

BIOE 459/BIOE 559 Cell Engineering
3 Credit Hours
Fall 2014

Instructor: Adam Higgins
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Office Hours: Th 2-3 pm, or by appt.

Meeting Schedule: MWF 9:00-9:50, KEC 1001

Prerequisites: BB 451, CHE 333

Revision Date: September 18, 2014

Catalog Description:

Application of engineering methods and principles to the study of mammalian cells. Emphasis will be placed on mathematical models of cellular processes (e.g., cellular mass transport, protein-ligand interactions, cellular mechanics) and methods for probing the physical characteristics of biological molecules and cells.

Reference Texts:

Molecular Biology of the Cell, Alberts et al., Garland Press, 5th Ed., 2008.

Molecular Cell Biology, Lodish et al., Freeman Press, 7th Ed., 2012.

Receptors: Models for Binding, Trafficking and Signaling, Lauffenburger, Oxford University Press, 1995.

Quantitative Human Physiology: An Introduction. Feher, Academic Press, 2012

Student Learning Outcomes:

By the end of the course, **BIOE 459** students must demonstrate an ability to:

1. identify and describe current significant challenges and trends in cell and tissue engineering;
2. use molecular and cellular biology to solve problems in cell and tissue engineering;
3. use appropriate mathematics and engineering knowledge to solve problems related to cell and tissue engineering.
4. successfully design a set of experiments using cells to investigate a problem, including selection of appropriate assays and design of data analysis strategies.

BIOE 559 students must meet the four outcomes above, and demonstrate an ability to:

5. write a research proposal to address a problem or test a hypothesis related to cell and tissue engineering.

Structure:

The course will consist of an introduction (cell structure, function and techniques) and three main sections: (1) experimental design in the context of cell and tissue engineering; (2) kinetic modeling of cellular processes; and (3) modeling of mass transfer in cells and tissues.

Course Grading:

Letter option only (A-F). Performance evaluation will be based on the following:

- Problem Sets (4 at 6% each) 24%
- Journal Article Write-Ups (4 at 6% each) 24%
- Participation 6%
- Exam 1 (Friday Oct. 31) 12%
- Exam 2 (Friday Nov. 14) 12%
- Exam 3 (Friday Dec. 5) 12%
- Final Report (due finals week) 10%
 - Students in BIOE 459 will write a literature review on a topic related to cell and tissue engineering. This will be a group project, with 2-3 people per group.
 - Students in BIOE 559 will write a grant proposal on a topic related to cell and tissue engineering. This will be a group project, with 2-3 people per group.

Final performance percentage will be assigned a letter grade by the following scale:

94-100	A	74-76	C
90-93	A-	70-73	C-
87-89	B+	67-69	D+
84-86	B	64-66	D
80-83	B-	60-63	D-
77-79	C+	0-60	F

Academic honesty

We take the issue of academic honesty very seriously. You will be expected to conduct yourself in a professional manner. Academic dishonesty such as cheating will not be tolerated -- students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- cheating- use or attempted use of unauthorized materials, information or study aids,
- fabrication- falsification or invention of any information,
- assisting- helping another commit an act of academic dishonesty,
- tampering- altering or interfering with evaluation instruments and documents, or
- plagiarism- representing the words or ideas of another person as one's own.

For more information about academic integrity and the University's policies and procedures in this area, please refer to the Student Conduct web site at: <http://oregonstate.edu/studentconduct/offenses-0> and the section on Academic Regulations in the OSU Schedule of Classes.

Course Values Statement

We are dedicated to establishing an inclusive learning environment that values all students' experiences. Therefore, disrespectful and demeaning statements, attitudes, and behaviors based on age, ability, color/ethnicity/race, gender identity/expression, immigration status, marital/parental status, military/veteran's status, national origin, political affiliation, religious/spiritual beliefs, sex, sexual orientation, socioeconomic status will not be tolerated.

Students with Disabilities

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 737-4098.