ARC 334L, Arc 385T, Arc 334L & ARI 384L: Environmental Controls II
Instructor: Michael Garrison
Summer 2020

Course Description
Environmental Controls II considers the application of the thermal environment, the issues of daylighting, vertical transportation systems, water systems, and the application of the fire code and, to integrate these systems into the form making process of architectural design.

Course Objectives
The intent of this course is to learn to integrate environmental control systems into the form making process of architectural design. This course is intended to be one of a series of building science courses which describe the function of building in filtering the environment about their occupants. Environmental Controls I considered the fundamentals of Lighting, Electrical Systems and Acoustics. Environmental Controls II considers the application of the thermal environment, the issues of water systems and the application of the fire code as well as other technical problems encountered in building design. We will focus on how the various human sensory systems are supported by related building; mechanical, building and environmental controls sub-systems:

1. Required fire protection and fire exits.
2. Review of elevator specifications.
3. Sizing heating, venting and air conditioning systems.
4. Servicing the water needs of plumbing.

Goals
The goal of this course is to develop a means by which designers can create energy-efficient buildings. These means shall include both: (1) to understand the forms and components of a building that provide efficiency and comfort; (2) processes for use in design that will encourage the selection of the proper physical responses and facilitate the investigation of the likely performance of these decisions. Successful completion of this course should give the student the ability to:

Student Performance Criterion/addressed

1. Determine building environmental controls needs for fostering comfort and performance requirements.
2. To suggest building strategies to satisfy these needs.
3. To synthesize building solutions and environmental control schemes that promote the design of efficient buildings.
4. To analytically and physically evaluate the performance of their environmental control decisions.

Topical Outline

A. LEED case studies
B. Environmental Resources
C. Building Envelopes
D. Fire Code
E. Elevators
F. Heating & Cooling
G. Daylighting and Glazing
H. Heat transfer
I. HVAC Case Studies
J. HVAC System Analysis
K. Plumbing
L. Solid waste & IAQ

Textbook:

Mechanical and Electrical Equipment for Buildings, 13th Edition,
By Grondzik, Kwok, Wiley Sons, New York, 2015.

Format

The course will have four components, including: (1) regularly scheduled lectures; (2) a series of readings; (3) homework assignments (4) exams.

Note the four components complement each other. The lectures and readings are offered to provide the basic "information of the course. The homework and case study assignments (team of four) should be used by students to resolve any questions about the topics considered in the lectures and readings and will serve as an opportunity to explore your sound building projects and their solutions in greater depth. Finally, the exams are meant to encourage student synthesis of the course material.

Evaluation Criteria

1. Homework No.1 Heat gain, heat loss, building load	due: July 1, 2020	20 pts
2. Homework No. 2 HVAC duct sizing and integration	due: July 1, 2020	20 pts
4. Exam No. 1	June 15, 2020	20 pts
5. Exam No. 2	June 29, 2020	20 pts
6. Exam No. 3	July 3, 2020	20 pts

Homework more than one (class) day late will be lowered one letter grade. Projects later than one week late will be lowered one additional letter grade for each week the project continues to be late. Projects more than three weeks late will not be accepted for class credit. There will not be makeup tests. If you miss an exam with a medical excuse, the value of the other exams will be increased.

All work done in this course will be evaluated according to the criteria outlined here. Each student should develop a habit of generation of his or her own evaluation of the work by testing it against these criteria. Grading is based on 60-69=D, 70-72=C-, 73-76=C, 77-79=C+, 80-82=B-, 83-86=B, 87-89=B+, 90-92=A-, 93-96=A, 97-100=A+

ZOOM

1. *We will hold classes via Zoom online starting the first day of clas, first summer term 2020 through the end of the term.*
2. *There is now a UT Canvas Site for the class as well as the UT Box Site for the class is available on these sites, as well as chat rooms, discussion platforms and class communication platforms. You will be able to access the class via of Zoom on Canvas. You do not need to download Zoom or have a password to access Zoom. You will receive an invite to access our Zoom Class meeting via email and will only have to clink on the link to join the online class.*
3. *You are required to be on the Zoom online class at the same time as our regular meeting time 1:00PM -4:30 PNMWF.*
4. *The TA will have access to Box, Canvas and will be co-host on Zoom*
5. *For technical assistance the UTSOA help desk will remain available,* https://soa.utexas.edu/resources/technology-lab/instructional-technology-tools
6. *If you have any technical problems including, email service you may reach me through my cell phone 512-632-1972*
7. **Class recordings:** *Class recordings are reserved only for the use of members of this class (students, TAs, and the instructor) and only for educational purposes. Recordings should not be shared outside the class in any form. Violation of this restriction could lead to Student Misconduct proceedings.*

The exams will be [proctored as an online exam during the scheduled exam period for the class] and [will be proctored remotely as an asynchronous online exam]: If you will be unable to take your exam at the scheduled time (e.g., for child- or elder-care needs), please notify the instructor before the scheduled date so alternate arrangements can be made.] Excellent resources about use of Proctorio including how-to videos and a Trouble-shooting Guide for Students.

Class meetings will be devoted to lectures and discussions, so regular attendance and active participation is essential. You may miss three classes– for any reason–without penalty. Each additional absence will lower your course grade by 5%, and six or more absences will result in a failing grade for the course. Will be reported to the Assistant Dean. Because our time in class is limited, promptness is important. If you are late for class, it is your responsibility to make sure you have not been marked absent.

A student who misses classes or exams, for the observance of a religious holy day should inform the instructor as far in advance of the absence as possible, so that arrangements can be made to complete an assignment within a reasonable time after the absence.

The University of Texas at Austin provides upon request appropriate academic accommodations for qualified students with disabilities. For more information, contact Services for Students with Disabilities at 471-6259 (voice) or 232-2937 (video phone)

Students are required to adhere to the UT Honor Code (or statement of ethics) and an explanation or
http://registrar.utexas.edu/catalogs/gi09- 10/ch01/index.html)

Please schedule a meeting with this instructor if you are not sure of your standing in the course. My office hours are 12-1PM on W & F. Please send an email to mgarrison@utexas.edu and I will schedule a Zoom meeting with you. It is up to the student to ask questions about items that are unclear to the student. If you have questions related to the course, please feel free to ask in class or contact one of the TA's or myself outside of class.

Reference

Books on 3-day reserve in the Architecture Library

Contact the library for ebook access portals

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1. HCL Heating, Cooling, Lighting: Design Methods for Architects, 4th ed. Second Editio by Norbert Lechner, Wiley & Sons, New York, 2014.

2. MEED Mechanical and Electrical Equipment for Buildings, 13th Edition by Grondzik, Kwok, Stein and Reynolds, Wiley & Sons, New York, 2019.

3. TASC The Architect's Studio Companion: Technical Guidelines for Preliminary Design, by Edward Allen and Joseph Iano, Wiley & Sons, New York, 2014

4. BSIH The Building Systems Integration Handbook, by Richard D. Rush, AIA Editor, The American Institute of Architects, Wiley & Sons, New York, 1986.

5. SFA Sunlighting as Formgiver for Architecture, by William M. C. Lam, Van Nostrand, Reinhold, New York, 1986.

6. PLFA Perception & Lighting As Formgivers For Architecture, by William M. C. Lam, Van Nostrand, Reinhold, New York, 1992.

7. BCI Building Codes Illustrated, by Francis Ching and Steven Wionkel, FAIA, John Wiley & Sons, New York, 2012.

8. IB Integrated Buildings: The Systems Basis of Architecture, by Leonard Bachman, John Wiley & Sons, New York, 2003.

9. PAEC Passive and Active Environmental Controls: Informing the Schematic Designing of Buildings, by Dean Heerwagen, McGraw Hill, New York, 2004.

10. NNZ The New Net Zero, by William Maclay and Maclay Architects, Chelsea Green Publishing Co., White River Junction, VT, 2014.

11. EDH Energy Design Handbook, Donald Watson, editor, American Institute of Architects, AIA Press, Washington, D.C., 1993.

12. AEECS The Architectural Expression of Environmental Control Systems, George Baird, Spoon Press, London and New York, 2001. .

13. HVACAD Heating, Ventilating and Air Conditioning Analysis and Design, by Faye McQuiston, Jerald Parker and Jeffrey Spitler, 6th Edition, Wiley & Sons, 2005.

14. CRD Climate Responsive Design: A Study of Buildings in Moderate and Hot Humid Climates, by Richard Hyde, Spoon Press, London and New York, 2000.