

Introduction

A major function of buildings is to provide acceptable indoor environmental conditions. This course addresses how building systems can be integrated with architectural components in order to achieve indoor environmental quality and safety with the least effect on the environment.

Objectives

- Understand requirements for thermal comfort, indoor air quality and acoustics efficiency.
- Ability to carry out simple heat loss and gain calculations and understand how architectural design can affect mechanical loads.
- Ability to develop architectural designs that effectively integrate large mechanical systems, using approximate sizing of ducts and other components.
- Understand the components and organization of major mechanical system in relation to other systems, including structure, enclosure, lighting, movement, plumbing and fire safety.
- Awareness of issues related to energy efficiency and renewable energy applications with focus on cold climate buildings.
- Understand main acoustical considerations for both noise control and clarity of speech.

Teaching Approach

The course will be presented through lectures, site visits, readings, and project work. The course is connected with the comprehensive studio through the required development of building system concepts. Lectures' frequency will be doubled during the first month of the course in order to provide sufficient background to handle the project. Lectures will be replaced by project workshops starting from the second half of the semester. Typical approaches to systems design will be reviewed in terms of air distribution approach and spatial organization. Site visits will provide an opportunity to view systems and equipment firsthand.

Content: Topic Areas

- Thermal comfort for both active and passive systems.
- Heat transfer processes through building envelope.
- Indoor air quality. Ventilation and building loads.
- Methods and equipment of heating and cooling.
- Types of ventilation and thermal control systems.
- Systems for small and medium size buildings.
- Systems for large buildings.
- Performance criteria for the evaluation of systems, (e.g., system capabilities, cost, energy efficiency, energy codes).
- Visual treatment of systems.
- Interrelationship of systems (e.g., envelope and active thermal control).
- Water and waste systems.
- Active fire and smoke control systems.
- Noise control and clarity of speech.

Means of Evaluation

Evaluation will be based on:

Project	60%
Quizzes	15%
Test	25%
Total	100%

The final test will be an open book examination.

Grading Scale

Grading will be based on the following scale:

Final grades will be reported as letter grades, with the final grade calculated according to the 4-point range.

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	92.5-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	85-92.49	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	80-84.99	Very good performance
B+	3.30	3.15-3.49	76-79.99	Good performance
B	3.00	2.85-3.14	73-75.99	Satisfactory performance
B-	2.70	2.50-2.84	70-72.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	66-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	63-65.99	
C-	1.70	1.50-1.84	60-62.99	
D+	1.30	1.15-1.49	56-59.99	
D	1.00	0.50-1.14	50-55.99	
F	0.00	0-0.49	0-49.99	

Notes:

A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript.

Readings

The course texts are

- The Architect's Studio Companion: Rules of Thumb for Preliminary Design, 5th ed. 2007, E. Allen and J. Iano, Wiley ISBN-13: 9780470641910
- W.T. Grondzik, A.G. Kwok, B. Stein, J. S. Reynolds, Electrical and Mechanical Equipment for Buildings (11th Edition), 2010 (selected chapters) Wiley, ISBN 978-0-470-19565-9

Canadian Architectural Certification Board - Performance Criteria Met by Course

The following CACB Student Performance Criteria will be covered in this course at a primary level: B6 Life Safety Systems (active systems), B8 Environmental Systems, B10 Building Service Systems, C2 Building Systems Integration.

The following CACB Student Performance Criteria will be covered in this course at a secondary level: B4 Sustainable Design, B11 Building Economics (elemental cost of HVAC systems), C1 Detailed Design Development.

Notes:

1. Written work, term assignments and other course-related project work must be submitted via the course Blackboard system.
2. It is the student's responsibility to request academic accommodations. If you are a student with a documented disability who may require academic accommodation and have not registered with the Disability Resource Centre, please contact their office at 220-8237. Students who have not registered with the Disability Resource Centre are not eligible for formal academic accommodation. You are also required to discuss your needs with your instructor no later than fourteen (14) days after the start of this course.
3. Plagiarism - Plagiarism involves submitting or presenting work in a course as if it were the student's own work done expressly for that particular course when, in fact, it is not. Most commonly plagiarism exists when:(a) the work submitted or presented was done, in whole or in part, by an individual other than the one submitting or presenting the work (this includes having another impersonate the student or otherwise substituting the work of another for one's own in an examination or test),(b) parts of the work are taken from another source without reference to the original author,(c) the whole work (e.g., an essay) is copied from another source, and/or,(d) a student submits or presents work in one course which has also been submitted in another course(although it may be completely original with that student) without the knowledge of or prior agreement of the instructor involved. While it is recognized that scholarly work often involves reference to the ideas, data and conclusions of other scholars, intellectual honesty requires that such references be explicitly and clearly noted. Plagiarism is an extremely serious academic offence. It is recognized that clause (d) does not prevent a graduate student incorporating work previously done by him or her in a thesis. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar.
4. Information regarding the Freedom of Information and Protection of Privacy Act (<http://www.ucalgary.ca/secretariat/privacy>) and how this impacts the receipt and delivery of course material.
5. Emergency Evacuation/Assembly Points (<http://www.ucalgary.ca/emergencyplan/assemblypoints>).
6. Safewalk information (<http://www.ucalgary.ca/security/safewalk>).
7. Contact Info for: Student Union (<http://www.su.ucalgary.ca/page/affordabilityaccessibility/su-structure/contact-info>); Graduate Student representative(<http://www.ucalgary.ca/gsa/>) and Student Ombudsman's Office (<http://www.su.ucalgary.ca/page/quality-education/academic-services/student-rights>).
8. The instructor may reduce grades for assignments and components thereof when submitted after deadlines.