

Course Syllabus for

MECH 6v29 – Biomedical Innovation: Theory, Design, and Practice

Section	Days	Time	Room	Instructor	TAs
001	T	1:00-3:45pm	ECSW 2.325 (Lecture) ECSW 3.315 (Lab)	Ann Majewicz Fey	TBD

Professor Contact Information

Dr. Ann Majewicz Fey

Office: ECSW 2.355G
Office Hours: Thursday, 1:00-3:00 pm
Phone: 972-883-4426
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Teaching Assistant Contact Information

Name: TBD
Office: TBD
Office Hours: TBD
Email: [TBD](#)

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisite: MECH 4310 or Graduate Student
Co-requisite: None

Course Description

The purpose of this course is to give students a broad understanding of the design and innovation process for biomedical technology. Course topics include: needs finding, concept generation and selection, prototyping, biodesign testing (e.g., user, bench, simulated use, *ex vivo* and *in vivo* tissue testing), regulatory processes, and manufacturing quality management. While the expectation is that students will be experienced engineers, some broad topics related to mechatronic design, sensor data acquisition and analysis, and advanced experimental testing and evaluation will be covered. This course includes laboratory time as well as a team-based project in which students will be partnered with clinical faculty mentors and other stakeholders to solve an unmet healthcare need. The outcome of the project will be a mature, manufacturable, validated, and reproducible prototype (or prototypes) to demonstrate a solution to the unmet need, as well as associated equipment required for the manufacture and/or testing the solution.

Course Objectives and Topics

Introduce theory, design, analysis, and implementation of novel biomedical technology. The learning objectives/outcomes for this course are as follows:

- Understand the roadmap for identifying, inventing, and implementing new medical devices, diagnostics, or other technologies intended to create value for healthcare stakeholders.
- Understand the function and application of mechatronic components (e.g., sensors, actuators, microprocessors, etc.) in the design, manufacture, or testing and validation process for medical technology.
- Develop teamwork, communication and project management skills for biomedical device design.

Required Textbook and Supplies

Authors: Yock, Zenios, Makower
Title & Edition: Biodesign: The Process of Innovating Medical Technologies, 2nd Edition
ISBN-13: 9781107087354

It is strongly suggested that you use a personal laptop for this course. The software used in this course includes: Microsoft Office (Word, Excel, Power Point), Matlab, and Solidworks. These can be purchased from the UTD Technology Store (<http://www.utdtechstore.com/>).

All software is also available in the ECSW computer labs.

Notes, supporting material, and other resources will be posted on eLearning.

Important Dates

Martin Luther King Day (no classes): January 20
Last day to withdraw without "W": March 23
Last day to withdraw with "W": April 20
Spring Break (no classes): March 16-22
Last day of classes: April 30
Finals week: May 2-8

Course Structure and Schedule

In MECH 6v29, you will attend one 2 hour and 45-minute class sessions each week, which will take place in **SPN 1.110 and SPN 1.115**. The first hour of the class will be a lecture and the second half of the lab will occur in lab, with some structured laboratory exercises.

The following is a **tentative** schedule of class topics. These dates are subject to change. It is your responsibility to keep up with any changes.

Week	Class	Topic(s)	Laboratory
1	1-14	Overview of Course, Needs Finding, and Project Introductions	PROJECT INTRODUCTIONS
2	1-21	Mechatronic Design and Actuators	Basic Electronics and Actuators Lab

3	1-28	Sensors and Signal Processing	Sensing Lab
4	2-4	Needs Screening and Concept Generation and Evaluation	<i>No Lab, Schedule Clinical Observations</i>
5	2-11	Programming (state machines)	State Machine Lab + Project Work Time
6	2-18	Prototyping and Manufacturing Considerations	Project Work Time
7	2-25	<i>CONCEPT SELECTION PRESENTATIONS</i>	
8	3-3	Biodesign Testing and Debugging	Project Work Time
9	3-10	MIDTERM EXAM	Project Work Time
10	3-17	SPRING BREAK NO CLASS	
11	3-24	Project planning + Case Studies	<i>Design Review and Demo</i>
12	3-31	Business Strategy Development (<i>guest lecture</i>)	Project Work Time
13	4-7	Project Work Time (*in lab*)	<i>Testing Methods Review</i>
14	4-14	Project Work Time (*in lab*)	Project Work Time
15	4-21	<i>No class. FINAL PROJECT EXPO WEEK (Date TBD)</i>	
16		Final Exam (TBD)	

UTSW Auditors are required to be at UTD: 1/14, 2/25, 4/7, 4/14, and Expo Day (TBD)

Grading Policy

[30%] Exams and Quizzes: There will be a midterm and final exam. Throughout the course, there may quizzes, either in class, or on eLearning, which combined account for 30% of the exam/quizzes grade. Grades for the lowest quiz will be dropped. Make-up exams will only be allowed for the cases of illness, participation in a university-sponsored event (e.g., athletics), or under unusual circumstances. For all cases, you are required to provide proper documentation.

[30%] Homework and Laboratory Assignments: There will be weekly, written homework laboratory completion worksheets or reports. These deliverables will be graded based on completeness, correctness, and legibility. Templates for homework and report submissions will be provided. *Late assignments will not be accepted under any circumstances and the lowest homework grade will be dropped. All laboratory deliverables are required – no exceptions.*

[40%] Final Project: The final design project will be graded on (1) a concept presentation, (2) a critical design and demonstration of functional prototype, (3), review of testing methods and results (4) participation in the final project expo competition, and (5) a final project report. The class demo day will be on **TBD, in ECSW or UTDESIGN**, and will be open to the public, including UTD faculty and students, and UTSW faculty and stakeholders. The competition grade will be determined by performance during the event as well as an evaluation by a panel of impartial judges.

You have five business days to appeal any grade after being assigned. Your final grade will be rounded to the nearest whole number, based on the following ranges:

	Plus (+)		Minus (-)
A	100 - 97	96 - 93	92 - 90
B	89 - 87	86 - 83	82 - 80

C	79 - 77	76 - 73	72 - 70
D	69 - 67	66 - 63	62 - 60
F		59 and below	

Course & Instructor Policies

Email must be sent from your UTD email account to the UTD email address of the instructor. Emails related to homework submissions should be addressed to both the instructor and TA.

The use of laptop computers, tablets, cell phones, or other electronic devices are **not** allowed during lectures or exams, unless required for the activity.

Academic dishonesty will not be tolerated. All suspected cases of academic dishonesty will be sent to the Office of Judicial Affairs (see <http://www.utdallas.edu/deanofstudents/managing/>). If it is determined that academic dishonesty occurred you will receive a grade of **F** in this course.

For a full list of university policies, please visit <http://go.utdallas.edu/syllabus-policies>

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR.