ARCH 4/591 ENVIRONMENTAL CONTROL SYSTEMS |
Department of Architecture | University of Oregon | Winter 2011

Course: ARCH 491 [CRN 20854] ARCH 591 [CRN 26708] 4 credit hours
One of two required ECS courses for architecture students

Instructor: Professor Alison G. Kwok, Ph.D., AIA, LEED AP
Office: 100 Pacific, Office hours: tbd
Adjunct Professor Roger Ota
Office: tbd

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: Mike Beamer, Christopher Deel, Charlie Deese, Paul Wolfe
TAs: Amanda Asa, Kate Laue, Ali McQueen, Sinead Quinn, Alex Zelaya

Required: Mechanical and Electrical Equipment for Buildings, 11th edition; Pilkington Sun Angle
Calculator; Thermal Delight in Architecture; The Green Studio Handbook, 2007 (Kwok and
Grondzik); iClicker from the UO Bookstore

Recommended: HOBO datalogger (Onset Computer: http://www.onsetcop.com)
Prerequisites: None; course is open to non-majors

DISCUSSION SECTIONS

Undergraduate
491: 20855 T 1600-1750 383 LA GTF:
491: 20856 W 0800-0950 383 LA GTF:
491: 20857 Th 1200-1350 383 LA GTF:
491: 20859 Th 1600-1750 383 LA GTF:

Graduate
591: 26991 T 1600-1750 104 PA GTF:
591: 26992 W 0800-0950 104 PA GTF:
591: 26993 Th 1200-1350 104 PA GTF:
591: 26994 Th 1600-1750 104 PA GTF:

FINAL PROJECT PRESENTATION:

Monday, March 14, 2011, 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,
- 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). 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 on one side and your name on the other side. 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.

**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 the Director of Student Judicial 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:

<table>
<thead>
<tr>
<th>Projects</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes</td>
<td>15%</td>
</tr>
<tr>
<td>Questions/Observations</td>
<td>5%</td>
</tr>
<tr>
<td>Section Attendance/Participation</td>
<td>15%</td>
</tr>
<tr>
<td>Case Study</td>
<td>35%</td>
</tr>
</tbody>
</table>

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. There will be several opportunities to “Take It Further” on the projects. These will be graded on a P/NP basis and used as a “safety net” at the end of the term if your grade is a borderline case, would go to the next half step. e.g. 89.4% = B+ with satisfactory completion of a safety nets would be an A-.

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.
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, 2007. 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.

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.


*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, Roger Ota January 2011