

**MECH3907 Mechatronic Design and Prototyping**  
**(Spring 22-23)**

<b>Course Code:</b> MECH 3907	<b>Course Title:</b> Mechatronic Design and Prototyping
<b>Required Course Or Elective Course:</b> Required	<b>Terms Offered (Credits):</b> Spring, 3 credits
<b>Faculty In Charge:</b> Robin Ma	<b>Pre/Co-Requisites:</b> MECH2520
<b>Course Structure:</b> The course is designed for students to gain experiences in designing and building a physical mechatronics system. Students are given opportunities to exercise their hands-on-practice through both laboratory and CAD sessions.	
<b>Textbook/Required Material:</b> Laboratory manual and notes	
<b>Course Description:</b> This courses' aim is to broaden the professional and engineering interests of students by enhancing their practicum/team-based experience through initiatives different from those of traditional lectures and tutorials. This is a project-based course to develop the students' knowledge/experience in designing and building a practical mechatronics system (formerly called Industrial Training). Students will work in teams to identify the needs for their designed prototype. Also, students will be given the opportunity to design and build various mechatronics components including electronic circuits, motors, sensors, etc. from CAD drawings, and practise their engineering knowledge through all laboratory sessions. The main goal is to develop and nurture skills in problem-solving, communication, interpersonal interaction, project and time management, etc. via the entire project.	
<b>Course Topics:</b> <ol style="list-style-type: none"> <li>1. CAD design</li> <li>2. Motors</li> <li>3. Electronic/electrical circuits</li> <li>4. Design and fabrication of a practical mechatronics system</li> <li>5. Materials selections</li> <li>6. Manufacturing process</li> </ol>	
<b>Course Objectives:</b> (correlated program objectives)	<ol style="list-style-type: none"> <li>1. Teach students to design and fabricate a practical mechatronics system. (P-O1, P-O3, P-O5)</li> <li>2. Facilitate hands-on-practice in mechanical and electronics engineering for students (P-O1, P-O3)</li> </ol>
<b>Course Outcomes:</b> (correlated course objectives and program outcomes)	On successful completion of this course, students are expected to be able to: <ol style="list-style-type: none"> <li>A. Explain and apply the basic principles of engineering design. (1) (POC1, POC2, POC3, POC4, POC5, POC6, POC8, POC11)</li> <li>B. Describe the key components of mechatronics systems. (1, 2) (POC1, POC2, POC8, POC11)</li> <li>C. Communicate and collaborate effectively as a member of a project team. (2) (POC7, POC8)</li> </ol>
<b>Assessment Tools:</b>	Peer review – 20% (C) Project report – 20% (A,B,C)

(correlated course outcomes)	Project presentation – 30% (A,B,C) Performance of the final prototype 30% (A,B,C)
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### **BEng in Mechanical Engineering (4-year program)**

#### **Program Objectives:**

- P-O1 Be able to communicate and perform as an effective engineering professional in both individual and team-based project environments,
- P-O2 Have an international outlook with clear perspectives on the Pearl river Delta and Greater China,
- P-O3 Be able to research, design, develop, test, evaluate and implement engineering solutions to problems that are of complexity encountered in professional practice and leadership,
- P-O4 Clearly consider the ethical implications and societal impacts of engineering solutions,
- P-O5 Continuously improve through lifelong learning.

#### **Program Outcomes:**

- POC1 ability to identify and formulate problems in multidisciplinary environment with an understanding of engineering issues and constraints;
- POC2 ability to design and conduct experiments as well as analyze and interpret data;
- POC3 ability to apply knowledge of mathematics, science, and engineering for problem solving in mechanical engineering and related sectors or for further education in a research career;
- POC4 ability to develop specification and to design system, component, or process to meet needs;
- POC5 ability to understand the manufacturability, maintainability, and recyclability of engineering system and components;
- POC6 ability to use modern engineering tools, techniques, and skills in engineering practice;
- POC7 ability to communicate effectively;
- POC8 ability to function in multi-disciplinary teams and provide leadership;
- POC9 broadly educated with an understanding of the impact of engineering solutions on issues such as economics, business, politics, environment, health and safety, sustainability, and societal context;
- POC10 clear understanding of professional and ethical responsibilities;
- POC11 recognition of the need for life-long learning and continuing education;
- POC12 international outlook with knowledge of contemporary issues.