

ME 239 – Mechanics of the Cell

Tue/Thu 3:15-4:30pm, 320-105

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Some information about yourself

11.1%	undergrad
22.2%	grad student, 1 st year
27.8%	grad student, 2 nd year
16.7%	grad student, 3 rd year
22.2%	other

88.9%	me
11.1%	bioe

I am taking this class because ...

61.1%	I am interested in cells
66.7%	I am interested in mechanics
61.1%	I want to learn how the mechanical environment influences the cell
83.3%	I want to learn how to describe cells mechanically

Cell mechanics is primarily part of my ...

50.0%	Research
72.2%	Coursework

Please describe your background in Mechanics.

almost all have a solid mechanics background from either undergraduate degrees (61.1%) or graduate classes (38.9%).

Please describe your background in Cell Biology.

mostly undergrad classwork (44.4%) and high school classes (27.8%). Some have taken graduate level classes (16.7%) and done research related to cell biology.

List the three equations that you would consider most important in Mechanics.

1. Hooks Law – More generally Constitutive Equations
2. Newtons Second Law – More generally Equilibrium Equations
3. Stress equals Force over Area

List the three things that you consider most exciting in Cell Biology.

- DNA, RNA, Genetics
- Molecular Interactions, Protein Folding, Self-Assembly
- Stem Cells, Stem Cell Therapy, Cell Differentiation

Please describe why you are taking this class.

- general interest in mechanics in biology
- to learn how to develop mechanical models of cells
- my research area / because my advisor told me to

What particular cell types are you interested in and why?

- cardiomyocytes ... clinical implications, prevalence of cardiac disease
- stem cells ... potential benefit for patients suffering from numerous conditions
- spores ... research area
- neural cells ... interesting
- skin cells, bone cells, adipose cells

What kind of class materials would you prefer to use?

- | | |
|-------|--|
| 38.9% | single textbook / focus on “relatively basic” knowledge |
| 11.1% | multiple textbooks / focus on “relatively broad” knowledge |
| 16.7% | recent manuscripts / focus on “current state of the art” knowledge |
| 50.0% | a combination of a textbook and some recent manuscripts |

Unfortunately, we do not have a lab session along with this class. We will try to cover some cell experiments and cell testing theoretically though.

What kind of class format would you prefer?

- | | |
|-------|----------------------------------|
| 16.7% | blackboard only |
| 44.4% | slides and handouts |
| 38.9% | blackboard, slides, and handouts |

We aim at describing intercellular and intracellular response, cell-cell interaction, and cell-surface interaction with fundamental laws of physics. Those might be quite complex and nonlinear.

Which way would like to address the equations of cell mechanics?

- | | |
|-------|--|
| 27.8% | theoretically on the blackboard / restricting ourselves to simple problems |
| 11.1% | computationally, e.g., with the help of matlab / more complex problems |
| 61.1% | combined theoretical and computational |

Which scales are you most interested in?

- | | |
|-------|----------------------------|
| 44.4% | cellular scale and smaller |
| 22.2% | cellular scale and larger |
| 33.3% | all scales |

What kind of final project would you like?

- | | |
|-------|---|
| 33.3% | single projects |
| 55.6% | projects in groups of two |
| 33.3% | research related projects with more freedom but less guidance |
| 16.7% | selected projects with less freedom but more guidance |

Additional comments and suggestions.

- Slides are great, however, equations and physics should be presented on blackboard
- Group presentations preferred to save time