

ARCH 4/591 ENVIRONMENTAL CONTROL SYSTEMS I
Department of Architecture | University of Oregon | Winter 2007

- Course: ARCH 491/591 [CRN: 491: 20403; 591: 20459] 4 credit hours
One of two required ECS courses for architecture students
- Instructor: Associate Professor Alison G. Kwok, Ph.D., AIA, LEED AP
Office: 100 Pacific; akwok@uoregon.edu; 346-2126
Office hours: as posted and announced in class
- Lectures: Tuesdays and Thursdays: 2:00 – 3:20 PM, 177 Lawrence
- Sections: Undergraduate and graduate discussion sections will be held on various days and locations as noted below
- GTFs: Dianne Ahmann, Sam Jensen Augustine, Adrienne Leverette, Matt Travis
TAs: Hannah Cooley, Pete Henne, Christopher Small, Stefanie Young
- Required: *Mechanical and Electrical Equipment for Buildings*, 10th edition; *Pilkington Sun Angle Calculator*; *Thermal Delight in Architecture*; web authoring software (Go Live, Dreamweaver, FrontPage, etc.)
- Recommended: *The Green Studio Handbook*, 2007 (Kwok and Grondzik);
Sun, Wind & Light, 2nd edition (Brown and DeKay); HOBO datalogger (Onset Computer: <http://www.onsetcop.com>); USB memory stick
- Prerequisites: None; course is open to non-majors

DISCUSSION SECTIONS

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|------------|--------------|--------|---|
| 491: 20404 | Tu 1530-1720 | 383 LA | GTF: Ady Leverette; TA: Chris Small |
| 491: 20405 | Th 1530-1720 | 383 LA | GTF: Sam Jensen Augustine; TA Hannah Cooley |
| 491: 20406 | We 0800-0950 | 383 LA | GTF: Matt Travis; TA Pete Henne |
| 491: 20407 | Th 1000-1150 | 383 LA | GTF: Dianne Ahmann; TA: Stefanie Young |
| 591: 20459 | Tu 1530-1720 | 141 LA | GTF: Dianne Ahmann |
| 591: 20460 | Th 1530-1720 | 141 LA | GTF: Matt Travis |
| 591: 20461 | We 0800-0950 | 141 LA | GTF: Ady Leverette |
| 591: 20462 | Th 1000-1150 | 141 LA | GTF: Sam Jensen Augustine |

FINAL EXAMINATION PERIOD

Monday, March 19, 2007, 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) sessions 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.

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.

Quizzes will be given each Tuesday 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.

Each week (on Thursday, in class) you will submit a **question or observation** about materials recently covered in class. The question or observation must be submitted on a 3x5 index card with the question on one side and your name on the other side. The question card may not be submitted by another person.

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 of a WWW-based report, and the presentation of the case study by the group during the scheduled final exam period for the course. More information on the case study will be provided in class.

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. For an undergraduate student (taking ARCH 491) a “pass” requires a minimum equivalent grade of C-. For a graduate student (taking 591) a “pass” requires a minimum equivalent grade of B-.

The overall course grade will be based upon a cumulative tabulation of the various elements described above, weighted as follows:

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| Projects | 25 % |
| Quizzes | 25 % |
| Questions/Observations | 5 % |
| Section Attendance/Participation | 15 % |
| Case Study | 30 % |

Grading will not be “curved.” From 98-100% is an A+, 93-97% is an A, 90-92% is an A-, and so forth. 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. 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. Any project (or quiz) 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. Copying

another's work, or portion of work, for submission as your own is grounds for a failing grade and the basis for potential referral to academic honesty procedures.

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 make arrangements to meet with the instructor during the first week of class.

REQUIRED READINGS

Required readings (see course schedule) are generally from *Mechanical and Electrical Equipment for Buildings*, 10th Edition: Stein, Reynolds, Grondzik, Kwok, John Wiley, Hoboken, NJ, 2006. Other required readings are from *Thermal Delight in Architecture*: Heschong, The MIT Press, Cambridge, MA, 1979. 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 2004 NAAB Criteria (bold are primary concerns): 1/Speaking and Writing Skills; 2/Critical Thinking Skills; 3/Graphics Skills; **4/Research Skills**; 6/Fundamental Design Skills; **7/Collaborative Skills**; 8/Western Traditions; 9/Non-western traditions; 10/National and Regional Traditions; 11/Use of Precedents; 12/Human Behavior; **13/Sustainable (sic) Design**; **17/Site Conditions**; **19/Environmental Systems**; **21/Building Envelope Systems**; **22/Building Service Systems**; **23/Building Systems Integration**; **24/Building Materials and Assemblies**; **26/Technical Documentation**; 32/Leadership; and 34/Ethics and Professional Judgment.

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.

The first law of thermodynamics rudely shakes us awake. von Baeyer, Hans Christian: *Warmth Disperses and Time Passes*, Modern Library, New York, 1999.

I 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 2007