Overview

An introduction to the way cells “touch” their surroundings, how they move and produce mechanical force and energy. We will closely follow the new text; Cell Mechanics and Mechanobiology" by C.R. Jacobs, H. Huang and R.Y. Kwon. Gardel Science (2013)

Goals

Topics covered will include

1) Background: the scope of the subject.
4) Review of Solid Mechanics
5) Review of Fluid mechanics
6) Review of Statistical Mechanics
7) Methods of Cell Mechanics. Micromanipulation, Measurement of forces produced by cells, Application of force to cells, analysis of deformation,
10) Adhesion to substrata and to other cells. Steric Forces, Traction forces and cell-cell forces. Peeling and disruption of bonds.
11) Contraction and Muscle
12) Migration and Amoeboid Motility: Pseudopodia, Endocytosis, phagocytosis, Lamellapodia and ruffling.
13) Mechanosensing; Durotaxis, chemotaxis, Anchor dependency and apoptosis, Contact inhibition.

Requirements

Some background in basic cell and molecular biology and in introductory solid or fluid mechanics.

Evaluation

Class participation, homework and projects