

Department of Chemical & Biomedical Engineering
BME 694/ BME 794
Tissue Engineering
Spring 2016

Tuesday and Thursday: 6:00 PM-7:15 PM (FH314)

Instructor: Dr. Chandra Kothapalli (Dr. K)
Assistant Professor

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Open Door Hours: Tue, Thurs 3 - 5 PM or by appointment

Catalog Description

BME 694 Tissue Engineering (3 credits)

Cross-listed with BME 794

Prerequisites: BME655 (Biomaterials), BME 553 (Cell & Tissue Biology), BME 658 (Medical Devices), ESC 270 (Materials Science), or equivalent; and Graduate standing in biomedical engineering or permission of the instructor.

Overview of the recent advances in biomedical field pertinent to engineering tissues in the body which were lost due to disease, injury, or genetic malformations. Topics include, molecular basis for cellular function and interactions, tissue engineering models, biological and engineering issues vital to tissue engineering system design, and individual/ tissue organ engineering.

OBJECTIVES

This course provides a fundamental knowledge of tissue engineering to biomedical engineering and medical device design professionals. The course will begin with an overview of the scope of tissue engineering and some basic concepts of cells and tissues. Then, the students will be exposed to various strategies developed for engineering cells and tissues in the body, using synthetic or biological materials. Alternative approaches such as stem cell therapy, gene therapy, etc., will also be discussed. Finally, students will engage in the design and development of a hypothetical tissue engineered product for solving a clinically relevant problem.

Prerequisites/ Co-requisites

Graduate standing in biomedical engineering or permission of instructor. Students should have knowledge of materials science, biomaterials, anatomy and physiology, cell and tissue biology.

CLASS POLICY

- Read CSU policy and procedures on academic integrity
<http://www.csuohio.edu/organizations/facultysenate/armiscon.html>
- Attendance: Students are expected to attend all the classes and participate in discussion. If for some reason, they won't be able to attend a particular class, they are expected to inform me by email or phone. This course is designed slightly differently and so missing a class could affect your final grade.

RECOMMENDED REFERENCE TEXTBOOKS (NOT REQUIRED TO PURCHASE)

- Principles of Tissue Engineering; by R. Lanza, R. Langer, J.P. Vacanti. Academic Press, San Diego; 2000.
- Biomaterials Science : An Introduction to Materials in Medicine. by B.D. Ratner, A.S. Hoffman, F.J. Schoen, J.E. Lemons Academic Press; 3rd edition, 2004
- Tissue Engineering. B.O. Palsson, S.N. Bhatia; Prentice Hall; 1st edition, 2003
- Methods in tissue engineering; A. Atala and R. Lanza; Academic Press, 2001

GRADING POLICY:

BME 694 level		BME 794 level	
• In-class Discussion/Presentations	40%	• In-class Discussion/Presentations	40%
• Homework	15%	• Homework	15%
• Final Exam	20%	• Final Exam	20%
• Final Project/ Presentation	25%	• Final Project/ Presentation	25%

Notes:

1. Since this is a 600/ 700 level course, grading will be slightly different. Students enrolled in 700x level section will have to complete two additional homework assignments, and will have 2 additional questions in the final exam paper.
2. Since this is a literature-driven course, extensive classroom discussion and presentations by students is desired. You will be assigned reading material (literature based on the topic of discussion), at least few days in advance, and will be asked to discuss that in class. Remember, 40% of your grade will be based on this approach.

Grading Policy:

A : 96-100%
A- : 91-95
B+ : 86-90%
B : 81-85%
B- : 76-80%
C : 65-75 %
F : < 65%

Grades are not negotiable.

Tentative Schedule

Week	Outline	Notes
Jan 19-21	Introduction The biology of regeneration	
Jan 26-28	Cells, Tissues, Scaffolds	
Feb 2-4	Vascular Tissue engineering	
Feb 9-11	Neural Tissue Engineering	
Feb 16-18	Cardiac Tissue Engineering	
Feb 23-25	Dermal Tissue Engineering	
March 1-3	Orthopedic Tissue Engineering	
March 8-10	Cartilage, Tendon Regeneration	
March 22-24	Liver, Kidney, Pancreas Regeneration	Individual final projects assigned
March 29-31	Biomechanics and Bioreactors	
April 5-7	Limb Regeneration	
April 12-14	Stem Cells	
April 19-21	Stem Cells	Project reports due on April 21
April 26-28	Student project presentations	3 students present each day
May 3-5	Student project presentations	3 students present each day, Final Exam assigned