

Course alpha, number, title	ME 456 Mechatronic System Design
Required or elective	Elective
Course (catalog) description	Application of imbedded microcontrollers to the design of mechatronic systems. Design of software and hardware for systems with mechanical, electrical and fluid components plus imbedded control systems. Laboratory exercises and design projects. Application to automotive, consumer and commercial systems.
Prerequisite(s)	(ECE 345 and ME 451 or concurrently)
Textbook(s) and/or other required material	Course kit prepared for MSU including electronic parts and (2) texts; <i>What's a Microcontroller?</i> and <i>Robotics!</i>
Class/Lab schedule:	Total Credits: 3 <i>Lecture/Laboratory/Discussion Hours: 2/6/0</i>
Topics covered	<ul style="list-style-type: none"> a. What's a microcontroller? b. Controlling and Detecting the Outside World c. Micro-controlled Movement d. Simple Automation e. Transducers, Displays & Data Logging f. Sensors: Light, Conductivity g. Actuator: DC Motor Drive h. Measurement and Control: PID Control and Autonomous Robot Control i. (2) design projects: individual, and team, of increasing complexity
Course learning objectives	<p>Students can:</p> <ul style="list-style-type: none"> a. Understand current and potential applications of mechatronic designs. b. Understand the interfacing of imbedded controllers with common sensors and actuators. c. Understand the use of digital I/O ports for mechatronic interfaces. d. Understand the application tradeoffs between conventional and smart sensors. e. Understand the tradeoffs between software and hardware solutions to design problems. f. Conduct laboratory exercises to explore mechatronic system design. g. Define, Generate and Test mechatronic designs to solve application problems.
Relationship of course to ME program outcomes	<p>The following measurement standard is used to evaluate the relationship between the course outcomes and the educational-program outcomes:</p> <p>3 = Strong Emphasis, 2 = Some Emphasis, 1 = Little or No Emphasis.</p> <ul style="list-style-type: none"> (a) an ability to apply knowledge of mathematics, science, and engineering—3 (b) an ability to design and conduct experiments, as well as to analyze and interpret data—2 (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability—3 (d) an ability to function on multidisciplinary teams—2 (e) an ability to identify, formulate, and solve engineering problems—3 (f) an understanding of professional and ethical responsibility—2 (g) an ability to communicate effectively—3 (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context —1 (i) a recognition of the need for and the ability to engage in life-long learning—1 (j) a knowledge of contemporary issues—1 (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice—2 (l) application of advanced mathematics—1 (m) design, build, and test in mechanical systems area—2 (n) design, build, and test in thermal/fluids area—1 (o) capstone design experience—1

Contribution to professional component: 40% Engineering Science 60% Engineering Design

Person(s) who prepared this description Clark Radcliffe

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