Course Outline

Meng 162 – Building Systems

Mechanical Engineering Technology Camosun College

CALENDAR DESCRIPTION

Students will examine the mechanical aspects of commercial and industrial building HVAC system design. Ventilation requirements, outdoor air requirements, duct sizing and layout, thermal and air-quality requirements to maintain human health and comfort, Psychrometrics, building construction and heat loss/gain analysis, selection of heating and cooling equipment, and building automation and control will be emphasized. Applicable federal, provincial and industrial standards will be discussed.

OFFERED:	Winter Semester
CREDIT:	3
IN-CLASS WORKLOAD:	2 lecture, 2 lab (per week)
OUT-OF-CLASS WORKLOAD:	4 (per week)

PREREQUISITES:

- One of: C in Pre-Calculus 11, C in MATH 073, C in MATH 137, C in MATH 139
- And one of: C in Physics 11, C in PHYS 101

OBJECTIVES

Upon successful completion of this course a student will be able to:

- Identify building system components such as fans, heating/cooling coils, ducts, diffusers, etc.
- Articulate the purpose of a building environmental control system
- Explore the range of needs to optimize human comfort and health within a building environment
- Set building environmental goals
- Specify both ventilation air rates and outdoor air rates (ASHRAE 62)
- Determine supply air temperature using Psychrometrics
- Layout out a building's duct system
- Select supply and return diffusers and grilles from catalogs
- Examine the operation of refrigeration/heat pump systems by looking at the vapour-compression refrigeration cycle
- Predict a refrigeration/heat pump system's performance
- Examine various aspects of building heat loss and gain and gain some knowledge of conductive and convective heat transfer
- Perform a heat loss/gain analysis on a building space for winter conditions
- Examine code requires for insulation and other building envelope components
- Explore building environmental controls and how they can be arranged to minimize energy usage and maximize human comfort
- Create a relatively complete HVAC design (with supporting calculations) and drawings

OUTLINE

As many of the following topics as time allows, will be covered in this course:

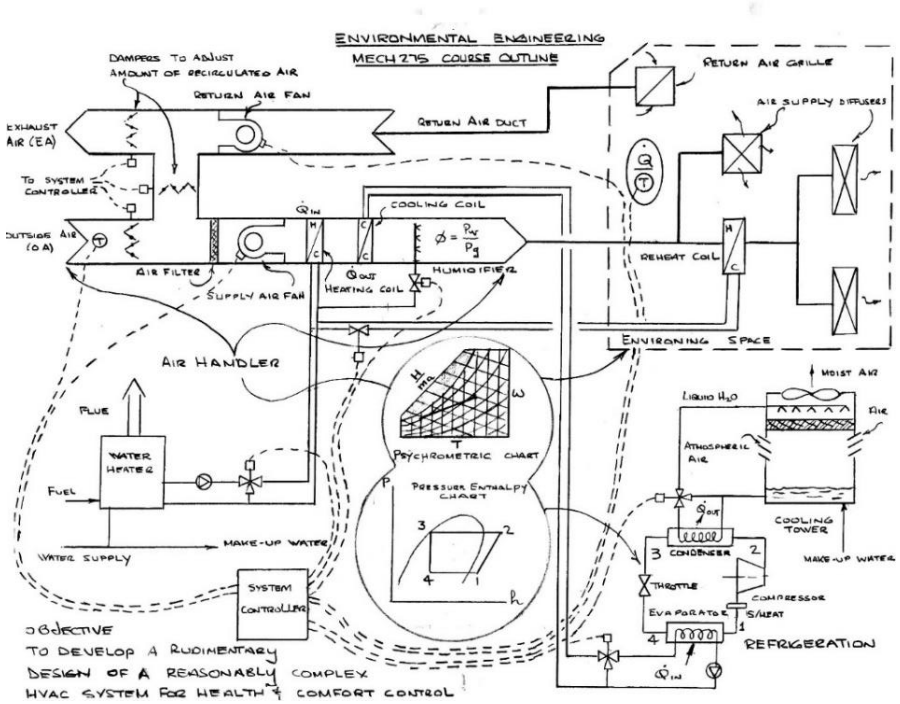
1. Mechanical control of indoor environments: The general need, equipment used, the challenges and benefits.
2. Indoor comfort: temperature, humidity, air quality and air movement.
3. Indoor air quality: ASHRAE 62.1, sick buildings and what to do about them.
4. Psychometrics: the Thermodynamics of working with moist air.
   - The Psychometric Chart.
   - Processes: Heating, cooling, mixing, humidifying, occupied spaces.
   - What should the supply air temperature and humidity be?
5. Heat loss/gain through building structure, overview of ASHRAE 90.1.
6. Ventilation methods to maintain an acceptable indoor condition.
   - Dilution ventilation: Commercial & Industrial Buildings.
   - Source Control: Industrial & Kitchen fume extraction.
7. Duct sizing and layout: supply, return, exhaust, diffuser selection and placement.
8. The refrigeration cycle.
9. Introduction to green building design and LEED.
10. Building automation and control systems.
11. Energy efficiency in commercial buildings.
12. Various topics concerning global warming and energy sources will be discussed.

REFERENCE TEXT

Possible Reference: ASHRAE Handbook - Fundamentals, most up-to-date edition.

Web site: www.fireflylabs.com/disted

Note: The diagram below illustrates many areas to be covered in this course.



Department of Mechanical Engineering Technology

Student Evaluation System

COURSE:	Environmental Engineering	ACADEMIC TERM:	Quarter 3
COURSE #:	MENG 162	SECTION #:	
INSTRUCTOR:	Tariq Amlani, Ryan Jellema, Will Spaulding	YEAR:	2017

COMPONENTS			COMMENTS
Assignments & Labs	30	%	
Quizzes		%	
Labs		%	
Other Projects/Labs		%	
Report(s)		%	
Instr. Assessment		%	
Midterm Exam(s)	30	%	
Final Project	40	%	
Other		%	
TOTAL	100	%	

- A weighted average of 50% must be attained on tests/examinations and a 50% must be attained on the final examination, otherwise an F will be awarded.
- All labwork/assignments must be submitted prior to the student sitting the final examination. Late assignments will have marks deducted; if handed in after assignments have been returned to the class, no mark will be given - but all assignments must be submitted in order to qualify to write the final exam.
- Full attendance at Labs is mandatory.

GRADING SYSTEM

A+	90 – 100%	B-	70 - 72%
A	85 - 89%	C+	65 - 69%
A-	80 - 84%	C	60 - 64%
B+	77 - 79%	D	50 - 59%
B	73 - 76%	F	< 50%

COMMENTS:

SIGNATURE: 

DATE: 9 January 2017