**Tissue Engineering Laboratory**
**BE 5365/BIOL 4365**
**Spring 2019**
**Tuesday/Thursday 9:30 — 10:50 am**
**ERB 280**

**Instructor:** Dr. Liping Tang  
**Office:** ERB 238  
**Office Hours:** Tuesday and Thursday 10:50 – 12:00 pm  
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**Course Description:** Introduction to laboratory techniques commonly used for designing and prototyping various products used in tissue engineering such as scaffolds and other medical devices, with a focus on the mechanisms and applications of 3D printing technology. The designing of tissue engineering products would be taught using Solidworks, one of the most popularly used software for computer aided 3D modelling.

**Meeting Times:** Tuesday & Thursday 9:30 – 10:50 am  
**Location:** ERB 280  

**Course Learning Goals/Objectives:** Students will learn the necessary skills required for proficiency with 3D modeling of scaffolds and medical devices in Solidworks. Students will be introduced to concepts of designing tissue engineering products. Students will learn basic Solidworks simulation technique to determine fluid flow mechanics and mechanical properties of scaffold and medical device designs. Students will become familiar with fundamental 3D printing software and its tissue engineering applications.

**Course Evaluation & Final Grade:**  
- Assignments (7 out of 8): 40%  
- Group Presentations 1 & 2 (12.5% each): 25%  
- Final Presentation: 20%  
- Participation/Attendance/bonus points: 15%

**Overview of Course Components**  

**Assignments:** Will include both individual and group assignments. Assignments may be due before the end of lab or at a later class period. No late homework will be accepted.
Presentations: Three group presentations will be included on the subject of a scaffold design project. Presentations will be done in groups and will provide a summary of the labs and results of all topics covered. Presentations must be submitted via Blackboard by 6:00 PM the day before the presentation date. No late presentations will be accepted. More detail on format and requirements will be given prior to the presentation dates.

Participation/Attendance: Attendance is mandatory on Tuesday without a University-approved and documented reason for absence. Participation will be evaluated on a class-to-class basis. Attendance is optional on Thursday for the dates which are highlighted.

Course material: No textbook is required for this class. All protocols and course materials will be uploaded on the Blackboard. Students are encouraged to bring their own laptops with Solidworks installed. Go to https://www.uta.edu/oit/cs/software/dassault-systemes/solidworks-win/index.php for the instructions to install Solidworks.

Laboratory Safety Training Required: Online at www.uta.edu/training. Login with UTA NetID and password.

Laboratory Schedule:

Section 1: Introduction to Solidworks

Jan 15 (Tue) : Course Introduction
Jan 17 (Thurs) : Introduction to Solidworks
Jan 22 (Tue) : Solidworks Beginner Functions
Assignment #1: Protocol submission & Solidworks tutorial 1
Jan 24 (Thurs) : Solidworks Intermediate Functions
Assignment #2: Protocol submission & Solidworks tutorial 2
Jan 29 (Tue) : Solidworks Advanced Functions
Assignment #3: Protocol submission & Solidworks tutorial 3
Jan 31 (Thurs) : Introduction to 3D Printing/Bioprinting

Section 2: Introduction to Device Design

Feb 5 (Tue) : Guided Design: Simple Part
Assignment #4: Part submission
Feb 7 (Thurs) : Guided Design: Simple Part for Assembly
Feb 12 (Tue) : Guided Design: Simple Part for Assembly Cont.

Feb 14 (Thurs) : Guided Design: Part Integration into Assembly

Feb 19 (Tue) : Introduction to Fablab

Feb 21 (Thurs) : Group Presentation #1: Device Assembly

**Section 3: Scaffold Design**

Feb 26 (Tue) : Device/scaffold Post-Processing

Feb 28 (Thurs) : Scaffold Design: Morphology

Mar 5 (Tue) : Scaffold Design: Porosity

Mar 7 (Thurs) : Scaffold Design: Design Challenge

**Mar 11-16 Spring Break**

**Section 4: Introduction to Simulation in Solidworks**

Mar 19 (Tue) : Mini integrated Design Group Project: Scaffold/Device integration

Mar 21 (Thurs) : Solidworks: Introduction to Fluid Simulation

Mar 26 (Tue) : Simulation Design Challenge: Flow Modelling

Mar 28 (Thurs) : Group Presentation #2: Mini Project/Final Project Design Progress

Apr 2 (Tue) : Solidworks: Introduction to Mechanical Simulation

Apr 4 (Thurs) : Simulation Design Challenge: Mechanical Properties

Apr 9 (Tue) : Mini Integrated Design Group Project: Simulation

**Assignment #5: Assembly submission**

**Assignment #6: Design challenge submission**

**Assignment #7: Design challenge submission**

**Assignment #8: Design challenge submission**
Section 5: Final Project

Apr 11 (Thurs) : Final Project Design

Apr 16 (Tue) : Prototype presentation

Apr 18 (Thurs) : Final Printing

Apr 23 (Tue) : Group Final Presentation (1-4)

Apr 25 (Thurs) : Group Final Presentation (5-8)

Apr 30 (Tue) : Design improvement

May 2 (Thurs) : Design improvement

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112 -- The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.

Academic Dishonesty: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)