

MECH1908 Exploration of Mechanical Design and Engineering

Course Code: MECH1908	Course Title: Exploration of Mechanical Design and Engineering
Required Course Or Elective Course: Required	Terms Offered (Credits): Spring, 3 credits
Faculty In Charge: Robin Ma	Pre/Co-Requisites: N/A
Course Structure: This course provides a comprehensive introduction to the field of mechanical engineering and its growing intersection with the generative design principle. Mechanical engineering, a discipline that applies scientific principles to design and construct machines and structures, has far-reaching impacts on our daily lives. Throughout this course, the broad spectrum of mechanical engineering, covering various subdisciplines and their unique applications of mathematics and science will be explored. Students will examine how mechanical engineering solutions are integral to our lives and work from the simplest tools to complex systems. By engaging with the course activities, students will be able to develop critical problem-solving skills applicable to real-world engineering challenges. This course aims to equip students with a foundational understanding of mechanical engineering principles and the ability to assess the integration of generative design process.	
Textbook/Required Material: Lecture notes,	
Course Description: <p>The introduction of the "Exploration of Mechanical Design and Engineering" course is driven by the need to provide students with a comprehensive foundation in this crucial field, while also contributing to their broader technological understanding. By offering a wide-ranging exploration of this field, we allow students to gain insights into various subfields, helping them make informed decisions about their academic and career paths while broadening their overall technological perspective.</p> <p>This course is designed to cultivate critical thinking and analytical skills inherent to engineering problem-solving. These skills are not only valuable within the field of engineering but are also highly transferable to many other disciplines. As technology continues to evolve and permeate all aspects of life, understanding the principles of mechanical engineering enhances overall technological literacy. This broadening in technology is crucial, as it enables students to grasp the interconnectedness of various technological fields and prepares them for a future where interdisciplinary knowledge is increasingly valuable.</p> <p>On the other hand, this course encourages creative thinking and the application of scientific principles to real-world challenges by exploring the relationship between engineering and innovation. It provides students with a contextual understanding of how mechanical engineering impacts daily life, fostering an appreciation for the field's societal contributions. The course also adopts a future-oriented perspective, discussing current trends and the future of engineering, thereby preparing students to adapt to and shape the evolving technological landscape.</p> <p>Ultimately, by showcasing the diverse and impactful nature of mechanical engineering within the broader technological landscape, this course aims to inspire students serving as a crucial gateway for the next generation of innovators and problem-solvers who can think across technological boundaries.</p>	
Course Topics: <ol style="list-style-type: none">1. Engineering and innovation2. Recent trend of mechanical engineering3. Statics and Dynamics	

4. Solid mechanics 5. Energy 6. Materials Science 7. Applications of Mechanical systems 8. Generative design concept	
Course Objectives: (correlated program objectives)	1. Equip students with a foundational understanding of mechanical engineering principles. (P-O1 and P-O3) 2. Enhance students' ability to assess the integration of generative design process. (P-O1 and P-O3) 3. Develop critical problem-solving skills applicable to real-world engineering challenges. (P-O1 and P-O3)
Course Outcomes: (correlated course objectives and program outcomes)	On successful completion of this course, students are expected to be able to: A. Explain the fundamental principles of mechanical engineering and their applications in everyday life. (POC1, POC3, POC4, POC5, POC8) B. Identify and describe various subfields within mechanical engineering. (POC1, POC2, POC3) C. Discuss the relationship between mechanical engineering and technological innovation. (POC7, POC8) D. Apply basic problem-solving techniques used in mechanical engineering to simple real-world scenarios. (POC7, POC8)
Assessment Tools: (correlated course outcomes)	In class test – 20% (C) Mid-term exam – 20% (A,B,C) Project report – 25% (A,B,C) Presentation – 25% (A,B,C) Peer evaluation – 10%

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.