

## Engineering Cell Biology and Micro-Nanoengineered Platforms

- Motivation/Objectives: A cell is the basic unit of life in all organisms. Understanding cellular structures and how cells function is fundamental to all aspects of biosciences and is the basis for disease diagnostics/therapeutics and drug discovery. For single cell studies, the development of enabling micro and nanoengineered techniques/systems is a highly active field. The objectives of this course are two folds: (1) The course targets engineering graduate students to introduce essential topics in cell biology. (2) The course will also discuss micro/nano fabricated/engineered techniques/systems for manipulating cells, stimulating cells, and quantitatively measuring cellular activities.
- Topics:
  - Introduction - basic cell components, biochemistry
  - Internal organization of the cell – Structure: intracellular
  - cell-cell, cell-ECM interactions, cell motility – Structure: extracellular
  - Energy – energy flow, enzyme
  - Gene, gene expression – information flow: inside out
  - Signal transduction – information flow: outside in
  - Experimental cell biology – techniques
  - Microengineered techniques for cell mechanobiology
  - Nanomaterials in cell biology
  - Micro and Nano techniques in genetics
  - Microfluidic devices for cell biology
- Percentage value:
  - **Midterm: 50%**
  - Term paper 40%
  - Presentation: 10%
- Schedule:
  - No lecture in reading week
  - Exam will be held Thurs. **March 7<sup>th</sup> 1-4pm**, HA403
  - Term papers will be graded at the end of semester, after student presentations.

- Textbook: Molecular Biology of The Cell, Roberts et al., sixth edition, 2014.