



Course Number: ARCH 404

Course Name: Architecture and Life Cycle Thinking: climate change and beyond

Classroom: [REDACTED]

Instructor: Dr. Getachew Assefa

- Email: gassefa@ucalgary.ca
- Phone: 403 220 6961/403 616 1527
- Office Hours and Location: PF 3191 by appointment via e-mail
- Instructor Email Policy: Please note that all course communications must occur through your @ucalgary email, and I will respond to emails sent via students' @ucalgary emails within 48 hours.

Teaching Assistant: NA

- Email: NA

Class Dates: Mandatory in-person classes: Tuesdays 11:00am to 12:50pm; Thursdays 11:00 to 11:50am, January 09 – April 09

Course Description:

This course focuses on introduction to strategies for comparing performance of buildings and building products/aspects based on contributions to climate change and other environmental impacts. Concepts of circular economy, life cycle analysis, embodied energy, recycling/reuse of building materials are explored through the lenses of impacts such as resource depletion, carbon and water footprints, and waste generation.

In this course, students will learn about the factors that make some buildings and building products superior than alternatives in terms of life cycle environmental performance. Using the circular economy concept as a platform, the course explores life cycle perspective of building design in the selection of materials and energy; design considerations for disassembly, reuse and recycling of materials and products; and repurposing of building products for multiple uses in the same product or another life in new products; and repurposing of whole buildings. Embodied, operating and demolition stages of buildings will be examined using relevant environmental sustainability metrics. Students pursuing or aspiring design profession will benefit from understanding, measuring and doing elements of the course that are central to the lectures, guest lectures, assignments and project.

Academic Calendar description:

<https://www.ucalgary.ca/pubs/calendar/current/architecture.html#47120>

Course Hours: 3 units; (2-1T)

Requisites: See [Section 3.3.5](#) of the Academic Calendar for more information regarding School of Architecture, Planning and Landscape courses.

- Prerequisite(s): ARCH 201
- Corequisite(s): none

Course Delivery:

- In-person Delivery

Course Learning Outcomes:

Upon completion of this course, students will know and be able to:

- Describe and explain the concepts of life cycle thinking and life cycle assessment
- Describe and explain the life cycle performance of buildings in light of architectural design
- Analyze the material and energy aspects of buildings from a life cycle perspective including climate change and other environmental impacts
- Explain and analyze the challenges and opportunities of using life cycle assessment through product category rules and environmental product declarations and for use in rating and certification of building materials and buildings

Learning Resources:

- Required readings, textbooks, and learning materials:
Bowick, M., O'Connor, J., Meil, J., Salazar, J. (2021). Guidelines for Whole-building LCA. National Research Council Canada: Ottawa, ON. 106 pp. [Full Text Available on D2L]
- Additional readings will also be provided separately as a list on D2L.
- Technology requirements:
 - D2L will be used as a course platform. Menti will be used as a tool for interactive sessions
 - Revit BIM Model will be used for the project (can be accessed from Autodesk with a student account)
 - To successfully engage in their learning experiences at the University of Calgary, 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:

- **Code of Conduct:** The SAPL Studio spaces and other SAPL/University-provided facilities and equipment are governed by the [University's Student Non-Academic Misconduct Policy](#). Professional and courteous behavior is expected at all times. For more information, please refer to [Appendix 1: Prohibited Conduct](#), including the following categories: 1. Protection of Individuals; 2. Protection of Property; 3. Protection of University Functions, Activities and Services; 4. False Information and Identification; 5. Possession or Use of Dangerous Objects, Drugs or Alcohol; 6. Aiding in the Commission of an Offence; 7. Contravention of Other Laws and University Policies; and 8. Failure to Comply with a Sanction.

Assessment Components:

The University policy on grading and related matters is described in [F.1](#) and [F.2](#) of the Academic Calendar. In determining the overall grade in the course the following weights will be used:

Assessment Method	Description	Weight	Aligned Course Learning Outcome
Quizzes: multiple choice	Five: top four will be taken for the final grades for each student	20(5X4)	All
Review	Individual written submission	10	All
Summary of In-Class discussion Lab	Individual written submission	10	All
Project component 1 – Goal, scope and context	Group written submission	10	3
Project component 2– Inventory of materials, energy and transport	Group written submission	5	3
Project component 3– assessment results and background materials	Group written submission	10	3
Project component 4– analysis, synthesis and interpretation	Group presentation	25	
Test covering whole course (Fill in the blanks or short answers)	Individual	10	All

- Assessment and Evaluation Information:
 - Attendance and live participation for the entire duration of course assessments are mandatory (e.g., pin up review, midterm review, final review or exam, etc.) and must be completed in person unless otherwise stated. If a student is unable to participate live due to unforeseen circumstances, please inform the Course Instructor in advance. Missed assessments with a valid excuse, as defined by the University's guidelines ([Section G.2.3](#)) or with advance prior notification to the instructor, may be considered without penalty upon review of the student's attendance and participation record. Failure to be present for a course assessment as a result of an unexcused absence are grounds for failure in the course. You may be required to provide supporting documentation, as per [Section M.1](#) of the Academic Calendar to support your request.
- Attendance and Participation Expectations:
 - Students are expected to attend and come prepared to meaningfully engage in all class sessions. This includes producing or preparing content necessary for discussion and contributing to individual and class-wide discussions and/or conversations/assessments with the Course Instructor.
 - **Excused Absences:** In the event of an exceptional circumstance (e.g., illness, bereavement, etc.) or an exceptional opportunity (e.g., varsity athletic competition, national conference or awards ceremony, pow wow, etc.) up to four excused absences (for courses that meet twice or more per week) and up to two excused absences (for courses that meet once per week) are allowable per semester before jeopardizing one's own course grade and ability to pass the course. However, any such accommodations must be approved by the Instructor with advance notice by the student.
 - **Unexcused Absences:** Attendance at all class sessions and participation in all assessments is mandatory. Unexcused absences in excess of two per semester (for courses that meet twice per week) and one per semester (for courses that meet once per week) are grounds for failure in the course.
 - **Total Number of Absences:** The combined total number of excused or unexcused absences per semester cannot exceed four per semester (for courses that meet twice per week) or two per semester (for courses that meet once per week). Any number in excess are grounds for failure in the course.
- Guidelines for Submitting Assignments:
 - All assignments (e.g., projects, papers, presentations, etc.) must be turned in on time. Assignments should be submitted through D2L Dropbox before midnight of the deadline date.
 - **Late Assignments:** Late assignments will lose a letter grade every 24 hours after the submission date/time. Late assignments submitted more than four days late constitute automatic failure. Late assignments with a valid excuse, as defined by the University's guidelines ([Section G.2.3](#)) or with advance prior notification to the instructor, may be considered without penalty upon review of the student's attendance and participation record. Please let your instructor know immediately if you cannot meet the deadlines

specified. You may be required to provide supporting documentation, as per [Section M.1](#) of the Academic Calendar to support your request.

- Final Examinations:
 - There will be quizzes and a test but no final examination.
- Expectations for Writing:
 - <https://www.ucalgary.ca/pubs/calendar/current/e-2.html>
 - written submissions should have a clear structure using headings, citation of sources when appropriate, written in single spaced 12pts times new roman or equivalent (for Word document submissions) and clearly show the names of group members.
- Criteria that must be met to pass: there is no specific component that will be used as a criteria. It is the overall performance that will determine the final score.

Flexible Grade Option (CG Grade):

As per [Section 3.5.1](#) of the Academic Calendar, the School of Architecture, Planning and Landscape will not permit the Flexible Grade Option (CG Grade) for any course offered by the School.

Grading Scale:

Based on [Section F.1.1](#) of the Academic Calendar

Grade	Grade Point Value	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding performance
A	4.00	3.85-4.00	90-94.99	Excellent performance
A-	3.70	3.50-3.84	85-89.99	Approaching excellent performance
B+	3.30	3.15-3.49	80-84.99	Exceeding good performance
B	3.00	2.85-3.14	75-79.99	Good performance
B-	2.70	2.50-2.84	70-74.99	Approaching good performance
C+	2.30	2.15-2.49	65-69.99	Exceeding satisfactory performance
C	2.00	1.85-2.14	60-64.99	Satisfactory performance
C-	1.70	1.50-1.84	55-59.99	Approaching satisfactory performance. Minimum

				grade requirement for prerequisite courses.
D+	1.30	1.15-1.49	50-54.99	Marginal pass. Insufficient preparation for subsequent courses in the same subject.
D	1.00	0.50-1.14	45-49.99	Minimal Pass. Insufficient preparation for subsequent courses in the same subject.
F	0.00	0-0.49	0-44.99	Failure. Did not meet course requirements.

Topic Areas and Detailed Class Schedule:

Course Schedule Date	Topic	Assignments/Due Dates
January 9 (Tuesday)	L1: Course introduction	
January 11 (Thursday)	REVIT Model	
January 16 (Tuesday)	L2: Life cycle perspective of building design	
January 18 (Thursday)	In-Class Discussion Lab 1 – barriers and enablers of sustainable buildings	
January 23(Tuesday)	L3: Circular economy concepts and tools	
January 25 (Thursday)	In-Class Discussion Lab 2 – AIA award-winning projects list	
January 30 (Tuesday)	L4: Climate change	Quiz 1: L2 and L3
February 1 (Thursday)	In-Class Discussion Lab 3 - greenest buildings list	Project component 1 submission
February 6 (Tuesday)	L5: Resource depletion and waste generation	
February 8 (Thursday)	In-Class Discussion Lab 4 – top scoring LEED projects list	
February 13 (Tuesday)	L6: Other environmental impacts	Quiz 2: L4

February 15 (Thursday)	In-Class Discussion Lab 5 – impact calculations	
February 20	No classes – term break	
February 22	No classes – term break	
February 27 (Tuesday)	L7: Materials in buildings	Quiz 3: L5 and L6
February 29 (Thursday)	In-Class Discussion Lab 6 – Material impacts	Review submission
March 5 (Tuesday)	L8: Energy in buildings	Quiz 4: L7
March 7 (Thursday)	In-Class Discussion Lab 7 – GHG and Energy	
March 12 (Tuesday)	GL1: Architectural design workflow	Jim Love – TBC
March 14 (Thursday)	Project time	Quiz 5: L8 Project component 2 submission
March 19 (Tuesday)	Virtual Tour - EEEL Building	Jim Love – TBC
March 21 (Thursday)	L9: Communicating environmental performance and benchmarking	
March 22 (Friday)		Project component 3 submission
March 26 (Tuesday)	Test Project time	
March 28(Thursday)	GL2: Climate declaration and Energy declaration in design of buildings in Sweden or In-Class Discussion Lab 8	Mauritz Glaumann - TBC
April 2 (Tuesday)	GL3: MacKimmie Tower	Dialog - TBC
April 3 (Wednesday)		Summary of In-Class Lab discussions submission
April 4 (Thursday)	GL4: Passive Houses and Sustainable Buildings	Frank Crawford - TBC
April 8 (Monday): 10 am		Project component 4 submission
April 9 (Tuesday)	Presentation	

University of Calgary Policies and Supports:

UNIVERSITY OF CALGARY COVID-19 UPDATES AND PROCEDURES

<https://www.ucalgary.ca/risk/emergency-management/covid-19-response/covidsafe-campus>

ACADEMIC ACCOMMODATION

<https://ucalgary.ca/student-services/access/prospective-students/academic-accommodations>

It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at:

<https://www.ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy>

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: <https://www.ucalgary.ca/legal-services/sites/default/files/teams/1/Policies-Accommodation-for-Students-with-Disabilities-Procedure.pdf>

Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to their instructor (contact information on first page above).

[Student Accessibility Services](#) 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 Procedures please visit:

- Student Academic Misconduct Policy: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-policy>
- Student Academic Misconduct Procedure: <https://www.ucalgary.ca/legal-services/university-policies-procedures/student-academic-misconduct-procedure>

Additional information is available on the Academic Integrity Website at

<https://www.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 (<https://www.ucalgary.ca/legal-services/university-policies-procedures/acceptable-use-material-protected-copyright-policy>) 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 AND GENDER-BASED 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 and Gender-Based Violence Policy guides us in how we respond to incidents of sexual and/or gender-based violence, including supports available to those who have experienced or witnessed sexual/gender-based violence, or those who are alleged to have committed sexual/gender-based 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/legal-services/university-policies-procedures/sexual-and-gender-based-violence-policy>.

UNIVERSITY STUDENT APPEALS OFFICE

If a student has a concern about a grade that they have received, they should refer to Section I of the Undergraduate Calendar (<https://www.ucalgary.ca/pubs/calendar/current/i-3.html>) which describes how to have a grade reappraised.

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