-3)

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Office Hours: By appointment

Grading: Midterm 20%
Final PROJECT 20%
Homework 30% (3 problem sets)
Quizzes 24%
Attendance & Participation 6%

Homework: There will be 3 **problem sets**. Homework is due at the beginning of the lecture on the due date. Late homework will be accepted but a 25% penalty will be deducted each 24 hr delay from the due date (counting begins at the beginning of the lecture)

Quiz: There will be 9 small quizzes throughout the semester. Your absence will result in no credit for the corresponding quiz. The lowest quiz score will not be counted toward your final grade.

Webpage: <http://klms.kaist.ac.kr/course/view.php?id=57934>

Class Ethics ※ VERY IMPORTANT ※**◆ Policy on Homework Preparation**

All homework assignments are to be completed on your own. You are allowed to consult with other students in the current class during the conceptualization of a problem but all written work, whether in scrap or final form, are to be generated by yourself working alone. You are not allowed to give or receive the details of the problems from anyone. You are also not allowed to possess, look at, use, or in any way derive advantage from others' (including students those who have taken this class earlier, publisher's solution manuals, etc.) work product.

- ◆ During the class, you are **NOT ALLOWED** to use mobile devices for personal communication. If you violate this policy, **you will be asked to leave the class.**

Course Description:

This course is designed for mechanical engineering students who are interested in mechanical approach for cellular processes and its application to engineering and medicine. It would introduce basics of cell biology, mechanical characterization of cells and their components, as well as effects of external mechanical stimulus on cellular processes which ultimately lead to various diseases such as cancer. Students who are interested in going into bio (medicine) - engineering interdisciplinary research would benefit from this by learning basic terminologies and concepts of mechanics in cells.

Tentative Lecture Schedule

#	Date	Topic	Note	Quiz
1	2/28	Why are we interested in Cell Mechanics?		
2	3/2	Introduction to Cell Mechanics		
3	3/7	Essential Cell Biology for Mechanical Engineers:		Quiz 1
4	3/9	What are cells made of? 1. Functional Components: Genes and Proteins		
5	3/14	2. Structural Components: Cytoskeletons: Microtubules & Intermediate filaments	HW#1 OUT	Quiz 2
6	3/16			
7	3/21	How do cells communicate? 1. Linkages to the environment: Junctions		Quiz 3
8	3/23	2. Membrane & Receptors	HW#1 IN	
	3/28	How do cells respond? 0. Overview	HW #2 OUT	
9	3/30	1. Signal-Nucleus- Behavior: Mechanotransduction		
10	4/4	2. Motile Responses: Single cell vs. Collective cells		Quiz 4
11	4/6		HW#2 IN	
12	4/11	3. Motile Responses Continued: Taxis & Guidance		
13	4/13	Midterm Review		
	4/18,20	Midterm Exam		
14	4/25	Special lecture by Prof. Jeon on Organ on a chip		
15	4/27	Midterm Exam		
16	5/2	3. Motile Responses Continued: Quantification of Motility		
17	5/4	3. Motile Responses Continued: Quantification of Cellular Stresses		
18	5/9	Election Day		
19	5/11	4. Biochemical Responses: Differentiation, Apoptosis		Quiz 5
20	5/16	5. Viscoelastic Responses: Cellular Physiology and Quantification methods	HW#3 OUT	
21	5/18	FINAL PROJECT WORKSHOP		
22	5/23	Easy Mechanics		Quiz 6
	5/25	Other Tools and Problems		
23	5/30	Other Tools and Problems		Quiz 7*
24	6/1	Other Tools and Problems	HW#3 IN	Quiz 8
25	6/6	National Holiday		
26	6/8	FINAL PROJECT PRESENTATION		
	6/13,15	Final Exam Period		

*** Quiz 7 on a makeup day!**