

MAE 211– Mechatronics

Instructor: Terence Musho, PhD, PE
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Office hours: W 12:00 PM - 12:50 PM or by appointment

Lecture: TR 11:00 – 12:15 AM Room MRB-E 113 (Lecture)
Lab: T 2:00 – 4:50 AM Room ESB-E 903 (Lab – Section 2)
R 2:00 – 4:50 AM Room ESB-E 903 (Lab – Section 3)
F 2:00 – 4:50 AM Room ESB-E 903 (Lab – Section 4)
W 9:00 – 11:50 AM Room ESB-E 903 (Lab – Section 5)

Text: None

References: Additional References will be provided on Ecampus.

Pre-requisites: ENR102 or CHE102 or MAE102

Course Objectives: The objective of this course is to gather the knowledge required for the selection of mechanical and electronic components and the integration of these components into complex electro-mechanical systems. These skills will be acquired in both a lecture and hands-on laboratory setting. The laboratory will provide a design of experiments approach with components and measurement equipment used in the design of mechatronic products.

Course Learning Outcomes: This course supports the following ABET Learning Outcomes:

	ABET Outcomes
1. Know how to create mechanical drawings of basic items using SolidWorks Solid Modeling software.	C
2. Know how to specify and use basic mechanical design elements, such as gears, belts, lead screws, joints, differentials and others.	-
3. Know how to read and generate simple wiring schematics, and how to construct circuits using standard industrial components.	D
4. Know basics of MATLAB, and how to use it to perform data acquisition and control functions.	K
5. Know how to specify and use common electro-mechanical sensors and actuators, such as DC motors, stepper motors, relays, potentiometers, optical encoders, proximity sensors, temperature sensors and switches.	D
6. Know how to write a simple engineering proposal for design and development of a product in response to a design specification.	C
7. Know how to work in a team to subdivide, coordinate, and integrate pieces of a design project and to develop a working prototype.	D

Grading:	Homework and Quizzes.....	10%
	Lab Reports.....	20%
	Exams.....	20%
	Project.....	15%
	Final Exam.....	35%

A final letter grade will be assigned on the following basis:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
Below 59	F

Quizzes and Exams:

A short quiz may be given over the material covered in both the lecture and the lab. Quizzes will not be announced ahead of time. There will be no makeup quizzes. There will be two exams and a comprehensive final exam. You must notify me before the start of the exam if you are going to be absent. There will be no makeup exams for unexcused absences. You may be required to show your student ID to turn in exam. You cannot use phones on exams. You will be given one warning if I see your phone out again you will receive a zero for exam and be reported to Dean's office.

Lab Attendance:

Attendance for all labs is mandatory. You must attend your assigned lab section. You will be given assigned lab stations. You must stay at this same lab station throughout the semester.

Lab Reports:

All labs will have one report for each lab group. All submission must be in PDF format that follow the provided Word Document Template. All lab assignments are due exactly one week after the starting time of your lab session unless otherwise specified.

Class Rules:

1. Professional attitude in class is expected from all students.
2. No use of cell phones allowed during exams or quizzes.
3. Attendance is mandatory. Attendance points may be given.
4. Lab assignments must be submitted through ecampus. I will not accept printed copies of lab reports.
5. All assignment problems must be presented on individual pages on plain white paper or engineering pad paper (each page must have NAME, DATE, and ASSIGNMENT NUMBER).
6. Make-up exams will be strongly discouraged and will only be allowed in the event of an excused absence or illness. In these instances the make-up will be given at the instructor's convenience.
7. Completeness, neatness and legibility in assignments, exams and projects are mandatory. All assignments and exams will be submitted on ecampus.
8. **NO LATE LAB ASSIGNMENT WILL BE ACCEPTED. Ecampus submission will close promptly on due date and time.**
9. Calculators will be inspected prior to exams for compliance.

10. No hats will be allowed during exams. Book bags may be required to be placed in the front of the classroom during exams. Student IDs may be required to turn-in exams.
11. All lab reports will be submitted on ecampus and scanned for plagiarism.

Academic Dishonesty: Cheating in way or form is unacceptable at WVU and may result in an UF grade and disciplinary action, regardless of overall performance. For definition of "Academic Dishonesty" and code of conduct, refer to the WVU Student Handbook and the WVU Undergraduate Catalog.

Policy of Zero Tolerance in Academic Dishonesty. It is a policy that cheating of any kind or form in exams, quizzes, project or assignments will result in formal disciplinary action that may include unforgivable F (UF), suspension or dismissal from the Program.

Each lab assignment and exam submitted on Ecampus may be subject to electronic plagiarism scanning. If a student is found to have plagiarized from another student's assignment both students will receive zero with potential for additional disciplinary action.

Inclusive Statement: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>

TENTATIVE COURSE OUTLINE

Date	Topics	Notes
Week 1 Aug 13 ~ 17	Introduction to Mechatronics No Lab	
Week 2 Aug 20 ~ 24	Signal and Measurement No Lab	
Week 3 Aug 27 ~ Aug 31	Basic Statistics Lab 1a Solidworks Parts	
Week 4 Sep 03 ~ 07	Gear Trains and Linear Motion Lab 1b Solidworks Assemblies	
Week 5 Sep 10 ~ 14	Basic Electricity Lab 2 Gears and Power Transmission	
Week 6 Sep 17 ~ 21	Kirchhoff's Law and Analysis of Circuits Lab 3 Instruments in the Mechatronics Lab	
Week 7 Sep 24 ~ 28	Diodes and Transistors Open Lab – Assign Project and Groups	
Week 8 Oct 01 ~ 05	Exam 1 – Oct 4 th . Lab 4 Simple Circuits	Mid-Semester Grade Due Oct 4th
Week 9 Oct 08 ~ 12	DC and Stepper Motors Open Lab – Work on Project	
Week 10 Oct 15 ~ 19	Position Measurement Lab 5 Intro to Arduino	Last Day to Drop A Class
Week 11 Oct 22 ~ 26	Feedback Control and Digital Signal Lab 6 Analog I/O and DC Motor Speed Control	Oct. 23, Last Day to Drop a Class
Week 12 Oct 29 ~ Nov 02	Sampling Theory Lab 7 Stepper Motor Control	
Week 13 Nov 05 ~ 09	Exam 2 Open Lab – Work on Project	Nov. 6, is Election Day
Week 14 Nov 12 ~ 16	Data Acquisition Lab 8 Closed-Loop Feedback Control	
Week 15 Nov 19 ~ 23	Fall Recess No Lab	
Week 16 Nov 26 ~ 30	Mechatronics Design Considerations Open Lab – Work on Project	
Week 17 Dec 03 ~ 07	Review Final Project Demonstration	
<u>Final Exam</u>	? in MRB E-113 Final Project Report Due	