BENG 5890 / 6890 Tissue Engineering

TTh 1:30-2:45pm ENGR 206

Credits: 3

Instructor: Dr. Elizabeth Vargis
(ENGR 402M, 797-0618, vargis@usu.edu or through Canvas)

Graduate Assistant: Farhad Farjood

Office hours: By appointment

Textbook: (none) Reading material available through Canvas

Other Materials: Small lab book (Dr. V has extras), Safety glasses

References: Tissue Engineering (Palsson and Bhatia, 2003)
Principles of Tissue Engineering (Lanza, et al., 2007)

Prerequisites: BENG 2330 or permission of instructor;
Admission to Professional Engineering Program

Introduction to fundamentals of tissue engineering. Investigation of engineering design strategies for artificial organs, as well as treatments for disease disorders of nerves, blood vessels, bones, cartilage, skin, and liver.

Who should take this course: Senior biomedical engineering students wanting to gain deeper knowledge of one area of biomedical research and engineering, understand concepts in tissue engineering design and participate in research and design projects in BE.

IDEA Learning Objectives
3. Learning to apply course material (to improve thinking, problem solving, and decisions)
11. Learning to analyze and critically evaluate ideas, arguments, and points of view

ABET Outcomes
b. Ability to design and conduct experiments, analyze and interpret data.
e. Ability to identify, formulate, and solve engineering problems.

Grading

- Attendance and participation — 10% (5% for graduate students)
    - Arriving on time, contributing appropriately to class discussion, being a good class citizen (not distracting your fellow students)
- Assignments — 20%
- Lab — 25% (20% for graduate students)
    - Participation, lab notebook, data analysis
- Lecture & Homework — 10% (graduate students only)
- Group Project — 20%
- Quizzes (unannounced) — 5%
- Exams (2) — 20%

Grading (generally fits following pattern) **A** 100-94%, **A-** to 90%, **B+** to 87%, **B** to 83%, **B-** to 80%, **C+** to 75%, **C** to 70%, **C-** to 65%, **D** to 50%, **F** below 50%

Course policies: Laptops may be used to take notes, read course material, search for topics, etc. pertaining to class (no emailing, chatting, disrupting the class, etc.). Treat the instructor / invited speakers / student presenters as you would want to be treated if you were lecturing.

Assignments: Due via Canvas, unless noted otherwise.

Late Policy: Late work creates difficulties in grading and a strict policy must be enforced. I am not insensitive to your personal problems, but I must insist that you rise above them. When an instructor grants an extension to one student, it is unfair to the other students who would have benefited from special treatment.

All assignments are due at the date and time specified. However, each student is entitled to one personal emergency. Thus, you are allowed to turn in ONE assignment up to one week late without penalty or explanation. When the personal emergency excuse has been used, late work is accepted with a penalty of 10% off *per day*. Please email the assignment to Dr. V.

Ethical conduct / Cheating policy: Students are expected to abide by the rules of conduct expected of all university students. Homework and lab reports must reflect individual effort; however, students are encouraged to form study groups and work as teams. Failure to properly cite sources is plagiarism. *Be certain to properly cite primary literature (refereed journal articles) for materials such as graphs, pictures, tables, videos used for presentations or papers.* Do not cut and paste material from the Internet for your lab reports and assignments.

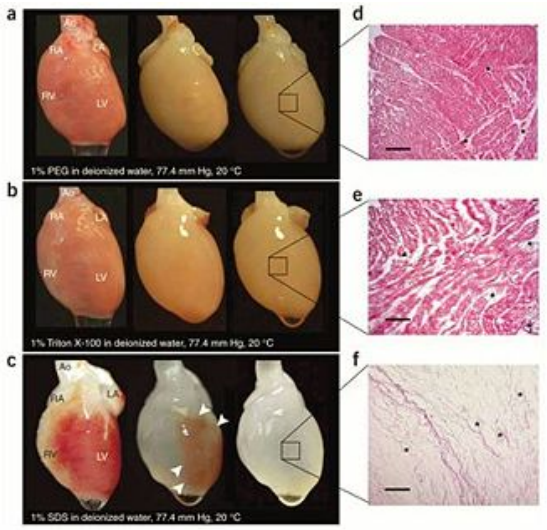
All forms of cheating are absolutely prohibited. Anyone caught cheating will receive negative points equal in magnitude to the possible points on the assignment or test. Repeat offenses will result in an automatic F for the class.

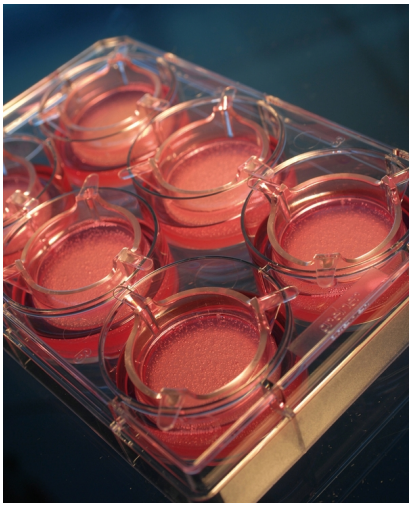
Add policy: The last day to add this class is January 29, 2018. Attending this class beyond that date, without being officially registered, will not be approved by the Dean's Office.

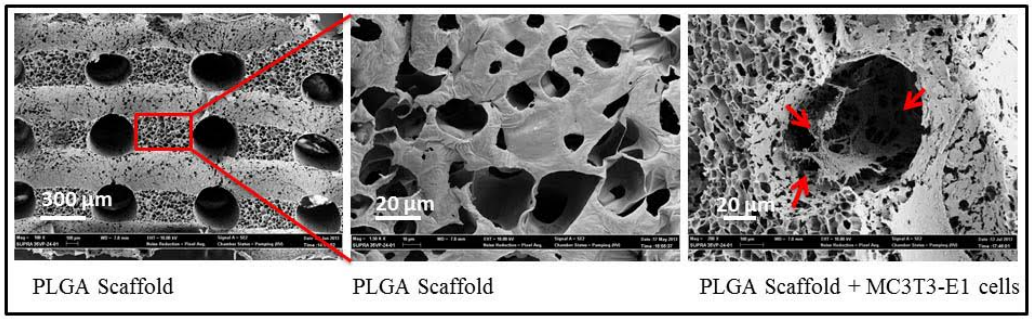
Students must be officially registered for this course. No assignments or tests of any kind will be graded for students whose names do not appear on the class list

Drop policy: January 29, 2018 is the last day to drop without notation on transcript. March 22, 2018 is the last day to withdraw with W on transcript.

Disabilities: If a student has a disability that will likely require some accommodation by the instructor, the student must contact the instructor and document the disability through the Disability Resource Center, preferably during the first week of the course. Any requests for special considerations relating to attendance, pedagogy, taking of examinations, etc. must be discussed with and approved by the instructor. In cooperation with the Disability Resource Center, course materials can be provided in alternative formats, e.g. large print, audio, diskette, or Braille.







Tentative Course Schedule (subject to change—check Canvas Calendar)

Week	Day	Date	Lecture	Assignment	Lab
1	T	1/9	Course overview Cell and tissue engineering	1: Personal motivation	
	Th	1/11	Recent TE news		
2	T	1/16	Biomolecular interactions Basic building blocks of cells		1. Cell culture technique / Media preparation
	Th	1/18			
3	T	1/23	Tissue organization	2:	2: Cell culture
	Th	1/25			
4	T	1/30	Morphogenesis	3:	3. Trypsinization
	Th	2/1			
5	T	2/6	Cell migration	Assignment 4: Project concept	4. Cryopreservation
	Th	2/8			
6	T	2/13	Stem cells	Assignment 5:	5. Cell Staining
	Th	2/15			
7	*T*	*2/20*	*Monday Schedule*		
	Th	2/22	Journal Club		
8	T	2/27	**Exam 1**	Assignment 6:	6. Substrate Testing
	Th	3/1			
	T	*3/6*	*Spring Break*		
	Th	*3/8*			
9	T	3/13	Biomaterials and Polymers	Assignment 7: Project proposal and experimental plan	7. Bioreactor Cell Culture
	Th	3/15			
10	T	3/20	Cell and Tissue characterization Analysis of cell growth		Group Project (1/5)
	Th	3/22			
11	T	3/27	ECM: properties, components, synthesis and degradation of cell growth		Group Project (2/5)
	Th	3/29			
12	T	4/3	Immune system complications		Group Project (3/5)
	Th	4/5			
13	T	4/10	*Graduate Student Presentations*		Group Project (4/5)
	Th	4/12			
14	T	4/17	**Exam 2**		Group Project (5/5)
	Th	4/19			
15	T	4/24	Group Presentations		
	Th	4/26			