Engineering Principles in Cancer

MECHENG 5550

Credit Hours: 3.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture

Course Description:
The purpose of this course is to introduce engineering principles in the context of cancer progression and therapy.

Prerequisites and Co-requisites:
Prereq: 3500, 3503, or CBE 2420, or permission of instructor.
Course Goals / Objectives:
- Interdisciplinary approach (engineering, science, and medicine) towards understanding concepts from tumor biology
- Introduction to cancer research for students with quantitative scientific and engineering backgrounds
- Introduction to engineered tools for addressing complex tumor biology
- Understanding of scientific literature: Students will acquire an understanding of the primary cancer research literature to successfully prepare the grant proposal and group presentations.
- Synthesis of scientific ideas and projects: Students will generate, justify the significance to cancer research, and defend a research topic/objective/hypothesis that that is to be novel in substance or approach
- Understanding of research design and methods: The grant proposal format also necessitates that the proposed design of experiments be logical, cohesive, and directly tests the validity of the selected hypothesis
- Ability to engage in scientific communication: The grant proposal and quizzes are exercises in written communication, the presentations exhibit oral communication, and class participation displays interpersonal communication
- Ability to collaborate and work on teams: Students will be required to collaborate as a team for the final presentation
- Exercises in critical thinking in preparation for Graduate-level studies

Course Topics:
- Tumor Biology and Microenvironment
- Transport Phenomena
- Mechanics of Tumor Angiogenesis and Metastasis
- Cancer Therapy and Detection
- Scientific Review Meetings

Designation:
Elective