

MECHANICAL ENGINEERING PROGRAM
ABET COURSE SYLLABUS

ME 359 Fundamentals of HVAC Systems. (4 Units) Elective

Course Description: (2019-20 Catalog)	Fundamentals of heating, ventilating and air-conditioning (HVAC) systems, human comfort and indoor air quality, primary and secondary systems and components. 3 lectures, 1 laboratory.
Prerequisite Courses:	Corequisite: ME 302.
Prerequisites by Topic:	Thermodynamics.
Textbook: (and/or other required material)	<u>Fundamentals of HVAC Systems</u> , R.R. Johnson, American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE), 2000.
References:	<u>Fundamentals of Engineering Thermodynamics</u> , by Moran, Shapiro, Boettner, and Bailey, 8 th Edition, 2014.

Course Coordinator/Instructor: Steffen Peuker, Assistant Professor of ME

Course Learning Outcomes: This course provides students with an introduction to HVAC&R systems and their application. In particular the student will be able to:

1. Define air-conditioning systems and describe major air-conditioning processes.
2. Analyze simple conduction/convection heat transfer models through composite walls.
3. Apply the concepts of environmental comfort to HVAC systems.
4. Calculate the requirements for proper indoor air quality.
5. Describe the different primary components of an HVAC system.
6. Analyze a simple refrigeration system and cooling tower.
7. Describe the relationship between duct/pipe and fan/pump curves.
8. Analyze friction losses in water pipes and air ducts.
9. Describe the components and layout of central air, air-water and all-water systems.
10. Analyze and compare different central air, air-water and all-water systems.
11. Analyze the economizer cycle.
12. Describe and analyze heat pumps and heat recovery systems.
13. Describe and analyze thermal storage systems.
14. Describe the basics of HVAC systems controls.

15. Work professionally within a team, provide peer feedback, and demonstrate written and verbal skills.

Relationship of Course to Mechanical Engineering Student Outcomes:

SO 1: Developing (D)
SO 2:
SO 3: Developing (D)
SO 4:
SO 5: Developing (D)
SO 6: Developing (D)
SO 7:

Topics Covered:

1. Overview of HVAC systems
2. Basic Design Considerations
3. Concepts of Environmental Design Indoor Air Quality
4. Primary System Components
5. Secondary System Components
6. Central Systems
7. All-Air Systems
8. Air-and-Water Systems, All-Water Systems
9. Unitary Systems

Laboratory Projects:

1. Use HVAC systems installed in lab
2. Tours of various HVAC systems on and off-campus
3. Prepare a report and oral presentation on an advanced HVAC&R topic

Class/Lab Schedule:

Three 50-minute lectures per week. One 170-minute lab per week.

Contribution of Course to Meeting the Professional Component:

(a) College-level mathematics and basic sciences:	0 credits
(b) Engineering Topics:	4 credits
Design:	0 credit
(c) General Education:	0 credits
(d) Other:	0 credits

Prepared by:
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Date:
6/12/19
