

MECH4340 Air Conditioning Systems

Course Code: MECH4340	Course Title: Air Conditioning Systems
Required Course Or Elective Course: elective	Terms Offered (Credits): Spring (3 credits)
Faculty In Charge: Hong Tao	Pre-Requisites: MECH3310
Course Structure: Lecture: 2 days per week, 1.5 hours; Tutorial: 1 day per week, 1 hour	
Textbook/Required Material: Heating, Ventilating, and Air Conditioning-Analysis and Design by McQuiston; Parker; Spitler	
<p>Bulletin Course Description:</p> <p>This course is intended to help students:</p> <ol style="list-style-type: none"> (1) Understand the principles of various types of HVAC systems based on the fundamentals of Thermodynamics, Fluid Mechanics and Heat Transfer; (2) Analyze various types of HVAC systems; (3) Develop creativity and capability in the design of HVAC systems. <p>To showcase the theoretical concepts and components that are taught in lectures, we will organize an HKUST HVAC plant tour on April 16th, 2024 to enhance students' understanding and enrich their learning experiences.</p>	
<p>Course Topics:</p> <ol style="list-style-type: none"> 1. General introduction to HVAC 2. Central Air-conditioning systems 3. Moist air properties and conditioning processes 4. Comfort and health and refrigeration 5. Heat transmission in building structures 6. Solar radiation 7. Heating load calculation 8. Cooling load calculation 9. Fluid flow, pumps, and piping design 10. Fans and building Air distribution system design 	
<p>Course Objectives: (correlated program objectives)</p>	<ol style="list-style-type: none"> 1. Understand the principles of various types of HVAC systems (P-O1) 2. Conduct energy analysis to various types of HVAC systems based on the fundamentals of Thermodynamics, Fluid Mechanics and Heat Transfer (P-O1, P-O2) 3. Develop the students' creativity and capability in the design of energy conversion system (P-O2, P-O3)
<p>Course Outcomes: (correlated course objectives and program outcomes)</p>	<ol style="list-style-type: none"> A. Understand the principles of various types of HVAC systems (1) (POC1, POC3) B. Be able to analyze various types of HVAC systems (1, 2) (POC1, POC3) C. Design and size major components of air conditioning systems (2, 3) (POC3, POC6) D. Rationalize and interpret the design and analysis results (1, 2, 3) (POC1, POC3)
<p>Assessment Tools: (correlated course outcomes)</p>	<p>Homework - 15% (A, B)</p> <p>Quizzes - 10% (A)</p> <p>Project / plant visit – 5% (A, B)</p>

	Midterm - 30% (A, B) Final examination - 40% (A, B)
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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.