MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 455 Introduction to Building Energy Modeling. (3 Units) Elective

Course Description: (2019-20 Catalog)	Introduction to principles and practices of building energy modeling. Case studies using state of the art energy modeling computer software to simulate the energy use of buildings. Methods to reduce energy consumption of buildings. 2 lectures, 1 laboratory.
Prerequisite Courses:	ME 350. Recommended: ME 359.
Prerequisites by Topic:	Heat Transfer. Recommended: Fundamentals of HVAC Systems
Textbook: (and/or other required material)	DesignBuilder, DesignBuilder Software Ltd
References:	ASHRAE Greenguide: Design, Construction, and Operation of Sustainable Buildings, 5th Edition, 2017 50% AEDG Technical Support Documents, ASHRAE, 2013 ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings ANSI/ASHRAE/IES Standard 90.1-2010, Energy Standard for Buildings Except Low-Rise Residential Buildings DesignBuilder Tutorials, DesignBuilder Software Ltd
Course Coordinator/Instructor:	Steffen Peuker, Assistant Professor of ME
Course Learning Outcomes:	Student will be able to: 1. Apply state of the art energy modeling computer software to perform case studies. 2. Identify potential energy saving measures using energy modeling computer software. 3. Compare basic building envelope to advanced envelopes. 4. Explain the impact of advanced building envelopes on building energy consumption, sustainability goals and society. 5. Create a building energy model of an existing building and analyze the model results. 6. Evaluate building energy model results and interpret the results critically, i.e. explain why results are trustworthy or not. 7. Compare different HVAC modeling options and explain their applicability. 8. Explain energy codes and prescriptive guidelines pertaining to building energy modeling.

Relationship of Course to Mechanical Engineering Student Outcomes:	SO 1: Mastered (M) SO 2: Mastered (M) SO 3: SO 4: SO 5: SO 6: SO 7:
Topics Covered:	1. Introduction to BEM 2. Building Envelope 3. Heating Design, cooling design, annual simulation 4. Zones, surfaces, materials 5. Schedules, windows, air movement 6. Advanced building envelope 7. Energy codes and best practices 8. Basic HVAC&R system simulation 9. Advanced HVAC&R system simulation 10. Future trends in BEM
Laboratory Projects:	Design Projects: 1. Building Design Optimization 2. Base Case Building; improvements to Base Case Building 3. Advanced HVAC&R system simulation 4. Existing building simulation and analysis
Class/Lab Schedule:	Two 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: 2 credits Design: 1 credit (c) General Education: 0 credits (d) Other: 0 credits
Prepared by: Steffen Peuker	**Date:** 6/12/19