

King Fahd University of Petroleum & Minerals
Architectural Engineering Department

ARE 322
BUILDING MECHANICAL SYSTEMS

Fall Semester 2004 (041)
U. T. 10:00- 10:50 a.m.
Building - 19-417

Instructor: *Dr. Mohammad S. Al-Homoud*

Office: *Building 19-315/ Building 21-725*

Office Hours: *As posted on office door or by appointment.*

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Grading Policy:	Examination # 1	15%
	Examination # 2	15%
	Final Examination (Comprehensive)	25%
	Lab. Assignments/Quizes	30%
	Project Potfolio	10%
	Attendance & Participation	<u>5%</u>
		100%

Objectives: This course is intended to provide Architectural Engineering and Architecture students with the fundamental principles and basic concepts in the analysis and design of building mechanical systems. The knowledge and skills acquired in this course is intended to prepare students to integrate mechanical systems into their designs as well as being able to communicate with design professionals in the field in a positive, cooperative and knowledgeable manner.

The course also provides students with the necessary knowledge required for advanced and creative building mechanical systems analysis and design.

Outcomes: At the completion of this course, the student is expected to:

1. Know the fundamental engineering principles for the analysis and design of building mechanical systems;
2. Be able to perform cooling load analysis for a complete building project;
3. Be able to conduct basic and integrative design of building mechanical systems for a small project; and
4. Be able to communicate building mechanical systems design in a written and graphic format to other professionals in the field

Lecture: Each lecture will cover a topic as indicated in the course lecture outline. The required chapters from the assigned textbook will be supplemented by handouts and class presentations.

Laboratory: The laboratory is an important part of the course. It is an opportunity for detailed discussion of some materials presented in the lecture as well as practical applications of theories gained from readings and class presentation.

Work Subm.: All course assignments are expected to be submitted in a neat format and on the scheduled time. Late submission will be deducted from the grade. **Each day past the due date** of an assignment will result in **5% deduction** from the grade of that assignment.

Attendance: Attendance is **mandatory** and will be taken each class period. The class attendance and participation account for **5%** of the course grade. Each absence will be **deducted 0.5%** from your grade. **More than the allowed absences** will result in a **DN** grade for the course according to the University regulations.

Absence from the lab. will result in a grade of **zero** for that particular session. **More than 5 lab. absences** will result in a course grade of **DN**.

No makeup labs. or exams except in the case of a written medical excuse.

Textbook: Stein, B. and J. S. Reynolds. 2000. *Mechanical and Electrical Equipment for Buildings*, 8th edition, John Wiley & Sons, New York.

References: American Society of Heating, Ventilating, and Air Conditioning Engineers. *ASHRAE Handbook Series*. Atlanta, GA.

Other references and instructor *handouts* will be referred to/distributed in class when appropriate.

Course Lecture Outline

Topic

Introduction

Fire Safety

- Safety in Buildings
- Fire Protection Planning
- Fire Protection Systems
- Smoke Control & Management

Water Supply and Distribution

- Water Supply Systems
- Water Supply Distribution
- Water Pipes Sizing

EXAM #1

Vertical Transportation Systems

Thermal Load Calculations

- Thermal Comfort
- Psychrometrics
- Basic Heat Transfer
- Heat Loss Calculations
- Heat Gain Calculations

EXAM #2

- Manual/Computerized Cooling Load Calculations
- Types of HVAC Systems

FINAL EXAM

Laboratory Syllabus

**T. 2:10- 5:10 p.m.
Building 19-410**

Exercise

Due Date

1. Introduction
2. Fire Protection Systems
3. Smoke Control
4. Water Supply and Distribution
5. Piping System Design
6. Vertical Transportation Systems
7. Site Visit/Building Walk through
8. Thermal Comfort
9. Psychrometrics
10. Heat Transfer
11. Heating Load Calculations
12. Manual Cooling Load Calculations: CLTD/SCL/CLF Method
13. Computerized Cooling Load Calculations
14. HVAC Systems Site Visit/Building Walk through