

University of Maryland, College Park
Mechanical Engineering Departments
ENME 423 / ENME 808U – Modern Climate Control and Building Energy Design/Analysis
Fall Semester 2019

Instructor: Dr. Jelena Srebric, (301) 405-6247, jsrebric@umd.edu

Office: 1200 Technology Ventures Building, 5000 College Ave./ 3143 Glenn L. Martin Hall

Class Time/Location: Tuesdays and Thursdays 12:30pm - 1:45pm, EGR 0135

Text Book: T.H. Kuehn, J.W. Ramsey, and J.L. Threlkeld, Thermal Environmental Engineering, 3rd Ed., Prentice Hall, ISBN 0-13-9172203. Supplementary Lecture notes will be provided through Canvas as necessary.

- References:**
1. F.C. McQuiston & J.D. Parker, Heating, Ventilating & Air-Conditioning, 6th ed., John Wiley and Sons, ISBN 0-471-47015-5
 2. ASHRAE Fundamentals Handbook, American Society of Heating, Refrigerating, and Air Conditioning Engineers, Atlanta, GA, 2009
 3. Brackney, L., Parker, A., Macumber, D., and Benne, K., Building Energy Modeling with OpenStudio: A Practical Guide for Students and Professionals, Springer Nature Switzerland AG, 2018

Course Description:

Prerequisite: ENME232 and ENME332. Fundamentals and design calculations of heat and moisture transfer in buildings; evaluation of cooling, heating and power requirements of buildings; building energy consumption simulations, use of alternative energy and energy conservation measures in buildings; fundamentals of fans/pumps and air/water distribution in buildings; introduction to refrigeration and energy systems for data centers and other mission-critical facilities.

Course Goals:

The students will be able to understand and use requirements for proper design and operation of building mechanical systems as prescribed by standards and guidelines. Furthermore, the students will be able to evaluate energy efficiency, indoor environmental quality and sustainability of building mechanical systems through rigorous engineering calculations and recommended best practices.

TENTATIVE LECTURE SCHEDULE	Date	Week
• Introduction to the Course, Review of Relevant Fundamentals;	08/27	1
• Thermodynamics of Moist Air Properties; HW 1 Assigned	08/29	1
• Thermodynamics of Moist Air Processes; HW 1 Due; HW 2 Assigned	09/03	2
• Air Handling Units; HW 2 Due; HW 3 Assigned	09/05	2
• Problem Solving Session for AHU Processes HW 3 due;	09/10	3
• Materials Mech. Vapor Compression Refrigeration; HW 4 Assigned	09/12	3
• Chillers and Cooling Towers in Common HVAC Systems; HW 4 Due	09/17	4
• Exam 1 based on HW 1, 2 and 3	09/19	4
• Tour of Chillers and Cooling Towers on Campus; Initial Project Assignment	09/24	5
• Introduction to Building Energy Modeling and Open Studio; HW 5 Assigned (relevant to the project)	09/26	5
• Building Energy Modeling Examples from OpenStudio; Project Part I due	10/01	6
• Problem Solving Session for Vapor Compression	10/03	6

• Heat and Moisture Transfer in Buildings; HW 5 Due	10/08	7
• Heat and Moisture Transfer in Buildings (Cont.); HW 6 Assigned	10/10	7
• Design Heating and Cooling Loads components and their calculations; HW 6 Due	10/15	8
• Design heating/cooling load components and their calculations, Cont.;	10/17	8
• In class project discussion	10/22	9
• Problem Solving Session for HMT in Buildings; Project Part II due	10/24	9
• Exam 2 based on HW 4, 5 and 6	10/29	10
• Water distribution systems (fans, pumps, pipe design);	10/31	10
• Water distribution systems, Cont.; HW 7 Assigned	11/05	11
• Air distribution systems;	11/07	11
• Air distribution systems, Cont.; HW 7 Due, HW 8 Assigned,	11/12	12
• Problem Solving Session for Distribution Systems; Project Part III Draft version due	11/14	12
• Heating and Cooling by Extended Surfaces/Heat Exchangers; HW 8 Due; HW 9 Assigned	11/19	14
• Project Part III Final must be uploaded by 11/20 by 11 PM. Project Presentations—Double Session	11/21	14
• No Class, In lieu of a double session on 11/21; HW 9 Due	11/26	13
• No Class, Thanksgiving Day	11/28	13
• Heating and Cooling by Extended Surfaces/Heat Exchangers (Cont.);	12/03	15
• Exam 3 based on HW 7, 8 and 9	12/05	15

GRADING

Exam 1	20%
Exam 2	25%
Exam 3	25%
Course Project	30%

Exam Absence: Your potential absence from the exam(s) has to be discussed with the instructor at least a week in advance with the exception of medical emergency that requires a written note from your doctor. All make-up exams have to be taken in advance of the scheduled exam(s) with the exception of the make-up exam(s) due to medical emergency.

Tentative Grading Scale:

A+: 100-96 A: 95-92 A-: 91-90

B+: 89-87 B: 86-83 B-: 82-80

C+: 79-77 C: 76-73 C-: 72-70

D+: 69-67 D: 66-63 D-: 62-60

F: below 60

Note: The above grading scale is meant to serve as a guideline.

Topics & Lecture Dates:

Tentative lecture and the exam dates are given in the course lecture schedule (above). If there is any change in the exam dates, students will be informed at least one week in advance.

Academic Policies: <http://www.ugst.umd.edu/courserelatedpolicies.html>