Overview:
This course is the second in a two-part series on environmental control systems. The emphasis is on sight (light), hearing (acoustics), taste (water) and smell (waste). The class will discuss environmental control systems as an integral aspect of the design process rather than as an applied after-thought.

The first half of this course focuses on architectural lighting, the rendering of building form in light. Emphasis for this portion of the class will be on understanding the basic principles of lighting and perception as a foundation for generating clear and successful design concepts, with a balance of practical and technical instruction so that designers can assume responsibility for lighting with increased confidence and renewed potential.

The second half on the course will focus on the topics and issues around water conservation, waste water treatment, and acoustics. The class will emphasize design issues over technical concerns, using a series of in-class explorations and take home exercises.

GOALS:
This course should enable students to do the following:
• Evaluate the success or failure of an existing lighting design
• Use light as an architectural element
• Identify a range of common lamp types / fixture types and when to use them
• Document a lighting design by producing a lighting layout, details, fixture schedule and catalog cuts
• Integrate daylighting with electric lighting as an energy conservation strategy
• Understand a broad range of water conservation strategies
• Understand a broad range of wastewater treatment strategies
• Understand the principles of acoustic design

Instructional Methodology:
Students are expected to do the readings prior to each lecture in order to expand on topics during the in-class activities and lecture discussions. In class explorations will be group exercises performed in groups of 3 to 4 students. Homework assignments (Exercises) must be done individually in order for a student to receive credit. Attendance is required for all lectures and Saturday sessions. Unexcused absences are not permitted. There will be weekly quizzes and in-lecture activities covering each week’s topics. This is intended to keep track of student’s participation, learning progress and applications of the course material. There are no – make up for pop quizzes or in class activities. The final grade for both quizzes and class participation will be based on an average of all grades with the lowest score on the quizzes and on the in-class explorations thrown out.
**Required Texts:**
The following text is available for purchase at the Oregon Bookstore.

*Mechanical and Electrical Equipment for Buildings (MEEB) – Eleventh Edition* by Walter T. Grondzik, Alison G. Kwok,
Benjamin Stein, John S. Reynolds

**Supplemental Texts:**
The following books are on reserve in the library.

*Concepts is Architectural Lighting*, M. David Egan
*Concepts in Architectural Acoustics*, M. David Egan
*Perception and Lighting as Formgivers for Architecture*, Lam, William;
*Sunlighting as a Formgiver for Architecture*; Lam, William;
*Light Revealing Architecture*; Millet, Marietta;
*Lighting Design Basics*, Mark Karlen and James Benya

**Evaluation:**
Performance in ARCH 492/592 will either be graded or pass / no pass (P/NP) to be selected by the student. A 492 pass is equivalent to a (C-) and 592 Pass is equivalent to a (B-).

Student work will be evaluated based on the following percentages:

- **Quizzes** (20%) Lowest grade will be dropped
- **Class participation** (20%) Includes attendance, participation, and in class explorations.
- **Homework Assignments** (40%) 4 Assignments – must be done individually
- **Final Project** (20%) Final design problem – must be done individually

Grading is not set on a curve.

- 97.1% - 100% A+
- 93.1% - 97% A
- 90.1% - 93 A-
- 87.1% - 90% B+
- 83.1% - 87% B
- 80.1% - 83 B-
- 77.1% - 80% C+
- 73.1% - 77% C
- 70.1% - 73 C-
- 67.1% - 70% D+
- 63.1% - 67% D
- 60.1% - 63 D-

All assignments are due at the beginning of the lecture, unless otherwise announced. Assignments (other than the final) will be accepted a maximum of week late with a 25% penalty. The final project will not be accepted past the due date. Incompletes are only given for medical emergencies and then only with authorised and written approval from the instructor.

**Academic Honesty**
Academic honesty is expected. Any cases of academic plagiarism or cheating will be reported to the Student Conduct Coordinator and handled as described in the University's Student Conduct Code. Such cases would include collaborating or copying during quizzes, copying work for individual assignments, and including the work of others in case studies without appropriate credit. All "homework" assignments are individual assignments, unless otherwise noted -- discussion of the general procedures and processes for such assignments is acceptable and encouraged, but all work submitted must reflect the individual thinking and decision-making of the submitting student. The in class explorations are intended to be group projects, where the submitted work reflects the considered judgment of a specific group of students.
U of O: School of Architecture and Allied Arts

ARCH 492/592 ENVIRONMENTAL CONTROL SYSTEMS
COURSE OUTLINE

Winter 2015

WEEK 1

PERCEPTION

NATURE OF LIGHT/ WHAT MAKES A GOOD LUMINOUS ENVIRONMENT

- Perception
- In-class Exploration A – PERCEPTION
- Terms and Definitions

Required Reading: Lam PALAFFA chap. 1, 2, 3
MEEB pg. 467-490

Supplementary Reading: LIGHT REVEALING ARCHITECTURE pg. 6-92

WEEK 2

DAYLIGHTING - LIGHT QUALITY

WHAT is DAYLIGHT? / LIGHTING DESIGN TECHNIQUES

- Designing with Light
- Window Placement / Window Size / Window Location
- In-class Exploration B – DAYLIGHT FACTOR

EXERCISE ONE DUE

Required Reading: DAYLIGHTING PERFORMANCE AND DESIGN pg.3-20
MEEB pg. 525-530

Supplementary Reading: CONCEPTS IN LIGHTING chap. 6 pg. 167-202

Sat. January 19th – WINDOW FORM / MEANING

- In-class Exploration C – WINDOW FORM and MEANING

WEEK 3

DAYLIGHTING - LIGHT QUANTITY

COMPUTER RENDERING/ EXAMPLES

- Guest Speaker – Computer Techniques
- Daylighting Examples

Required Reading: MEEB pg. 587-626
Supplementary Reading: LIGHT REVEALING ARCHITECTURE pg. 93-148

WEEK 4

LAMPS and LUMINARIES

LAMPS TYPES/ LUMINAIRE SELECTION/ DETAILING

- Guest Speaker – Luminaires
- Incandescent, Fluorescent, HID / Luminaire Selection Criteria
- In-class Exploration D – SCAVENGER HUNT

EXERCISE TWO DUE

Required Reading: MEEB pg. 514-524, 531-562, 572-586, 629-649
Supplementary Reading: LIGHTING DESIGN BASICS pg. 3-30

WEEK 5

ELECTRIC LIGHTING CALCULATIONS

DESIGN PROCESS / CONTROLS / CODES / DOCUMENTATION

- Drawings / Fixture Schedules
- Energy Code / IES Recommendations
- Point Method / Lumen Method
- In-class Exploration E – LIGHTING CALCULATIONS

Required Reading: MEEB pg. 491-514, 563-586, 649-688,
Supplementary Reading: LIGHTING DESIGN BASICS pg. 37-44, pg. 55-72
Saturday Feb. 9th – ELECTRICAL LIGHTING FIXTURE DESIGN
• In-class Exploration F– CUSTOM FIXTURE DESIGN

WEEK 6
ARCHITECTURAL ACOUSTICS: BASIC PRINCIPLES
DEsign INtegration
• Lighting Design Applications
• Acoustics STC and IIC
• In-class Exploration G – ACOUSTIC DESIGN

Required Reading: MEEB pg. 737-782

WEEK 7
ARCHITECTURAL ACOUSTICS: ARCHITECTURAL INTEGRATION
ACOUSTICS
• Guest Speaker – Acoustics

EXERCISE THREE DUE
Required Reading: MEEB pg. 782-861
Supplementary Reading: CONCEPTS in ACOUSTICS

WEEK 8
WATER and WASTEWATER
WATER CONSERVATION and REUSE
• Hydrological Cycle
• Water Systems
• Guest Speaker – Plumbing Systems
• In-class Exploration H – WATER CALCULATIONS

Required Reading: MEEB pg. 909-998, 999-1081

WASTEWATER TREATEMENT SYSTEMS
• Design Examples
• LEED / Living Building Challenge
• In class exploration L- LEED / LBC

WEEK 9
DESIGN INTEGRATION
FIRE and LIFE SAFETY SYSTEMS
• Building Automation
• Fire Suppression / Control Systems
• Egress Systems
• Smoke Management

Required Reading: MEEB pg. 1085 - 1161

EXERCISE FOUR DUE

WEEK 10
REVIEW WEEK
NO CLASS

WEEK 11
FINALS WEEK
FINAL SKETCH PROBLEM DUE
• In class review of sketch problems