



SACRAMENTO STATE
Construction Management

College of Engineering and Computer Science

Construction Management Program

CM 136

Principles of Mechanical and Electrical Engineering

Course Syllabus
Fall 2008

Instructor: David Huhn, PE (weeks #1- #9, Mechanical/Plumbing)
Chuck Moore (weeks #10-#15, Electrical)

Lecture Schedule: M 6:00pm-8:50pm
Location: Brighton Hall 110

Email for David Huhn: davehuhn@comcast.net

Office hours and location: Professor Anderson
RVR 4019: TR 1:00pm-2:00pm
MW 11:00am-12:00pm, or by appointment

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CM 136: Principles of Mechanical and Electrical Engineering

COURSE DESCRIPTION:

Basic principles of thermodynamics with application to heating, ventilation, and air conditioning systems. Introduction to plumbing systems and electrical circuits and circuit analysis with construction applications. **3 units.**

PREREQUISITES:

The prerequisite course(s) for this class, which must have been completed with a C- or better grade, include Physics 5B and CM 30. One hundred series CM courses are limited to students whose changes of major to the upper division have been approved by the Program Coordinator.

ACADEMIC HONESTY & GRADING SYSTEM:

All students are subject to the policies described in the University Catalogue. In particular, students should be familiar with policies described on pages 104 – 112 and page 339 of the 2004-2006 CSUS Catalogue.

Giving aid to a student during an exam or taking information from another student or student's exam constitutes academic dishonesty. Students caught cheating during an exam will receive a failing grade in the course and can be dismissed from the university. Students are encouraged to work together to solve homework problems, but **copying is obviously prohibited.**

Grades will be assigned based on the student's performance as measured by the assigned homework, midterm exams, and final exam. Grading shall be in accordance with the University's grading policy as outlined in the section entitled "Grading System" in the current copy of the University catalog.

Grade Scale:

A: 90-100 B: 80-89
C: 70-79 D: 60-69
F: <60

*Students achieving overall percentages as shown above are guaranteed grades as indicated. Actual cutoffs may be lower.

COURSE OBJECTIVES:

The purposes of this course are to:

- Understand the uniform building code requirements for the construction of mechanical, electrical and plumbing systems in commercial buildings
- Properly evaluate the pros and cons to the various heating, ventilation, and air-conditioning (HVAC) systems that available for building structures
- Determine the heating and cooling loads on a building structure
- Size piping for both open-channel and closed-channel flow systems
- Determine electrical demand loads (equipment and lighting) for buildings.
- Understand the fire and life-safety requirements for a building structure
- Gain knowledge to the environmental advantages for sustainable design, i.e. "green" buildings
- Evaluate the long-term cost advantages for central plant facilities, such as large building campuses.

SPECIFIC EDUCATIONAL OUTCOMES:

At the conclusion of the class, students should be able to:

- Describe fundamental properties for HVAC (heating, ventilation, and air conditioning) systems – energy flow, various delivery systems
- Calculate the heating and cooling design loads for building structures
- Determine the various types of heating and cooling production equipment
- Understand the components for HVAC delivery – fans, ducts, ventilation, air mixing
- Describe fundamental properties for hydraulics – open and closed channel flow
- Adequately size piping for water supply, drain fixtures, sewer drain, sewer venting, storm water drains and gas lines.
- Properly size mechanical pumps for fluid flow
- Understand the most common types of fire suppression systems, based on building occupancy classifications.
- Describe the fundamental laws of electricity – current, voltage, power, energy
- Understand the advantages of different types of electrical systems – such as AC versus DC, and single-phase versus three-phase power
- Analyze and design building power systems, communication, life safety, security systems
- Calculate the lighting demand loads for a building, and determine the proper lighting equipment to service the building space.
- Evaluate methods for controlling noise and vibration of mechanical equipment and buildings
- Sustainable design – recycled energy and building products, water treatment, natural ventilation, proper shading techniques, and costs.

TEXTBOOKS:

American Technical Publishers (ATP), *Mechanical and Electrical Systems for Construction Managers*, Homewood, Illinois, 2007. Sold in the CSUS bookstore.
(Required)

COURSE ORGANIZATION & EVALUATION:

Lecture Sessions

Attendance is strongly recommended. Lecture sessions will be two hours and thirty minutes in length, and held one time per week. A tentative instruction schedule, listing lecture topics and reading assignments to be completed by the student prior to attending the lecture, is attached to this syllabus. Classes will be devoted to the presentation of lecture topics, a brief review of the assignments, administering exams, and addressing individual questions as time allows. To maximize learning, you are encouraged to participate actively in lecture. You will also have the opportunity to work in small groups to solve problems in/out of the classroom.

Field Trips

A mandatory field trip to the UC Davis Medical Center *Cogeneration Plant* will be conducted on Monday, December 15, 2008 from 6:00 p.m. – 7:30 p.m. A 2nd field trip may be scheduled to observe the installation of mechanical and/or electrical systems at a local jobsite.

Course Web Page

A CM 136 course web page will be developed through the CSUS Web CT. It is **important** for you to have a SacLink account to utilize the tools of this course web page. You will be expected to check your Saclink email and the course web page regularly (i.e., daily) for important class announcements, homework assignments & solutions, and other information. You must send all email to me during the semester with **“CM136”** **somewhere in the “subject line”**. Email without this designation will not be recognized or responded to (i.e., I will assume that it has not been submitted).

Classroom Interruptions

The lecture sessions should be treated in a professional manner, as you would behave during a meeting with a client/contractor. All cellular phones and pagers to be turned off prior to entering lecture sessions and exams. Use of classroom computers during the lecture will also not be allowed. Any violation of these warnings will result in dismissal of the student from that day's lecture.

Homework Policy

Homework problems will be assigned regularly. Assignments must be turned in at the **beginning** of class on the due date, typically two periods after they have been assigned. A maximum of 2 late homeworks will be accepted at the beginning of the next class period, with a **20% penalty**. No homework may be submitted after an assignment is returned or after solutions are provided.

Homework must be neat and organized, and completed using a straight edge and engineering paper (front side only). Final answers must be boxed or underlined for clarity and **engineering units must be used in solving problems and shown on final answer to receive credit**. Homework sheets must be stapled, with name at the top of each page.

Homework will be reviewed for completion of all assigned problems, but not all of the assigned problems will necessarily be graded. However, solutions of all problems will be posted on Web CT and should be reviewed.

Exams Policy

Two eighty minute midterm exams will be given as noted on the exam schedule below. These midterm exams will be returned for review in class, but will be collected and remained on file in the instructor's office for a minimum period of one year. Any appeal on the scoring of an exam must be made at the first lecture period following return of the midterm exam.

Exam Dates (tentative)

Midterm Exam #1	Monday, October 27	(Week 9)
Midterm Exam #2	Monday, December 15	(Week 15)

Students may bring the *Mechanical and Electrical Systems for Construction Managers* textbook along with one 8.5 x 11 sheet (both sides) to the first exam, and an additional sheet for each subsequent exam. These sheets must be your own hand written notes. The instructor will collect and review these sheets. Makeup exams will be given only if *prior permission* is granted for extreme situations such as valid medical reasons.

Evaluations

Students are encouraged to provide constructive feedback to the instructor during the semester through "student representatives" and will also formally evaluate the instructor during the last week of class using the standard evaluation form.

Course Binders

All students are required to submit a neatly compiled three-ring binder, with divider tabs, all course notes, assignments, handouts, quizzes, exams, and other course work. Binders will be returned to the students following the ACCE accreditation visit in Spring 2009. Failure to produce and submit this binder will result in a failing grade in the class.

DOMINATE THE COMPETITION!
COMPLETE HVAC DOMINATION!

CM 136 - Course Outline
Fall 2008

Week	Lecture	Topic	Reading Assignment
1	1	Introduction to Mechanical & Electrical Systems	Chapter 1
	2	HVAC Principles	Chapter 8
2	3	Psychrometric Basics	Chapter 9
	4	Forced Air Heating Systems	Chapter 10
3	5	Steam & Hydronic Heating Systems	Chapter 11
	6	Refrigeration Principles	Chapter 12 QUIZ
4	7	Refrigeration Principles	Chapter 12
	8	Air Conditioning Systems	Chapter 13
5	9	Air Conditioning Systems	Chapter 13
	10	Heat Pumps	Chapter 14
6	11	Control Systems	Chapter 15
	12	Heating & Cooling Loads	Chapter 16 QUIZ
7	13	Heating & Cooling Loads	Chapter 16
	14	Load Calculations	Chapter 17
8	15	Forced Air System Design	Chapter 18
	16	MIDTERM #1: HVAC	
9	17	Electrical Principles	Chapter 20
	18	Basic Quantities, Testing, and Measurement	Chapter 21, 22
10	19	Ohm's Law	Chapter 23
	20	Power Formula, Series & Parallel Circuits	Chapter 23
11	21	Electrical Plans & Connections	Chapter 24
	22	Switches & Receptacles	Chapter 25
12	23	Wiring	Chapter 26
	24	Thanksgiving Day Holiday - NO CLASS	
13	25	Service Entrances	Chapter 27
	26	Transformers	Chapter 28
14	27	Resistance, Inductance, and Capacitance	Chapter 29
	28	Commercial Circuits	Chapter 30
15	29	Lighting	Chapter 30
	30	MIDTERM #2: Electrical Systems	

DISCLAIMER:

The instructor reserves the right to adjust the scope of the course, including number and timing of exams, as necessary.