Course: ChE 482 – Introduction to Tissue Engineering

Semester: Spring 2011

Course Format and Credit Hours: 3 hr Lecture
3 hr Credits

Prerequisites: ChE 381, ChE 382

Instructor: Dr. Robin Hissam, 443 Engineering Sciences building
293-9339; Robin.Hissam@mail.wvu.edu

Schedule: 11-12:15 TR

Location: 449 Engineering Sciences Building

Office Hours: 3-4pm Monday, Wednesday

Course Objectives: Tissue engineering requires an understanding of the role played by both cells and a scaffold in the function of a tissue. The objective of this course is to introduce biological principles and engineering fundamentals as they pertain to cell behavior and substrate properties. The design and characterization of artificial tissues will be discussed using properties and function of native tissues as a guide.

Expected Learning Outcomes: Upon successful completion of this course, students will be able to:

1. Identify biological and physical properties of tissues.
2. Identify key properties that need to be addressed to develop a tissue engineered substrate.
3. Apply biological, chemical, and engineering principles to tissue engineering problems.
4. Critic and discuss scientific publications.
5. Communicate scientific ideas through writing and presentation.

Recommended Text: Lanza, R., Langer, R., Vacanti, J., *Principles of Tissue Engineering*, Academic Press, 2007, Third Edition.

Grading:

Homework	30%
2 Journal Article Reviews (10% each)	
Design Project Interim Report (10%)	
Design Project Part I	30%
Design Project Part II	20%
Quizzes	10%
Professionalism	10%
Total	100%

Grade Assignment:

100-90	A
89-80	B
79-70	C
69-60	D
< 60	F

Grading Policy: Late assignments will not be accepted under any circumstances. No make up exams allowed except by prior arrangement with instructor. Grading appeals in writing on the day the assignment is returned.

Professionalism: Professionalism encompasses the behavior that would be expected of a person in a formal/professional setting. Attendance, participation, and respect toward all members of class are expected and will be evaluated.

Design Project: A design project will be assigned to small groups to research a tissue engineering application and design a plausible method to take a system from design to implementation. Additionally, they will need to consider the possible side effects of their system and the ethics associated with tissue engineering. The measurable for this design project will be a research paper and brief presentation at the end of the semester.

Homework: Homework will relate to the design project in an attempt to promote working on the project over the course of the semester. These assignments will include two interim design reports.

Journal Article Reviews

Reviews of two journal articles related directly to the design project will be submitted as homework, which will enhance the students ability to evaluate a journal article for both its strengths and weaknesses. The review will be comprised of four sections; 1) introduction to the topic addressed and objective of the article, 2) discussion of information and data presented, 3) critic of work, including strengths or weaknesses, particularly how/if the authors met the objective of the paper, and 4) presentation of ideas to enhance or further the research. The purpose of these assignments is to ensure the students can read, critic, and investigate the articles and coherently convey and discuss their findings.

Design Project Interim Reports

A detailed outline of the class presentation will be required during the semester. In order to ensure high quality of a class lecture, an outline containing information gathered on the tissue engineering application, references, and examples of the application will serve as a road map for class preparation. The detailed outline benefits the students by giving structure and content to the oral presentation, organizing information for the literature review (final written report) and also encourages them to begin work on the project during the semester.

Attendance Policy: Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.

Social Justice Statement: "West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age,

disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and giving serious consideration.

If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700)"

"WVU recognizes the diversity of its students and the needs of those who wish to be absent from class to participate in Days of Special Concern, which are listed in the Schedule of Courses. Students should notify their instructor by the end of the second week of classes or prior to the first Day of Special Concern, whichever is earlier, regarding Day of Special Concern observances that will affect their attendance. Further, students must abide by the attendance policy of their instructors as stated on their syllabi. Faculty will make reasonable accommodation for tests or field trips that a student misses as a result of observing a Day of Special Concern."

Course Schedule:

Week	Dates	Topic	Homework Due
1	01/11/11, 01/13/11	No Classes	Reading
2	01/18/11, 01/20/11	Introduction to Tissue Engineering	
3	01/25/11, 01/27/11	Scaffolds	
4	02/01/11, 02/03/11	Scaffolds and Cells	
5	02/08/11, 02/10/11	Stem Cells and Signals	Article Review #1
6	02/15/11, 02/17/11	Implantation	
7	02/22/11, 02/24/11	Regeneration	
8	03/01/11, 03/03/11	Engineering Concepts	Article Review #2
9	03/08/11, 03/10/11	Engineering Concepts and Ethics	
10	03/15/11, 03/17/11	Future of Tissue Engineering	Outline
11	SPRING BREAK		
12	03/29/11, 03/31/11	Applications of Tissue Engineering: Special Topic #1	Presentation Notes
13	04/05/11, 04/07/11	Applications of Tissue Engineering: Special Topic #2	
14	04/12/11, 04/14/11	Applications of Tissue Engineering: Special Topic #3	
15	04/19/11, 04/21/11	Applications of Tissue Engineering: Special Topic #4	Final Report/ Review
16	04/26/11, 04/28/11	Applications of Tissue Engineering: Special Topic #5	
17	FINALS WEEK		