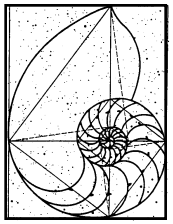
Architecture 307
Environmental Control Systems II
Winter 2001



• **SYLLABUS** •

Lecture Instructor: Prof. Margot Kally McDonald, AIA
Office: 34-220D / Phone: 756-1298 /e-mail: mmcdonal@calpoly.edu
Office Hours: MW 12:10pm-1:00pm; TR 12:10pm-1:30pm

Lab Instructors: Profs. Jennifer Rennick, George Stewart, Barry Williams; Ansgar Killing, TA

• LECTURE

Course Overview

Architecture 307 builds on the fundamentals of environmental control systems dealing specifically with building heating, cooling, lighting, water, waste, and acoustics. This course places an emphasis on the integration of spatial, visual, and environmental performance aspects of predominantly residential and small scale buildings that are skin-load dominated. Innovative environmental solutions will be illustrated throughout the course. Lectures and laboratories meet twice weekly. Field trips will occur as an integral part of the course.

Objectives

At the end of this course, the student will be expected to:
- *recognize* the use of environmental control systems as architectural form determinants;
- *demonstrate* knowledge of the interaction between passive and active environmental controls in small to medium scale buildings;
- *understand* selection criteria for choosing an appropriate environmental control systems early in the design process;
- *size and lay out* elements of environmental control systems;
- *demonstrate* knowledge of the California Energy Standards;
- *recognize* the implications of architectural design decisions on resource consumption.

Student success at meeting these objectives will be measured by tests and quizzes in lecture and through participation and exercises in laboratory.

• LABORATORY

Study Vehicle

The laboratory exercises will give students hands-on qualitative and quantitative experience with each of the major topics of the course. To encourage in-class discussion, students will be assigned to find and read articles from various sources on each of the lab topics. Also, students are encouraged to apply concepts learned in this class to their design studio and to engage their lab instructor's expertise on specific design inquiries related to environmental controls systems.

Assignment Format

The laboratory exercises should be organized into a 8-1/2" x 11" 3 ring notebook. In addition, students should keep a personal sketchbook with observations, sketches, and field trip notes related to the course. Relevant sketchbook material should be xeroxed and inserted into the notebook. In all work, graphic clarity is essential. Freehand sketches are encouraged with carefully lettered or word-processed text.

• **GRADING:**

Lecture grades will be based on in-class participation (quizzes and attendance), midterms, and a *cumulative* final exam. Students must receive a passing grade in both lecture and laboratory to pass the course. The lecture grade weighting is as follows:

PARTICIPATION/QUIZZES	5%
EXAM 1	10%
EXAM 2	10%
FINAL EXAM	25%
LABORATORY	50%
	100%

Laboratory grades will be based on lab activities: participation, attendance, quizzes, exercises and article summaries. Students must demonstrate minimum proficiency in all laboratory topics to receive a passing grade in the lab section. Late work will not be given full credit. The laboratory grade weighting is as follows:

PARTICIPATION/ARTICLES	10%
LAB EXERCISES	90%
	100%

• **LABORATORY ARTICLE SUMMARIES:**

For each of the course topics (acoustics, lighting, passive systems or energy codes, water or waste), locate an article from journals or the Internet with architectural content and relevancy to the course. Write a one page summary of the article including a bibliographic reference. Make two copies of the article *and* your summary. Insert one copy in your notebook and submit the second copy to the instructor when due. See the syllabus for due dates.

• **LABORATORY ATTENDANCE**

Attendance in laboratory is mandatory since labs are completed, with few exceptions, during class time. Students with an excused absence should notify their instructor and attend another lab section during the same week.

• **MATERIALS & COURSE FEES:**

Required Reading

California Energy Commission. 1992. Excerpts from the *Residential Manual for Compliance with the Energy Efficiency Standards.* Sacramento: California Energy Commission. (Provided to students in laboratory from lab fee.)

County of San Luis Obispo, 1992. *San Luis Obispo County General Plan Noise Element*, San Luis Obispo: County of San Luis Obispo. (Provided to students in laboratory from lab fee.)

Moore, Fuller. 1994. *Environmental Control Systems*. New York: McGraw Hill.

Stein, B. and John Reynolds. 1992. *Mechanical and Electrical Equipment for Buildings*, 8th edition. New York: John Wiley & Sons.

E-mail Accounts

E-mail your lab instructors during the first week of the term in order to receive supplemental class announcements.

Lab Fee As published.
Field Trip Fee (TBD).

• **GENERAL NOTES:**

1. Students should be sure to notify the instructor regarding any absences or extenuating circumstances that might impact their performance.
2. Student work may be collected and retained from this course for accreditation as allowed by the Cal Poly Catalog.
3. Students are responsible for doing their own work according to university policy.

Architecture 307
Environmental Control Systems II
Winter 2000 / McDonald

L E C T U R E & R E A D I N G S C H E D U L E

Readings are taken from the texts and handouts: *Mechanical and Electrical Equipment for Buildings*, 8th edition (MEEB); *Environmental Control Systems* (ECS); *San Luis Obispo County General Plan Noise Element*, May 1992 (Lab Handout); California Energy Commission's *Residential Manual for Compliance with the Energy Efficiency Standards*, July 1992 (CEC) (Lab Handout). Chapters from MEEB noted in *italics* were first assigned in ARCH 207. The symbol § means "Chapter". Read the assigned sections prior to the associated class lecture.

SCHEDULE	TOPICS	READINGS	LAB ASSIGNMENTS
WEEK 1 - JAN 8/10	**Introduction / Design Integration**		
Monday	Course Introduction		LAB 1 – Integration Warm-up
Wednesday	ECS and Design Integration		
WEEK 2 - JAN 15/17	**ROOM ACOUSTICS**		
Monday	MARTIN LUTHER KING HOLIDAY		
Wednesday	Fundamentals of Sound / Room Acoustics	MEEB § 26.1-26.26	LAB 2 - Acoustics
WEEK 3 - JAN 22/24	**NOISE ISOLATION AND CONTROL**		
Monday	Designing for Noise Control	MEEB § 27.1-27.38	
Wednesday	Exterior Noise Considerations	SLO Noise Element	
WEEK 4 - JAN 29/31	**THE LUMINOUS ENVIRONMENT**		
Monday	Fundamentals of Light	ECS § 23-24	LABS 3 + 4 - Lighting
Wednesday	Daylighting Design Methods	ECS § 25	
WEEK 5 - FEB 5/7	**DAYLIGHTING METHODS**		
Monday	Daylighting Design Methods	MEEB § 20.8-20.23	
Wednesday	Introduction to Electric Lighting		
WEEK 6 - FEB 12/14	**ELECTRIC LIGHTING / EXAM**		
Monday	Lighting Design Concepts	MEEB § 20.8-20.23	
Wednesday	MIDTERM EXAM		

Architecture 307
Environmental Control Systems II
Winter 2000 / McDonald

L E C T U R E & R E A D I N G S C H E D U L E

WEEK 7- FEB 19/21	**Thermal Load Balancing: Heat and Light**		
Monday	HOLIDAY - George Washington's B-Day		LAB 5 – Thermal Optimization
Wednesday	Passive Design + Supplemental Systems	MEEB § 6.5-6.7	
WEEK 8 - FEB 26/28	**Energy Code / Water in Architecture**		
Monday	California Energy Code	CEC readings	
Wednesday	Water in the Built Environment	MEEB § 3.1-3.7; § 8.1-9.3	
WEEK 9 - MAR 6/8	**Water + Waste**		
Monday	Solar and Conventional DHW Systems	MEEB § 9.4-9.5b	LAB 6 – Water + Waste
Wednesday	Small Building Water Supply & Waste Systems	MEEB § 10.1-11.4	
WEEK 10 - MAR 13/15	**Environmental Impacts**		
Monday	Environmental Impacts of Buildings	MEEB § 12.1-12.3	LAB 7 – ECS/Design Integration
Wednesday	Course evaluation + review		

• **F I N A L E X A M** WEDNESDAY, 10:10am – 12:00pm, 21 MARCH 2001 •

ADDITIONAL RECOMMENDED READING

Brown, G.Z. and Mark Dekay, *Sun, Wind, and Light,* New York: John Wiley & Sons, 2000
Lyle, John, *Regenerative Design for Sustainable Development*. New York: John Wiley & Sons, 1994
Mazria, Edward, *The Passive Solar Energy Book*. Emmaus, Penn.: Rodale Press, 1979
Vale, Brenda and Robert, *Green Architecture*. Boston: Bullfinch Press, 1991
Watson, Don & Kenneth Labs, *Climatic Design*. San Francisco: McGraw-Hill, 1983