

TUSKEGEE UNIVERSITY
COLLEGE OF ENGINEERING, ARCHITECTURE & PHYSICAL SCIENCES
MECHANICAL ENGINEERING DEPARTMENT

Spring/2011

Course: MENG 0418 - Heating, Ventilating and Air Conditioning (HVAC)
3 Credit Hours, MWF 9:00-10:00AM, Room LHFH 402

Prerequisites: MENG 312, MENG 313, MENG 414 (co-requisite)

Instructor: Dr. Tao Xing
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Office Hours: MWF 1:00 ~ 3:00 PM. Other times are available by appointment only.

Course Description: This course is designed to enable students to perform fundamental analyses and design of heating, ventilating and air conditioning systems. The topics covered include: moist air properties, basic air conditioning processes, comfort and health design conditions, heat transfer in building structures, and space heating and cooling load calculations. A comprehensive design project is a requirement of this course.

Course Materials:

Textbook: Principles of Heating, Ventilating and Air Conditioning, by Ronald H. Howell, William, J. Coad, Harry J. Sauer, Jr., 6th Edition, ASHRAE, 2009.

Software: Visual DOE 4.0 Software Manual, Architectural Energy Corporation

References: ASHRAE Handbooks

Grading:

Homework/Attendance	10%	
Four Tests	60%	(15% each)
Project/Tutorials	30%	

Dress Code: Attire is business casual (unless otherwise noted); absolutely no hats

Scale: A = 90-100, B = 80-89, C = 70-79, D = 60-69, E = Below 60

Other policies:

1. Students are expected to attend all classes and are responsible for all the materials covered in class. Any student missing a class without a valid excuse can't ask the instructor to provide or explain the material covered in the missed class.
2. Homework should be turned in on its due date. It will be checked and returned to students promptly. Homework assignments are designed to enhance students' comprehension of the course material and prepare them for examination. Copying of others' work is strictly prohibited and will only lead to inadequate performance on examinations.
3. All examinations are open book. There will be no makeup examinations except under very exceptional circumstances pre-excused by the instructor. Any missed examination automatically receives a grade of ZERO. Collaboration on examination (including exchange of books, calculators, etc.) is strictly prohibited. Cheating on examinations could lead to an "E" grade in the course.
4. Design project report should be turned at the end of the last scheduled class period for the semester according to the official university calendar. Failure to do so could result in a grade of ZERO for the project.
5. Any cellular telephone use (calls or other functions, e.g. calculator) is not allowed during class and especially during examinations.

Course Objectives:

Students Will:

- (1) Understand the basic processes of air-conditioning
- (2) Know how to use the Psychrometric chart to analyze air conditioning processes
- (3) Be acquainted with indoor air quality requirements and comfort conditions
- (4) Be able to compute the heat transfer in building structures
- (5) Apply design methodologies to calculate heating and cooling loads
- (6) Utilize computer software to design energy-efficient buildings

Concepts:

The following concepts are covered within each objective

Objective 1:

Concept 1 ---- Air-conditioning processes

Objective 2:

Concept 2 ---- Psychrometric chart

Objective 3:

Concept 3 ---- Design Conditions

Objective 4:

Concept 4 ---- Heating load - Ventilation

Concept 5 ---- Heating load - Heat transfer

Objective 5:

Concept 6 --- Cooling load – Opaque surfaces

Concept 7 --- Cooling load - Fenestrations

Objective 6:

Concept 8 --- HVAC software

Course Outcomes:

At the time of graduation, the students will have:

- a. an ability to apply knowledge of math, science and engineering
- b. an ability to design and conduct experiments, as well as to analyze and interpret data
- c. an ability to design a system, component, or process to meet desired needs
- d. an ability to function on multi-disciplinary teams
- e. an ability to identify, formulate and solve engineering problems
- f. an understanding of professional and ethical responsibility
- g. an ability to communicate effectively
- h. the broad education necessary to understand the impact of engineering solutions in a global and societal context
- i. a recognition of the need for, and an ability to engage in life-long learning
- j. a knowledge of contemporary issues
- k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

Outcomes	a	b	c	d	e	f	g	h	i	j	k
Objective 1					x						
Objective 2					x						
Objective 3			x		x						
Objective 4			x		x						
Objective 5			x		x						
Objective 6			x				x				x

COURSE OUTLINE
MENG 0418 HEATING, VENTILATING AND AIR CONDITIONING

TOPIC	TEXT CHAPTER	SESSIONS
Background	1	1
Thermodynamics and Psychrometrics	2	2-5
Test # 1*		6
Basic HVAC System Calculations	3	7-15
Test # 2*		16
Design Conditions	4	17-19
Loads Estimating Fundamentals	5	20-24
Test # 3*		25
Residential Cooling and Heating Load Calculations	6	26-31
Test # 4*		32
Energy Estimating Methods	8	33-36
Test # 5*		37
HVAC; software and its applications		38-41
Project Submission and Presentation		42

*Test dates are tentative