



Course title: Architecture and Life Cycle Thinking: climate change and beyond			
Course Number	ARST 421 – 01(2-1T)		
Pre/Co-Requisites	ARST 201		
Instructor Name	Getachew Assefa	Instructor Email	gassefa@ucalgary.ca
Office Location	PF3191		
TA Name		TA Email	
Class Dates	Winter 2020, Monday and Wednesday, and Friday (Tutorial)		
Class Times	12:00pm to 12:50pm		
Class Location	ST 130		

Course Information / Description of the Course

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

In this course, students will learn about the factors that make some buildings and other products superior in climate change and other environmental impact comparisons. 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 products and buildings for multiple uses in the same product or another life in new products. Embodied, operating and demolition stages of buildings will be examined using aspects such as resource depletion, carbon footprint, water footprint and waste generation.

Learning Resources

Recommended (NOT required) course book:

Crawford, R (2011) *Life Cycle Assessment in the Built Environment*. London ; New York: Spon[Full Text Available Online through the UofC Library]

Further learning materials:

- www.buildingscience.com

Course Learning Outcomes

After completion of the course the students should be able to:

1. **Describe** and **explain** the concepts of life cycle thinking and life cycle assessment
2. **Describe** and **explain** the building life cycle performance in architectural context
3. **Analyze** the material and energy aspects of buildings from a life cycle perspective including climate change and other environmental impacts
4. **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

Assessment Components				
Assessment Method	Description	Weight	Aligned Course Learning Outcomes	Changes
Participation	Presence and active participation in In-Class Discussion Lab	10	All	No change
Review	Group written submission	20	All	No change
Summary of discussions	Group written submission	15	All	No change
Project component 1 – building materials	Individual	10		Review 1
	Group written submission	20	3	
	Individual	10		Review 2

Project component (PC) 2– energy in buildings	Group written submission	10	3	
Project component (PC) 3– synthesis of component 1 and 2	Individual	10 or 20		Review 3 depending on how PC 1 and PC 2 are done
	Group presentation	10	3	
Take-home exam		15	All	Change from test to take-home exam

Assessment and Evaluation Information

Attendance and Participation Expectations:

All students are expected to attend and participate in the In-Class Discussion Labs as groups and perform the review. All group members are expected to participate in the group work and each member's specific contribution should be clearly documented.

Guidelines for Submitting Assignments:

Assignments should be submitted through D2L Dropbox before midnight of the deadline date.

Final Examinations:

There will be 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 equivalents (for Word document submissions) and clearly show the names of group members.

Late Assignments: 1 mark per day late will be deducted for each late submission of assignment.

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.

Final grades will be reported as letter grades, with correspondence between letter grades, 4-points scale and percent based on the following grading scale.

Grading Scale

Grade	Grade Point Value	Percent	Description
A+	4.00	92.5-100	Outstanding
A	4.00	85-92.49	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	80-84.99	Very good performance
B+	3.30	76-79.99	
B	3.00	73-75.99	Good – clearly above average performance with knowledge of subject matter generally complete
B-	2.70	70-72.99	
C+	2.30	66-69.99	
C	2.00	63-65.99	Satisfactory – basic understanding of the subject matter
C-	1.70	60-62.99	Receipt of a grade point average of 1.70 may not be sufficient for promotion or graduation (see individual undergraduate faculty regulations)
D+	1.30	56-59.99	
D	1.00	50-55.99	Minimal pass – marginal performance
F	0.00	0-49.99	Fail – unsatisfactory performance or failure to meet course requirements

Topic Areas & Detailed Class Schedule			
Course Schedule Date		Topic	Assignments/Due Dates
Week 1	Jan 13	Course introduction	
	Jan 15	In-Class Discussion Lab	Designing and constructing sustainable buildings
	Jan 17	Tutorial	AIE overview

Week 2	Jan 20	Climate change	
	Jan 22	In-Class Discussion Lab	Analysing highly performing buildings: AIA 2019 award winners
	Jan 24	Tutorial	AIE and Assemblies
Week 3	Jan 27	Resource depletion and waste generation	
	Jan 29	In-Class Discussion Lab	Analysing highly performing buildings : one of the seven of the most sustainable buildings
	Jan 31	Tutorial	A1-D in AIE
Week 4	Feb 3	Water footprint and other environmental impacts	
	Feb 5	In-Class Discussion Lab	Analysing highly performing buildings: One of the top three scorers of LEED
	Feb 7	Tutorial	AIE and Material
Week 5	Feb 10	Life cycle perspective of building design	
	Feb 12	In-Class Discussion Lab	A1-D architect's role
	Feb 14	Tutorial	AIE and Energy
Week 6	Feb 17	No class – UofC mid-term break	
	Feb 19	No class – UofC mid-term break	
	Feb 21	No class – UofC mid-term break	
Week 7	Feb 24	Materials in buildings	Guest lecture - TBC
	Feb 26	In-Class Discussion	Impact intensity of materials
	Feb 28	Tutorial	Project
Week 8	Mar 2	Energy in buildings	
	Mar 4	In-Class Discussion Lab	Impact intensity of energy sources and grids
	Mar 6	Tutorial	Project

Week 9	Mar 9	Product category rules, environmental product declarations and building performances benchmarking	
	Mar 11	In-Class Discussion Lab	PCRs and EPDs in architecture; Benchmarking in architecture
	March 13	Tutorial	Project Review submission
Week 10	Mar 16	Life cycle thinking in LEED and other rating systems	
	Mar 18	In-Class Discussion Lab	LCA credit in LEED and life cycle performance
	Mar 20	Tutorial	ZOOM Project
Week 11	Mar 23	Architectural design workflow	Jim Love - ZOOM
	Mar 25	Tutorial	ZOOM Project
	Mar 27	EEEL	ZOOM by Jim Love and Adam Stoke
			Project component 1 submission
Week 12	Mar 30	Circular economy concepts and tools	ZOOM Summary of discussions submission
	Apr 1	In-Class Discussion Lab	ZOOM CE opportunities in Architecture
	Apr 3	Tutorial	ZOOM Project Project component 2 submission
			Project component 3 submission
Week 13	Apr 6	Project component 3 presentation	ZOOM
	Apr 8	Project component 3 presentation	ZOOM
	Apr 10	Project component 3 presentation	ZOOM
	Apr 13	No class – Easter Monday	
Week 14	Apr 16-20	Take-home exam	April 16 and answer submission April 20

Media and Recording in Learning Environments

Part 1

University Calendar: <https://www.ucalgary.ca/pubs/calendar/current/e-6.html>

Recording of lectures (other than audio recordings that are pre-arranged as part of an authorized accommodation) is not permitted.

Students may not record any portion of a lecture, class discussion or course-related learning activity without the prior and explicit written permission of the course instructor or authorization from Student Accessibility Services. For any other use, whether by duplication, transcription, publication, sale or transfer of recordings, written approval must be obtained from the instructor for the specific use proposed. Any use other than that described above constitutes academic misconduct and may result in suspension or expulsion.

Part 2

The instructor may use media recordings to capture the delivery of a lecture.

The instructor will notify all students and guests in the class that the event is being recorded. If a student or guest wants to take steps to protect privacy, and does not want to be recorded, the instructor will provide the individual (s) with an alternative means of participating and asking questions (e.g., passing written notes with questions). Students cannot be penalized for choosing not to be recorded in situations where participation is part of the course. Students must be offered other ways of earning participation credit that do not involve recording.

Any video-recording would be intended to only capture the instructor and the front of the classroom. Students/other participants would not necessarily be visible on video recordings.

University of Calgary Policies and Supports

ACADEMIC ACCOMMODATION

Students seeking an accommodation based on disability or medical concerns should contact Student Accessibility Services; 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/. 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. The full policy on Student Accommodations is available at <http://www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf>.

ACADEMIC MISCONDUCT

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, (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. Any suspicion of plagiarism will be reported to the Dean, and dealt with as per the regulations in the University of Calgary Graduate Calendar. For information on academic misconduct and its consequences, please see the University of Calgary Calendar at <http://www.ucalgary.ca/pubs/calendar/current/k.html>

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.

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.

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://ucalgary.ca/student-appeals/>

More student support and resources (e.g. safety and wellness) can be found here:
<https://www.ucalgary.ca/registrar/registration/course-outlines>