MECH 4851
Heating, Ventilating, and Air-conditioning (HVAC)

Course Description

This course is an introduction to the design of thermal systems for indoor climate control. The major topics include: human comfort requirements, outdoor climate variables, psychrometrics, heating and humidification loads, cooling and dehumidification loads, ventilation requirements and criteria, central system types and selection, energy estimation methods, piping, pumps, ducts, fans, and control systems. Computer programs for design load calculations, energy estimation, and design of duct systems are discussed and demonstrated.

This course presents the principles, design, and operation of modern heating, ventilating, and air-conditioning (HVAC) systems for indoor climate control for indoor comfort. The concepts, design, application, and control of modern HVAC systems are introduced through the use of the fundamentals of thermo-fluids, practical design principles, and computer software packages. The course is designed to provide a balance among the theory, practical design principles, and hands-on applications to prepare students for the real world of HVAC design and application.

Through the use of 1) a lab-scale computer-controlled HVAC system for demonstration and experiment, 2) commercial software packages, 3) plant tours of actual HVAC systems, and 4) guest lectures by HVAC experts and practitioners, the gap between textbook fundamentals and real world HVAC applications is bridged. The overall objective is to ensure that the students are well prepared to design a small HVAC system with minimal help and supervision.

As it stands, this is a practical and design oriented course that is challenging and interesting. Students learn a lot, and enjoy the course. To enhance this course, we will fully integrate the use of computer software package(s) for load and energy estimation, as well as for duct system design into the course through a term project that required the design of a HVAC system for a small commercial building. Students in groups of four/five will design the HVAC system as their term project.

Considering the importance of computer design tools in the HVAC field, if resource and time permitted, we are planning to introduce the software in tutorials that will be held in a computer lab with the instructor/TA leading students through several small-scale problems.

DALHOUSIE UNIVERSITY
Department of Mechanical Engineering

MECH4851
HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

COURSE OUTLINE FOR FALL TERM - 2003

Week	Subject	Textbook Reference
1	IntroductionChapter 1 + Handout Notes	
2	Air Conditioning Systems	Chapter 2 + Handout Notes
2	Air Conditioning Systems	Chapter 2 + Handout Notes
3	Air Conditioning Systems	Chapter 2 + Handout Notes
4	Moist Air Properties and Air Conditioning Processes	Chapter 3 + Handout Notes
5	Comfort and Health (Two-Hour Tutorial Time)	Chapter 4 + Handout Notes
6	Heat Transmission in Building Structures	Chapter 5 + Handout Notes
6	Space Heat Load	Chapter 7 + Handout Notes
7	Space Heat Load	Chapter 7 + Handout Notes
8	The Cooling Load	Chapter 8 + Handout Notes
10	The Cooling Load	Chapter 8 + Handout Notes
11	Energy Calculations	Chapter 9 + Handout Notes
12	Fluid Flow, Pumps and Piping Design	Chapter 10 + Articles
12	Room Air Distribution	Chapter 11
13	Fans and Building Air Distribution	Chapter 12 + Articles
13	Automatic Control of HVAC Systems	Handout Notes + Articles
14	Review	

Instructor: **Dr. Alan Fung**, P.Eng., Office: C254, Phone 494-6183, e-mail: Alan.Fung@Dal.Ca
Office hours: Any time you have a question between 9:00-17:00, Mon.-Fri. and by appointment.
Tutor/Marker: **Mr. Haixiong Zhang**, Office: C254, Phone 494-6183, e-mail: hzhang5@Dal.Ca.

Text: "Heating, Ventilating and Air Conditioning - Analysis and Design", 5th. Edition
F.C. McQuiston, J. D. Parker and J.D. Spitler, John Wiley & Sons, 2000.
References: ASHRAE Handbooks, handouts, and articles.

Marking: Final course mark will be based on weekly assignments, a group project, a two-hour mid-term and a three-hour final exam in the following proportions: 15%, 15%, 30%, 40%. The mid-term exam will be on Monday, November 3. Only the textbook, one sheet of formulas/notes, class notes, blank psychrometric charts and a calculator will be allowed in the exams. Assignments, solved problems or other books will not be allowed. A minimum of 50 out of 100 is required in the final exam to receive a passing mark.

Assignments: There will be approximately 68 sets of problem assignments. Problem sets will be handed out every Monday in tutorial, and solutions will be due on the following Monday. Late assignments will be penalized 10% for each day. Assignments handed in later than one week will not be accepted. There will be at least one laboratory experiment. The lab report mark will be included into the assignment mark. A plant tour of a modern HVAC system in building as well as special lecture(s) held by distinguished HVAC engineer(s) will be organized as part of the course. It is mandatory to attend the lab, lectures by guest speakers, and tour(s) to pass the course. Time permitted, brief introduction on several energy simulation software packages (such as Hot2000, Enerpass, and E20-II HAP) will also be included.

Supplementary Exam: A Supplementary Exam. will be given. It will replace only the final exam mark in the calculation of the course mark.

Please note: The class schedule is as follows: Lectures: Tuesday and Thursday 11:35-12:55 Room B229
Tutorial: Monday **13:45**-15:25 Room D413

Additional Note: Please check http://is.dal.ca/~afung/mech4851/ regularly for up-to-date news.