



Course Number	ARCH-614	Classroom	Zoom
Course Name	Environmental Control Systems		
Pre/Co-Requisites			
Instructor	Dr. Kuljeet S. Grewal	Office Hours/Location	By appointment
	Email: kuljeetsingh.grewal@ucalgary.ca		Phone: +1 587-968-5911
Class Dates	Mandatory real-time Zoom classes: Thursday mornings from 09:00 to 12:00 by remote, synchronous instruction		
Instructor Email Policy	Please note that all course communications must occur through your @ucalgary email, and I will respond to emails sent via student's @ucalgary emails within 48 hours.		
Name and Email of Teaching Assistant(s)	TBD		

Course Description

Comfortable indoor environment is a major goal in the design of buildings and achieving this may be challenging in cold climate where several factors should be considered simultaneously. The ultimate goal of the course is to bridge gap between architecture and engineering, towards achieving more sustainable environment. The course addresses design of buildings for cold climate to provide comfortable and productive environment while reducing the negative environmental effects at the global level by reducing demands for fossil fuels.

Online Delivery

This course will take place **online** via Desire2Learn (D2L) and Zoom. Students are required to participate in the asynchronous learning tasks using the D2L learning environment and synchronous Zoom sessions. If unable to participate live due to unforeseen circumstances, inform the instructor in advance to work out an alternative participation activity (e.g., watch the recordings, submit a brief reflection, and actively contribute to the follow-up online discussion).

The course will be presented in lecture and workshop mode. The course is connected with the comprehensive studio through the required development of building system concepts. Typical approaches to systems design will be reviewed in terms of air distribution approach and spatial organization. The assignment is conceptual design of a ventilation and thermal control system for the studio project, using rules of thumb for sizing.

Course Learning Outcomes

By the end of this course, students will be able to:

1. Apply the basic principles of heat transfer mechanism and to perform simple heat loss /gain calculations.
2. Evaluate design decisions on heat loss/gain through envelope.
3. Apply basic passive design strategies to reduce operational energy requirements of the building.
4. Design mechanical control systems using approximate methods for sizing of ducts and other components.
5. Organize major mechanical system components in relation to other systems, including structure, enclosure, lighting, and fire safety.
6. Apply the principles of ventilation in cold climates (including natural ventilation, heat recovery, etc.).
7. Demonstrate awareness of issues related to energy efficiency and renewable energy applications for cold climate buildings.
8. Develop architectural designs that integrate mechanical systems together with other building systems (e.g. building envelop, lighting, structures).

Learning Resources

Useful readings, textbooks and learning materials

- 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
- Additional materials will be posted on the course website.

Technology requirements (D2L etc.): In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Broadband internet connection

* Most current laptops will have a built-in webcam, speaker, and microphone.

Additional Classroom Conduct and Related Information

Guidelines for Zoom Sessions in Online Classes

Students are expected to participate actively in all Zoom sessions and to turn on their webcam. Please join our class in a quiet space that will allow you to be fully present and engaged in the Zoom sessions. Students must behave in a professional manner during the session. Students, employees, and academic staff are also expected to demonstrate behaviour in class that promotes and maintains a positive and productive learning environment.

Assessment Components			
Assessment Method	Description	Weight	Aligned Course Learning Outcome
Passive design presentation	Details/strategy for the implementation of passive concepts in term project	10%	2 and 3
Mid-term exam		10%	1, 2 and 3
Final exam		20%	1 to 8
Design project		50%	1 to 8
Class participation		10%	1 to 8

Assessment and Evaluation Information
<p>Attendance and Participation Expectations: Attendance of students in Zoom lecture sessions is expected. Class participation (discussion, exercises and asking questions) is highly encouraged and accounts for 10% in final grading.</p> <p>Guidelines for Submitting Assignments: Written work, term assignments, presentations and other course related work must be submitted by D2L. <u>Only if instructed</u>, particular submissions can be done by email and must come from an official University of Calgary (ucalgary) email account.</p> <p>Final Examinations: Final exam (weighted as 20% in overall grade) along with project submission (50% weightage) will be desired towards the end of the course.</p> <p>Expectations for Writing (https://www.ucalgary.ca/pubs/calendar/current/e-2.html): 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. Furthermore, additional instructions about writing can be found in assignment details.</p> <p>Late Assignments: Although late assignment submissions are not encouraged but considering COVID 19 situation it may be accepted with 1% per day deduction in marks, subjecting to valid reason.</p> <p>Criteria that must be met to pass: To pass the course the final exam should be attempted, and final project must be acceptable and well organized. Along with this, the minimum grading criterion should be met.</p>

Grading Scale				
Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94.99	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89.99	Very good performance
B+	3.30	3.15-3.49	80-84.99	Good performance
B	3.00	2.85-3.14	75-79.99	Satisfactory performance
B-	2.70	2.50-2.84	70-74.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69.99	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	60-64.99	
C-	1.70	1.50-1.84	55-59.99	
D+	1.30	1.15-1.49	50-54.99	
D	1.00	0.50-1.14	45-49.99	
F	0.00	0-0.49	0-44.99	

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.

(for Architecture courses only) CACB Student Performance Criteria
<ul style="list-style-type: none"> The following CACB Student Performance Criteria will be covered in this course at a primary level: B8 Environmental Systems, C2 Building Systems Integration, B10 Building Service Systems. The following CACB Student Performance Criteria will be covered in this course at a secondary level: B4 Sustainable Design, C1 Detailed Design Development, C4 Comprehensive Design.

Topic Areas & Detailed Class Schedule		
Course Schedule Date	Topic	Assignments/Due Dates
January 14 [Thu]	Introduction to environmental control systems; Thermodynamics principles; Thermal comfort and human factors	
January 21 [Thu]	Thermal dynamics in buildings; Heat transfer aspects in building design; Psychometrics; Heating and cooling loads and their calculation; Selection of design temperature and humidity	
January 28 [Thu]	Introduction to passive design (heating, cooling, daylighting, and ventilation); Load reduction; Passive heating and cooling; Natural ventilation; Indoor air quality	
February 04 [Thu]	Case studies of passive design; Guest speaker (TBD); Discussion session on passive design implementation in term project	
February 10 [Wed]	Submission deadline for Assignment 1 [by 6:00 pm]	Presentations and other documents uploaded on D2L with annotations
February 11 [Thu]	Mid term exam Students' presentation: Passive design implementation in the Term project	
February 16-20	No classes - term break	
February 22 [Mon]	Submission deadline for Assignment 1 presentation peer evaluations [by 10:00 am]	Feedback must be submitted for <u>all presentations</u> in a consolidated document through D2L
February 25 [Thu]	Introduction to active systems; HVAC for buildings (residential and commercial); Types of HVAC systems	
March 04 [Thu]	HVAC for small and large buildings; Generic HVAC Systems (Air to air, air to water and all- water, etc); Heat recovery; District heating and cooling; Guest speaker (TBD)	
March 11 [Thu]	HVAC for large buildings (contd.); Rules of thumb for sizing HVAC equipment; Distribution; Project tutorial	
March 15-19	No classes / SAPL Block Week	
March 25 [Thu]	Distribution systems (contd.) (Type of distribution, delivery systems, etc.); Air ducts and approximate sizing of ducts - in class exercises	
March 29 [Thu]	Control strategies for systems/sub-systems; modern control systems; building energy management; Other related topics to environmental control systems Crits	
April 08 [Thu]	Final Exam Crits	
April 15 [Thu]	Crits	
April 15 [Thu]	Deadline for the Assignment 2 - Project submission [by 6:00 pm]	Presentations and other documents uploaded on D2L with annotations

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a “live” video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor’s permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as per the [Code of Conduct](#)). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g [Student Non-Academic Misconduct Policy](#)). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit: <https://elearn.ucalgary.ca/guidelines-for-zoom/>

If you are unable to attend a Zoom session, please contact your instructor in advance to arrange an alternative activity for the missed session (e.g., to review the recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

Special Budgetary Requirements

Not Applicable

Special budgetary requirements are limited to the optional purchase of course readings and, in specific courses, mandatory supplementary fees to cover certain expenditures, such as field trips. Mandatory supplementary fees must be approved by the University prior to implementation. Instructors are required to list and describe approved optional and mandatory supplementary fees for courses. This can include possible costs incurred for special materials, equipment, services, or travel.

Optional:

For certain courses students may be given the option of purchasing course readings. In these cases the cost of the reading package should be stated in the course outline. When course readings are available for purchase, a minimum of two copies of the readings must be made available at the SAPL Reception or online.

University of Calgary Policies and Supports

COVID-19 PROCEDURE FOR SICK STUDENTS: <https://ucalgary.ca/risk/sites/default/files/Covid-19%20Folder/COVID-19-Procedure-for-Sick-Students.pdf>

ACADEMIC ACCOMMODATION

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The Student Accommodations policy is available at <https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>.

Students needing an accommodation based on disability or medical concerns should contact Student Accessibility Services (SAS) in accordance with the Procedure for Accommodations for Students with Disabilities (<https://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities.pdf>). Students who require an accommodation in relation to their coursework based on a protected ground other than Disability should communicate this need in writing to their Instructor.

SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/.

ACADEMIC MISCONDUCT

Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedure please visit:

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf>

<https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf>

Additional information is available on the Academic Integrity Website at <https://ucalgary.ca/student-services/student-success/learning/academic-integrity>.

COPYRIGHT LEGISLATION:

All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (<https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html>) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy (<https://www.ucalgary.ca/pubs/calendar/current/k.html>).

INSTRUCTOR INTELLECTUAL PROPERTY

Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY

Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

SEXUAL VIOLENCE POLICY

The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at <https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf>

UNIVERSITY STUDENT APPEALS OFFICE: If a student has a concern about the course, academic matter, or a grade that they have been assigned, they must first communicate this concern with the instructor. If the concern cannot be resolved with the instructor, the student can proceed with an academic appeal, which normally begins with the Faculty. <https://www.ucalgary.ca/secretariat/student-appeals>

OTHER IMPORTANT INFORMATION

Please visit the Registrar's website at: <https://www.ucalgary.ca/registrar/registration/course-outlines> for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk