ARCH 4/591: ENVIRONMENTAL CONTROL SYSTEMS I

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Course: ARCH 491 [CRN 20966]; ARCH 591 [CRN 21023]. 4 credit hours
One of two required ECS courses for architecture students
Instructor: Professor Alison G. Kwok, Ph.D., AIA, LEED AP, akwok@uoregon.edu
Office: 100 Pacific, Office hours: to be announced
Lectures: Tuesdays and Thursdays: 2:00 – 3:20 pm, 177 Lawrence
Sections: Undergraduate and graduate discussion sections will be held separately but during concurrent time
periods on various days and locations as noted below
GTFs: Diana Hogard, Annie Liu, David Bisers
TAs: Dan Beltramo, Sara Tepfer, Wesley Thompson, Andrew Westling, Perrin Wright
Pilkington Sun Angle Calculator
*Thermal Delight in Architecture* (Heschong)
*The Green Studio Handbook*, 2011 (Kwok and Grondzik)
iClicker from the UO Bookstore
Recommended: HOBO datalogger (Onset Computer: http://www.onsetcomp.com)
Prerequisites: None; course is open to non-majors

DISCUSSION SECTIONS

Undergraduate
491: 20967 T 1600-1750 383 LA
491: 20968 W 0800-0950 383 LA
491: 20969 Th 1000-1150 383 LA
491: 20970 Th 1600-1750 383 LA

Graduate
591: 21025 T 1600-1750 XXX
591: 21027 W 0800-0950 XXX

FINAL PROJECT PRESENTATION

Monday, March 19, 2012, 1:00-3:00 PM

BACKGROUND

Scope: This course will focus upon building and design elements generally described as *climate control systems*. These systems
often involve active (mechanical/electrical) solutions—but with underlying issues that are fundamentally “architectural” in
nature. Passive (architectural) solutions will also be addressed. An exquisitely brief introduction to mechanized circulation
systems will also be provided. The course syllabus provides a detailed outline of course content and schedule.

Objectives: The systems discussed in this course play an important role in all types of buildings. They substantially affect
building costs (both first and life-cycle costs), building performance, and occupant health, safety, comfort, and productivity.
Ultimately, climate control performance may be a primary determinant of owner and occupant perceptions of building success.
It is ethically imperative that every architect have a sufficient understanding of climate control systems to permit their proper
implementation and integration into the building design process. Providing such a fundamental understanding is the main
objective of this course.

Outcomes: This course intends to develop a basic understanding of building climate control systems that will permit you to
actively participate in decision making regarding such systems during the design process and that will (if you desire) facilitate
further study leading to the ability to design such systems.

Those who successfully complete this course should—with respect to climate control and mechanized circulation systems:
• be able to communicate with the client and other members of the design team through an understanding of basic
terminology and measurement units,
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- be able to make early design decisions regarding the appropriateness of various systems and design concepts through an understanding of system functions (what the systems can and cannot do),
- be able to participate in project coordination through an understanding of the role and character of these systems in typical building applications and contexts, and
- understand the basics of system selection, placement, components, sizing, and integration.

Format: ARCH 4/591 is a lecture/lab course. Much information will be exchanged in lecture. The required readings will provide a background to facilitate such exchanges. The lab sections will be used to develop and discuss issues and concepts beyond what is possible in lecture. Hands-on application of selected concepts will be explored through projects and section activities by the GTFs who will conduct lab sections work under the direct supervision of the professors. These sections will be conducted according to the protocols that have been approved by the professor and that are common to all sections of the course. The professors will meet with the GTFs on a weekly basis to coordinate material and ensure that the sections are being run consistently according to the instructors’ specifications.

Understanding the systems and concepts presented and discussed in this course, and their connection to the broad arena of architecture, requires that you reflect upon potential applications for such systems in the buildings that you design. You are strongly encouraged to engage and make contextual sense of the concepts presented in class—as opposed to simply listening to the lectures and mechanically completing the projects. Design is a messy endeavor; get your hands dirty and your brains exercised.

Money: In addition to typical University tuition, fee, and book expenses, additional expenses will likely be incurred for materials and supplies required for the completion of course projects and potential travel related to the case study.

GRADING
Multiple measures will be used to assess your performance. A grasp of information will be tested via quizzes. The ability to apply information in design situations will be assessed via projects. Active participation in the learning process will be assessed via weekly questions and section attendance and participation. A case study assignment will span several weeks of the term. Regular class attendance and participation (including sections) and timely assignment submission are minimum expectations for successful course completion.

The professors will have ultimate responsibility for determining and entering grades. GTFs will assess work under clear criteria determined by the professors for each assignment. Professors will regularly monitor the grading activities of GTFs with respect to accuracy and fairness. Graduate students will be invited to have the option of having their work graded solely by the professors.

Quizzes will be given each Thursday in class (timing at the instructor’s discretion). Textbook (MEEB or other) is required in class. A missed quiz may be made up ONLY in the case of a verified emergency situation or a pre-excused absence approved prior to the time of the quiz. The lowest quiz grade is NOT dropped.

Question/Response: Each week we will give you a “question of the week” to respond to. This will be due on Tuesday at the beginning of lecture. You can also submit a question or observation about materials recently covered in class. The question or observation must be submitted on a recycled, uncrumpled piece of paper with the question, your name, and email address. The question card may not be submitted by another person. The instructors will use these Q/R sheets to look at learning trends in the class and will not be returned; they may be responded to on occasion.

iClickers will be used for activities and evaluation throughout the class. You will register your iClicker through Blackboard by the end of the first week of class. iClickers may only be used by you. Submitting responses for another person, or allowing others use your iClicker, is grounds for a failing grade and the basis for potential referral to Academic Affairs. Clickers must be brought to each lecture. Extra clickers will not be available.

Several project assignments will be made during the term. Each will be described in writing and will have a specific due date. Projects will be discussed in class at the time they are assigned. Work must be submitted in a format reflective of your status as a student in a professional program. This explicitly excludes illegible, poorly-organized work, and torn/ragged sheets of paper, unintelligible writing, and indecipherable spelling. Specific data sources and/or other documentation used to complete assignments must be clearly noted (this is a valuable habit for practice). Presentation quality will affect grading—as will content accuracy and completeness.
A longer-term case study project will be assigned. The case study is a group assignment, will involve interim reviews, requires the development a report and poster, and the presentation of the case study by the group during the scheduled final exam period for the course.

Attendance at section meetings is required. This aspect of the course will be assessed based upon physical attendance and active and constructive participation in discussion and in-section activities.

The course may be taken on either a graded or P/N basis. A “pass” requires a minimum equivalent grade of C- (undergraduates); B- (graduates). The overall course grade will be based upon a cumulative tabulation of the various elements described above, weighted as follows:

- Projects 30%
- Quizzes 15%
- Questions/Observations 5%
- Section Attendance/Participation 15%
- Case Study 35%

Grading will not be “curved” (which tends to unfairly penalize those who do well). Grading will be as follows:

- A+ = 97.5-100%, A = 92.5-97.4%, A- = 89.5-92.4%
- B+ = 87.5-89.4%, B = 82.5-87.4%, B- = 79.5-82.4%
- C+ = 77.5-79.4%, C = 72.5-77.4%, C- = 69.5-72.4%
- D+ = 67.5-69.4%, D = 62.5-67.4%, D- = 59.5-62.4%

All projects are due at the start of class, unless otherwise announced. Projects (other than the case study) will be accepted up to a week late with a 5% per day late penalty. (If turned in after the start of class on the due date, this constitutes 5% late penalty.) Case studies must be submitted as scheduled. Final case study presentations are scheduled during the University’s designated final examination period (see syllabus for case study dates). Failure to attend the case study presentations will result in a 50% case study grade penalty.

A grade of Incomplete will be given ONLY for medical emergencies and requires written pre-approval from the instructor. The instructor reserves the right to withhold a final course grade if equipment on loan is not returned in working order by the time of the final case study presentations. Requests for extra-credit or compensatory work to make up for missing assignments or quizzes will not be considered.

Group discussion of projects is acceptable and is encouraged. Collaborative work (which can be very educational) has limits, however. Copying another’s work, or a portion of work, for submission as your own, or allowing others to copy your work, is grounds for a failing grade and the basis for potential referral to the Director of Student Judicial Affairs. Any project submitted for grading is—by the act of submission—certified to be the true work product of the individual who submits the work. This means that the work reflects a personal exercise of judgment regarding accuracy, quality, and completeness.

If unforeseen and uncontrollable circumstances during the term make it impossible for you to fully participate in course activities as scheduled, such a situation must be brought to the instructor’s attention immediately—delayed requests for compassionate consideration will not be accepted. Any request for deviation from published and/or assigned course requirements must be made in a timely manner and be agreed to in writing.

If you have a documented disability and anticipate needing accommodations in this course, please provide documentation from UO Disability Services and meet with the instructors during the first week of class.

**HOMEWORK PRESENTATION POLICY**

On all project pages, include your name, date, the number of the project, and your GTF’s name. Any project without a name will receive no credit. All questions requiring a short response should be answered with a concise, well-crafted paragraph. Answers should be typed, unless otherwise noted. Staple your short answer sheets behind the project assignment, and turn them in on the assigned date. If you are to fill in answers on the project sheets themselves, please turn in a clean, legible copy. Illegible answers will not receive credit. Successful presentations of projects include, but is not limited to: spelling, clarity of thought, following instructions, and design. Points are awarded at the instructor’s discretion.
Show all calculations and include all units (e.g. Kilowatts = kW). Calculations may be handwritten, if presented legibly.

Projects are due at the beginning of lecture on the due date indicated. **Projects must be turned in by 2:00 pm, in the boxes outside Lawrence 177.** Any project not turned in at this assigned time will be marked off 5% per day up to one week. Any project turned in later than one week after it was due will not receive any credit. Arrangements should be made with your GTF to turn in a late project.

**REQUIRED READINGS**

Required readings (see course schedule) are generally from *Mechanical and Electrical Equipment for Buildings*, 11th Edition: Stein, Reynolds, Grondzik, Kwok, John Wiley, Hoboken, NJ, 2010. Other required readings are from *Thermal Delight in Architecture*: Heschong, The MIT Press, Cambridge, MA, 1979 and *The Green Studio Handbook*: Kwok, Grondzik, Architectural Press, Oxford, 2011. Additional required readings are derived from a number of sources as noted on the course schedule—these sources are either on physical or electronic library reserve. Specific reading assignments are noted by page, section, or chapter numbers. Required readings are to be read prior to the class meeting to which they are linked in the schedule. Books are to be brought to class.

**NAAB CRITERIA**

This course addresses the following 2009 NAAB Criteria (bold are primary concerns):

**Realm A: Critical Thinking and Representation**

**Realm B: Integrated Building Practices, Technical Skills and Knowledge**

**Realm C: Leadership and Practice**

**COURSE PHILOSOPHY**

*... the ultimate task of architecture is to act in favor of man ... to remove the gross environmental load from his shoulders.* Fitch, James Marston: *American Building – The Environmental Forces that Shape It*, 2nd ed., Schocken Books, New York, 1975.


*We believe that it is the professional, ethical, and moral responsibility of the architect to ensure the comfort, safety, and health of occupants of buildings she/he designs AND to design in a way that dramatically reduces or eliminates the use of fossil fuels on building design, construction, operation, and decommissioning.*

Alison G. Kwok, January 2012