**ECI-125: Building Energy Performance, Winter, 2011**

# Department of Civil and Environmental Engineering

**University of California Davis**

**Instructor:** Prof.Mark Modera

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Office Hours: T, Th 12-2

Office: 3120 Ghausi Hall

**Units:** 4

**Location/Schedule:** T,Th 2:10-4 PM/106 Olson Hall

**Textbook:** Lecture Notes

**References**:

ASHRAE Handbook of Fundamentals

Heating Ventilating and Air Conditioning – Analysis and Design, F.C. McQuiston, J.D. Parker, J.D. Spitler (Fifth Edition)

Building Physics – Heat, Air and Moisture, Hugo Hens, 2007 Ernst & Sohn

Modelling Methods for Energy in Buildings, C.P. Underwood and W.H. Yik, 2004 Blackwell Publishing

**Prerequisites** Upper division standing.

**Grading Criteria:** Homework 20%

Mid-term #2 35%

Final 45%

Final letter grades will be assigned “on the curve”

**Class Structure:** The principal objectives of this class are to provide students with an understanding of the mechanisms behind the energy consumption of buildings, and to introduce students to energy efficiency as a means to reduce that energy consumption. The principal focus will be on the energy use associated with maintaining thermal comfort, but the course will also cover the other significant energy end uses in buildings. The student will learn about mechanisms and technologies for improving the energy efficiency of buildings, once again focused primarily on the maintenance of a comfortable indoor environment. Specific topics to be covered include: energy end uses in buildings, thermal loads, ventilation and air infiltration, thermal energy distribution, HVAC systems, characterization of weather, and methods for simulating energy performance.

**Listserv**: The listserv for the class is …………You will automatically be enrolled on this list if you are registered for the class and have a campus e-mail address. If you don’t have a campus e-mail address, you must obtain one. [Go to IT Express, located in room 182 of Shields Library (turn right inside the main entrance and go a few doors down) and bring a photo ID with you.] I will use this to let you know when I post items to the course website, as well as to broadcast questions and answers relevant to the class as a whole. I expect that you will check your email regularly. You are also welcome to send messages to the list yourself.

The software for establishing the class mailing list automatically uses your UC Davis e-mail address. It is not possible to substitute a different address. If you want to receive messages at a different address, you should set up your UCD account to forward to that desired address. See <http://email.ucdavis.edu/forms/mailidredirect.html> for instructions on how to do this.

**Website**: For those registered in the class, the course web site can be accessed through your MyUCDavis portal, <http://my.ucdavis.edu>. The Smartsite name is “ECI 125 WQ 2011”. The following items can be viewed and downloaded online from the course web site: (1) homework assignments, (2) copies of the lecture notes, (3) updated copies of the syllabus (which changes from the most previous version highlighted in red), (3) supplemental reading material, and (5) announcements.

Lecture and Reading Schedule

**Date Topic Reading**

1/4 Introduction: Building Energy Use

1/6 Thermal Energy Balance - Basics Lecture Notes

1/11 Thermal Balance – Heat Transfer, Tsol-air Lecture Notes

1/13 Thermal Balance – Solar Radiation McQ Solar Radiation

1/18 Thermal Balance– Windows ASHRAE Ch 15: pp 1-30

1/20 Thermal Balance– Windows - SHGC Lecture Notes

1/25 Thermal Balance– Internal Gains, Hourly Solar Lecture Notes

1/27 Thermal Balance– Ventilation and Infiltration ASHRAE Ch 16

2/1 Mid-Term Lecture Notes

2/3 Mid-Term Review – Hourly Model, Seasonal Weather Lecture Notes

2/8 Thermal Balance – Weather Application, Transient Effects Lecture Notes

2/10 Thermal Balance – Transient Effects ASHRAE Ch 18 pp 1-44

2/15 HVAC Equipment – Residential Lecture Notes

2/17 Residential Cooling, Psychrometrics, Lecture Notes

2/22 Evaporative Cooling, Thermal Energy Distribution Lecture Notes

2/24 Residential Thermal Energy Distribution ASHRAE Std 152

3/1 Residential Thermal Energy Distribution - Ducts Lecture Notes

3/3 Commercial Equipment and Thermal Distribution Lecture Notes

3/8 Hotel HVAC, Psychrometrics Review Lecture Notes

3/10 Review, Example Applications

3/15 **FINAL**

**USEFUL WEBSITES**

* <http://eetd.lbl.gov/eetd-org-bt.html>
* <http://epb.lbl.gov/>