BMED 4500 Cell and Tissue Engineering Laboratory (Elective)

Catalog Description: BMED 4500 Cell & Tissue Engr Lab (1-6-3)
Prerequisite(s): BMED 3610 (w/concurrency)
The principles of cell and tissue engineering will be presented as a laboratory course to give students a hands-on experience. Cell engineering topics include receptor/ligand interactions, cell cycle/metabolism, cell adhesion, cellular mechanics, cell signal transduction, and cell transfection. Tissue engineering topics include applications, biomaterials/scaffolds and cells for reparative medicine, bioreactors and bioprocessing, functional assessment, in vivo issues.

Textbook: Tissue Engineering, Palsson et al, Pearson Prentice Hall, Inc. (2004)

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Topics Covered:

1. Fundamentals of cellular engineering
2. Tissue culture fundamentals
    a. Cells and Tissues, Cell/Tissue Culture Cell Growth and Differentiation
    b. Tissue development
    c. Cell cycle and metabolism
    d. Receptor-ligand interactions
    e. Cell adhesion
    f. Cell migration
3. Fundamentals of tissue engineering
    a. Biomaterials for tissue engineering
    b. Cells for repair
    c. Bioreactors and bioprocessing
    d. Functional assessments
    e. Host integration
    f. Regulatory and Ethical Issues

Course outcomes:

Students who complete this course will be able to:
Outcome 1: Apply their acquired laboratory skills and experimental design skills to cell and tissue engineering experiments (Student Outcomes a, b, g, k,)

- 1.1 Use experimental variables and controls
- 1.2 Generate and analyze data
- 1.3 Present experimental results

Outcome 2: Identify the engineering and biological issues relevant to cell and tissue engineering (Student Outcomes b, e, j, and k)

- 1.1 Evaluate the critical issues in developing a tissue engineered construct

1.2 Evaluate the governing principles of cell and tissue engineering through a comparison of what is physically performed in the laboratory with what is presented in the corresponding lecture component

Correlation between course outcomes and student outcomes:

BMED 4500											
	Biomedical Engineering Student Outcomes										
Course outcomes	a	b	c	d	e	f	g	h	i	j	k
1.1	X	X									X
1.2	X	X									X
1.3							X				
2.1										X	
2.2		X			X						X

The Wallace H. Coulter Department of Biomedical Engineering Student Outcomes:

a. an ability to apply knowledge of mathematics, science, and engineering;
b. an ability to design and conduct experiments, as well as to analyze and interpret data;
c. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, societal, political, ethical, health and safety, manufacturability, and sustainability;
d. an ability to function on multidisciplinary teams;
e. an ability to identify, formulate, and solve engineering problems;
f. an understanding of professional and ethical responsibility;
g. an ability to communicate effectively;
h. the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context;
i. a recognition of the need for, and an ability to engage in lifelong learning;
j. a knowledge of contemporary issues;
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice;