

## Biomedical Engineering Department BMD ENG 346 Tissue Engineering

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### Textbook

Journal, magazine articles, and chapters from books. I recommend **Principles of Tissue Engineering** Ed. (Lanza, Langer, Vacanti). Access course information through "my blackboard" at <https://courses.northwestern.edu>.

### Course Objectives:

The students should:

- 1) Use a structured process to apply tissue engineering principles to a medical problem.
- 2) Integrate materials science, chemistry, biology, and transplantation medicine in order to provide potential solutions to human disease or medical problems
- 3) Use self-directed knowledge acquisition to analyze case studies and extract or apply fundamental tissue engineering concepts
- 4) Apply key principles or design paradigms of tissue engineering to various tissue or organ systems
- 5) Write a scientific research proposal that involves a tissue engineering application

### Class/laboratory schedule (number of sessions each week and duration of each session)

Winter Quarter 2016: Lecture 2:00-3:20 PM T/Th

### Contribution of course to meeting the professional component:

This is an introductory course to the principles and applications of tissue engineering that uses case studies and student-directed learning as educational tools to teach the material.

### Relationship of course to BME department program objectives:

This course is essential to those specializing in regenerative medicine and tissue engineering. The students will develop research, communication, and analytical skills that will be important to their development in the field of tissue engineering.

### Assessment of outcomes:

Grading: Case studies/class participation (equally weighted) - 45%  
Quiz 1 - 15%  
Oral presentation of the final project - 10%  
Final Project - 30%

Suggested Text: Useful database search engines that are available through N.U. library's electronic resources: Medline and Science Citation Index (Web of science).

"All papers submitted for credit in this course must be sent as e-mail attachments as well as delivered in printed form. Your written work may be electronically tested for plagiarized content."

### Lectures and case-based studies:

(A 1-page summary statement of your literature search and analysis of its relevance to the case is due upon request at the beginning of Tuesday's class. BE PREPARED to discuss the case. Failure to turn in a summary statement when requested will forfeit the oral component of the team's grade. An expanded case analysis, incorporating class discussion, will be due electronically at 12:00 PM on Friday. Late case reports **WILL NOT BE ACCEPTED**)

Week 1 (1/5, 1/7)      **Introduction to tissue engineering and the case based method** (assignment of case 1)

Week 2 (1/12, 1/14)      **Cell/extracellular matrix interactions** (discussion of case 1, written report for case 1 due 1/15; assignment of case 2)

- Week 3 (1/19, 1/21) **Cellular processes and interactions with materials/Nanotechnology in tissue engineering** (discussion of case 2, written report for case 2 due 1/22; assignment of case 3)
- Week 4 (1/26, 1/28) **Transport of nutrients and metabolites** (vascularization) (discussion of case 3, written report for case 3 due 1/29) Send in quiz questions
- Week 5 (2/2, 2/4) **QUIZ 1 and Oral presentation of preliminary proposal** (assignment of case 4)
- Week 6 (2/9, 2/11) **Scaffolds for tissue engineering** (discussion of case 4, written report for case 4 due 2/12; assignment of case 5)
- Week 7 (2/16, 2/18) **Regenerative medicine clinical case study** (discussion of case 5, Final project topic and abstract due 2/18; written report for case 5 due 2/19; assignment of case 6)
- Week 8 (2/23, 2/25) **Tissue microenvironment and bioreactor design. Guest: Dr. Jason Wertheim, Transplant Surgery, Feinberg School of Medicine** (discussion of case 6, written report for case 6 due 2/26)
- Week 9 (3/1, 3/3) Work on **Proposal/Practice Presentation**
- Week 10 (3/8, 3/10) **Oral final proposal presentation. (Written report due 3/11)**

\*Written reports of the cases should be no more than 2 pages plus references (single space, 12 point font 1-inch margins). Please be concise and to the point.