



BME 302 Mechanical Fundamentals of BME

3 Credits

Lecture/Lab Format- 1.5 hour lecture twice per week; 2 hour laboratory once per week

Instructor: Saikat Pal, PhD

Course Coordinator: Saikat Pal, PhD

Textbook(s)/Materials Required:

1) Engineering Mechanics: Statics and Dynamics 14th Edition Russell Hibbeler, 2016 (Print ISBN: 9780133915426, 0133915425; eText ISBN: 9780133951851, 0133951855)

Course Description:

This course is part of NJIT's four-course introduction to biomedical engineering. The purpose of this course is to introduce students to the fundamentals of engineering mechanics. We will study the principles of engineering statics and how these principles are applied in biomedical engineering.

This is a foundational course in biomedical engineering, especially in the biomechanics track. Many upper level courses will build on the concepts introduced in this course. A solid understanding of these fundamental concepts will ensure success in upper level courses and life-long learning. After completing this course, you will be able to describe:

- Addition and resolution of force vectors in three dimensions
- Equilibrium of a particle
- Force system resultants
- Equilibrium of rigid bodies
- Structural analysis
- Internal forces
- Friction, center of gravity and centroid, moments of inertia

Prerequisites:

Grade of C or higher in Phys 121, Math 112 and BME 105

This is a required course for all students.

Course Learning Outcomes (CLO):

1. Understand the fundamental concepts of biomechanics.
2. Understand the relevance of engineering to human physiology by performing relevant labs.
3. Understand the characteristics of biomaterials with applications to biomechanics.
4. Apply mathematical tools and engineering to analyze biological problems.
5. Learn to utilize MATLAB software to analyze data and produce mathematical computation and graphical analysis.
6. Be capable of working cooperatively and communicate effectively with peers on teams to attain a common goal, including well-formulated lab reports and oral presentation

Student Learning Outcomes:

Student outcome A – Apply foundations of math, science, and engineering.

Related CLO – 2, 3, 4

Student outcome E – Ability to identify, formulate, and solve engineering problems.

Related CLO – 1, 2, 3

Student outcome G – Ability to communicate effectively

Related CLO – 4

Program Specific Criteria:

B- the capability to apply advanced mathematics (including differential equations and statistics) to solve the problems at the interface of engineering and biology

Related CLO – 2,4

C - the capability to apply advanced science and engineering to solve the problems at the interface of engineering and biology

Related CLO – 2,3,4,5

Course Topics:

- Addition and resolution of force vectors in three dimensions
- Equilibrium of a particle
- Force system resultants
- Equilibrium of rigid bodies
- Structural analysis
- Internal forces
- Friction, center of gravity and centroid, moments of inertia