

ME 3550 Mechatronics Components

Learning Outcomes

Dr. Bob Williams

The objective of this course is to expose students to basic components of mechatronic systems to prepare them for component / system implementation in ME 4550 Mechatronics. Students will understand at a mastery level the mechanical / electrical input and output characteristics of mechatronic components. Students will also be comfortable with interfacing two or more individual components in the context of system implementation. At a competence level students will understand how to choose appropriate components for mechatronic systems and understand the components' mechanical / electrical input / output characteristics.

Specific topics include:

1. Resistors, Capacitors, Inductors
2. Ohm's Law
3. Kirchoff's Voltage and Current Laws (KVL and KCL)
4. AC Impedance
5. Electronic circuit modeling
6. Semiconductors and Transistors
7. Logic Gates
8. Bridge Circuits
9. Microcontrollers (Pi Pico)
10. Switches & Relays
11. Strain Gauges
12. Electromechanical Components
13. Temperature Sensors
14. Electric Motors

ME 3550 Mechatronic Components Syllabus and Policy

Dr. Bob Williams 262 Stocker williar4@ohio.edu	Spring 2025 740-593-1096 people.ohio.edu/williams
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Time & Venue

Class	100	12:55 – 1:50 p.m.	Mon Wed	Porter 107	1696	3 credit hours
Lab	101	9:40 – 11:25 a.m.	Mon	Stocker 198	1697	OR
	102	9:40 – 11:25 a.m.	Wed	Stocker 198	11149	

Prerequisites

ET 2100 and (ET 3132 or PHYS 2056) and JR

Description

This course builds on basic circuits knowledge to develop competence with mechatronic system components such as basic electronic components, digital and analog circuits, microcontrollers, sensors, and electrical and mechanical actuation. Basic theory is integrated with hands-on laboratory implementation to aid students in understanding how mechatronic components function in mechanical systems.

Office Hours

2:00 – 3:30 p.m. Tu Th and by appointment

Required NotesBooks

Mechatronic Components, Dr. Bob Productions, ©2025

[Mechatronic Components \(lulu.com\)](https://www.lulu.com/search?kw=mechatronic+components)

I would NOT use all your Stocker prints for hardcopies of this required NotesBook.

You must first purchase from lulu.com before making a hardcopy locally.

Required Textbook

none

ME 3550 Course Website

people.ohio.edu/williams/html/Courses.html

Dr. Bob's Atlas of Models and Transfer Functions

people.ohio.edu/williams/html/PDF/ModelTFAtlas.pdf

Homework

Five homework assignments will be collected via hardcopy at the start of class as shown in the schedule on the following page. Each homework will be assigned via email two weeks before it is due. A **Memo** (see sample memo) summarizing the work must be the first page of each homework. All HWs are equally weighted.

Quizzes

Six quizzes will be given in class as shown in the schedule on the following page. All quizzes are closed notes and closed NotesBook. All quizzes are equally weighted.

Laboratory Reports

Seven laboratory experiments will be conducted in Stocker 198, according to the schedule given below. Laboratory experiments will be conducted in teams of 2-3 students. Kathline may form a team of 1 if she so chooses. One laboratory report from each team will be collected in hard copy in the Irvine class on Wednesdays according to the schedule shown. All seven laboratory reports are equally weighted and normally each team member earns the same grade. **SAFETY IS PARAMOUNT! THIS MEANS YOU!! SAFETY FIRST!!!**

Homework/Quiz/Laboratory Makeup Policy

You can make up any quiz, with a valid written OU excuse, before the next class. For planned absences with a valid OU excuse, please turn in the homework early. For unplanned absences with a valid OU excuse, you can turn in the homework ASAP to Dr. Bob. You must turn in the homework early to Dr. Bob if you have an unexcused absence on one of those HW due dates.

Academic Dishonesty

Cheating in any form will not be tolerated. A grade of zero will be registered for any infraction, and the matter will be referred to University Judiciaries. There will be a zero-tolerance punishment of plagiarism in any form – the assignment in question will receive a zero and you will be referred to University Judiciaries. Cite all references properly and do not copy ANY text (with the exception of an important short quote, in quotation marks, and attributed and referenced properly).

Attendance

Full attendance is required. Class participation is expected. No homework, quiz, or exam can be made up without a valid written OU excuse.

Grading

Homework 30%	Quizzes 35%	Lab Reports 35%
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93.3-100	90-93.3	86.7-90	83.3-86.7	80-83.3	76.7-80	73.3-76.7	70-73.3	66.7-70	63.3-66.7	60-63.3	< 60
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

ME 3550 Spring Semester 2025 Lecture Schedule

Week	Date	Day	Lecture	NotesBook	HW	Quiz	
1	13-Jan	Mon	Syllabus, Intro	1			
		Wed	Resistors, Capacitors, Inductors	2.1-3			
2	20-Jan	Mon	MLK Holiday				
		Wed	Series and Parallel R and C	2.1-2			
3	27-Jan	Mon	Quiz 1			Q1	
		Wed	KVL, KCL, 1st-order ODE	2.4-6			
4	3-Feb	Mon	Impedance	2.7	HW1		
		Wed	Series RLC Circuit Modeling, KVL, analogy	3.1, 3.3			
5	10-Feb	Mon	Quiz 2			Q2	
		Wed	Parallel RLC Circuit Modeling, KCL, analogy	3.2-3			
6	17-Feb	Mon	Semiconductors, p-n Junctions, Diodes	4.1-2	HW2		
		Wed	Transistors, MOSFETs, Op-Amps	4.3-4			
7	24-Feb	Mon	Quiz 3			Q3	
		Wed	Logic Circuits, Truth Tables, Timing Diag	4.5			
8	3-Mar	Mon	Bridge Circuits	4.6	HW3		
		Wed	Microcontrollers, Number Systems	5.1-2			
9	10-Mar	Mon	Spring Break				
		Wed					
10	17-Mar	Mon	Raspberry Pi Pico	5.3			
		Wed	Raspberry Pi Pico	5.3			
11	24-Mar	Mon	Quiz 4			Q4	
		Wed	Switches and Relays	4.7			
12	31-Mar	Mon	Load cells (strain gauges), Filters	4.8-9	HW4		
		Wed	Electromechanical components	4.10-12			
13	7-Apr	Mon	Quiz 5			Q5	
		Wed	Temperature Sensors, Displays	4.13-14			
14	14-Apr	Mon	Brushed DC Motors, PWM	6.1	HW5		
		Wed	Other Electric Motors	6.2-4			
15	21-Apr	Mon	Quiz 6			Q6	
		Wed	no class				

ME 3550 Spring Semester 2025 Laboratory Schedule

Week	Date	Day	Laboratory	Lab Report
1	13-Jan	Mon		
		Wed		
2	20-Jan	Mon	MLK Holiday	
		Wed		
3	27-Jan	Mon	Lab 1. Lab Equipment	
		Wed	Lab 1. Lab Equipment	
4	3-Feb	Mon	Lab 2. RC Circuits	
		Wed	Lab 2. RC Circuits	Lab 1
5	10-Feb	Mon		
		Wed		Lab 2
6	17-Feb	Mon	Lab 3. Diodes	
		Wed	Lab 3. Diodes	
7	24-Feb	Mon		
		Wed		Lab 3
8	3-Mar	Mon	Lab 4. H-Bridges	
		Wed	Lab 4. H-Bridges	
9	10-Mar	Mon	Spring Break	
		Wed		
10	17-Mar	Mon	Lab 5. Raspberry Pi Basics	
		Wed	Lab 5. Raspberry Pi Basics	Lab 4
11	24-Mar	Mon		
		Wed		Lab 5
12	31-Mar	Mon	Lab 6. Strain Gauge Load Cells	
		Wed	Lab 6. Strain Gauge Load Cells	
13	7-Apr	Mon		
		Wed		Lab 6
14	14-Apr	Mon	Lab 7. DC Motor Control	
		Wed	Lab 7. DC Motor Control	
15	21-Apr	Mon		
		Wed		Lab 7

ME 3550 Mechatronic Components

Homework / Laboratory Report Policy

Dr. Bob Williams

Homework Assignments and Laboratory Reports will be collected in hardcopy at the start of class, as shown previously in the ME 3550 schedule. Each HW will be assigned via email about two weeks before it is due. A **Memo** (see sample memo next page) summarizing the work must be the first page of each HW and Lab submission.

- 1) No late homework assignments nor laboratory reports will be accepted. Each homework assignment and laboratory report is due as assigned.
- 2) No computer excuses will alter deadlines. In the event of problems, do your best.
- 3) Each assignment must be neat, with answers clearly noted and supporting information provided.

MEMO-WRITING. A MEMO MUST BE INCLUDED WITH YOUR HOMEWORK AND LABORATORY RESULTS EACH TIME. An example memo is given on the next page. This should be a *brief* technical communication addressed to me, summarizing the homework assignment or laboratory report and bottom-line results. Your single memo must summarize all assignments each week. LENGTH LIMIT: *one single-sided page, 12 pt font*. Without a MEMO your HW or Lab score will be entered as zero. If the MEMO is not clear, credit can also diminish. A memo is required from the first HW assignment and laboratory report through the last.

For maximum credit, you must focus on **Good Graphical Communication, Validation, and Discussion.**



OHIO UNIVERSITY

Russ College of Engineering & Technology
Department of Mechanical Engineering

DATE: January 31, 2025
TO: Dr. Bob
FROM: Ima Student
SUBJECT: ME 3550 HW #1

Dr. Bob,

The purpose of this memo is to present the basic results for HW Assignment #1. You assigned a total of two problems: (*enumerate briefly here*).

The answers to problem 1 are: (*give answers; not always appropriate here*). My sketches appear on p. 2 (*if appropriate*). Hand calculations are presented on p. 4. (*Brief summary of roadblocks, issues, or learning here, if appropriate*).

For problem 2, (*similar to above paragraph*).

If you have any questions on my work, please contact me.

Sincerely,

Ima Student

AlmostTotallyUnintelligibleUsername@ohio.edu