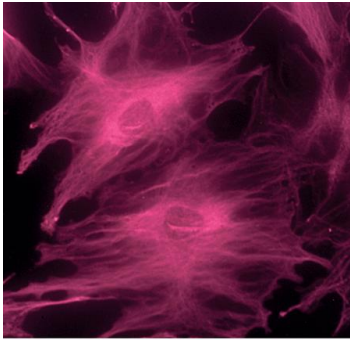
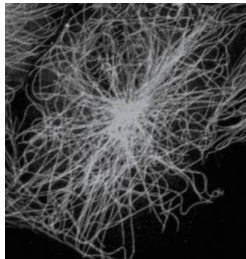
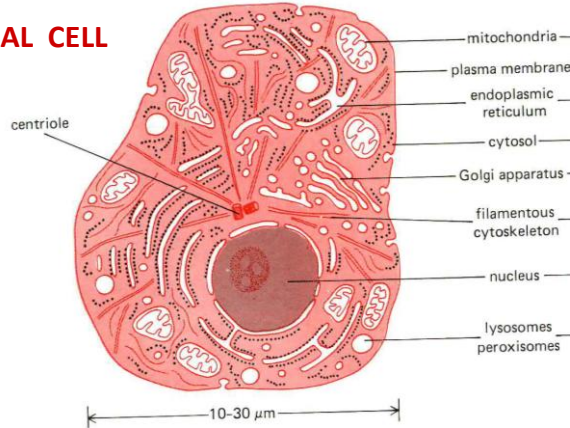


MECH510: Living Cells and their Molecules: Mechanics and Thermodynamics

Instructor: R. Bhiladvala Units: 1.5 Hours: 3-0-1 Summer 2013

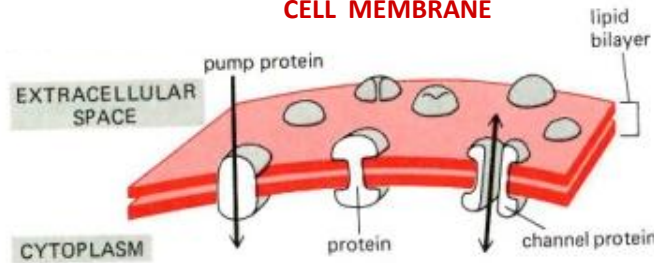


ANIMAL CELL



CYTOSKELETON

CELL MEMBRANE

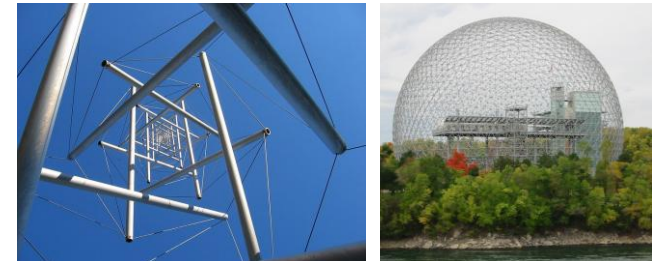
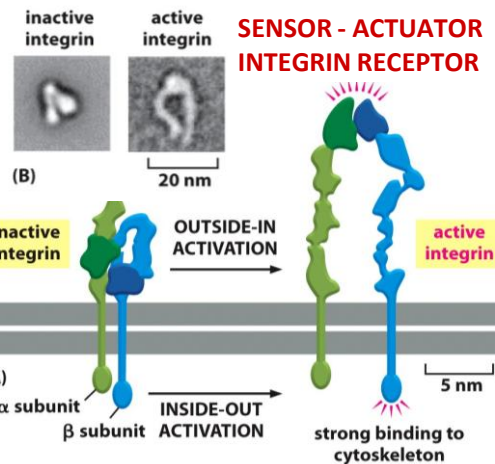
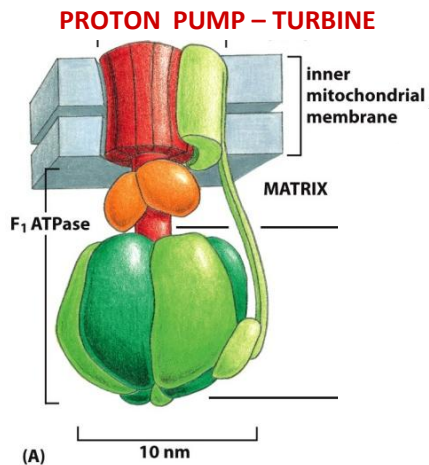


Course Objectives:

- [1] To understand how macromolecular machines in living cells contribute to health & disease.
- [2] To explore design of engineering systems inspired by mechanics and energy conversion processes in cells, refined by natural selection for over 3 billion years.
- [3] To enable engineering career choices useful to healthcare & to biological research.
- [4] Project Areas: Studies in cellular or molecular level of diagnosis or treatment; tissue engineering; targeted drug delivery; bio-inspired engineering.

Themes and Topics:

- Cell components and their functions.
- Families of molecules used by cells.
- Energy conversion and ordering processes.
- Proteins –the machine systems of cells.
- DNA –the cell’s Library and copy machines.
- Mech analyses of cytoskeleton, cell membrane.
- Cell movement and forces.
- Cell mechanotransduction.
- Tissue regeneration, stem cells for healing.
- Cancer
- Diagnostics/treatment at cell & molecule level.
- Bio-inspired engineering systems.



TENSEGRITY STRUCTURES

MECH510: Living Cells and their Molecules: Mechanics and Thermodynamics

Instructor: R. Bhiladvala Units: 1.5 Hours: 3-0-1 Summer 2013

Web Info: <http://moodle.uvic.ca> is the course info site for announcements, assignments, and course materials.

Text: Essential Cell Biology, 3rd Edition
(New texts are under review for 2013. Chosen textbook will be stocked in Campus Bookstore)

Materials: Class slides, papers, movies, on Moodle course site.

Evaluation	MECH510
<i>Assignments & Short Quizzes:</i>	20 %
<i>Project:</i>	50%
<i>Midterm Quiz:</i>	15%
<i>End Term Quiz:</i>	15%

MECH 510

Units: **1.5**

Hours: **3-0-1**

Living Cells and their Molecules: Mechanics & Thermodynamics

Provides an engineering introduction to cell architecture, and cell function in health and disease states. Cell components and functions. Families of molecules used by cells. The role of water in cell architecture. Proteins –the machine systems of cells. Thermodynamics of metabolic processes. Mechanical analyses of cytoskeleton, cell membranes. Cell movement and forces. Cellular mechano-transduction. Readings in bio-inspired engineering systems, biotechnology, molecular diagnostics, tissue regeneration, stem cells and cancer.