Winter 2021–ARCH 126: Environmental Building Design

Course Information

Arch 126 – Winter 2021 – Environmental Building Design

Wednesdays 2-5pm, MS Teams

Instructors:

Anna Beznogova – abeznogo@uwaterloo.ca

Andrew Judge – Andrew.judge@uwaterloo.ca

Office hours: As needed

When to contact: You need special accommodations or questions about the assignments that are not addressed in the assignment or class outlines.

TAs:

Jade Manbodh – jemanbodh@uwaterloo.ca

Maria Ottoni – mlottoni@uwaterloo.ca

Office hours: As needed

When to contact: You can't find something in Teams or LEARN, are having an issue figuring out how something works in Teams or LEARN.

Territorial Acknowledgement

We acknowledge that the School of Architecture is located on the traditional territory of the Neutral, Anishinaabeg and Haudenosaunee peoples. The University is situated on the Haldimand Tract, the land promised to the Six Nations that includes 10 kilometres on each side of the Grand River. (see references here: https://uwaterloo.ca/engineering/about/territorial-acknowledgement)

Course Description

An introduction to environmental design practices leading to low carbon design. Topics of discussion include passive heating and cooling, solar geometry, climate and meteorological influences, microclimate, site design, daylighting, active systems, embodied energy, sustainable rating systems, sustainable design philosophies such as cradle to cradle, biomimicry and design for disassembly. Energy-related issues will be addressed and energy-based software design programs will be introduced. Understanding the role of design in an energy efficient or passive solar building will be a central learning outcome.

Learning Objectives

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

- Distinguish between sustainable design and green building design
- Describe how issues of environmental sustainability, social justice, and individual quality of life are interconnected
- Understand how the making of buildings affects each of these spheres locally and globally, and how design of the built environment shapes culture, as a manifestation of a particular philosophy or worldview
- Understand how sustainable design can form the basis of a design philosophy as opposed to being an "add on"
- Describe how buildings fit into material, energy, and water systems, and therefore how design can address larger issues faced in these systems
- Describe the differences between several sustainable rating systems
- Understand local climate and climate threats, and apply the appropriate principles of sustainable design and green building to a small building
- Recognize basic tenets of Indigenous land-based sustainability practices

Required Text

Norbert Lechner – Heating, Cooling, Lighting; any edition

Other readings will be distributed through LEARN or be available through Course Reserves.

Course Requirements and Assessment

Reflective Writing Assignment 1 – 10% - due February 3

Reflective Writing Assignment 1 Presentations – 5% - on February 10 (3 mins to share your reflection)

Building Catalogue / Final Project Siting – 15% - due February 24

Reflective Writing Assignment 2 – 10% - due March 10

Reflective Writing Assignment 2 Presentations – 5% - on March 17 (3 mins to share your reflection)

Building Case Study – 20% total

- part 1 due Mar 3 (2%) - project selection
- part 2 due Mar 10 (3%) - annotated bibliography
- final due March 24 (15%) - essay

Final Design Project – 35% - due April 21

Comprehensive descriptions of the deliverables for the assignments (including detailed evaluation criteria, submission procedures, etc.) will be shared in another document when the assignments are formally issued.

Topics & Schedule

January 13 – Lecture 1 – Anna Beznogova

- Defining sustainable / environmental building design
- In-class activity (not recorded)
- Readings: Felix Guattari "The Three Ecologies"
- Resources:
    - Biomimicry toolbox: https://toolbox.biomimicry.org/introduction/
    - 14 Patterns of Biophilic Design: https://www.terrapinbrightgreen.com/reports/14-patterns/

January 20 – Lecture 2 – Andrew Judge

- Climate change, sustainable habitat design, perspective shift, local ecology, Indigenous worldview and epistemology
- Assignment 1 introduction
- Readings:
    - "Earth Climate Future"
    - "Indigenous land based sustainability practices - A Method for Thriving and Reconciliation"

January 27 – Lecture 3 – Anna Beznogova and Alison Creba

- Buildings and the material system, aspects of sustainability related to material selection, embodied carbon and energy
- Building Catalogue / Final Project Siting assignment introduction
- In-class activity – "Learning to Listen" with Alison Creba
- Readings:
    - Addis and Gorgolewski selections to aid in assignment
- Resources:
    - Cradle to Cradle: https://mcdonough.com/cradle-to-cradle/
    - Cradle to Cradle products: https://mbdc.com/how-to-get-your-product-cradle-to-cradle-certified/
    - Design for Disassembly guide: https://kingcounty.gov/~/media/depts/dnrp/solid-waste/green-building/documents/Design_for_Disassembly-guide.ashx?la=en
    - Carbon Crackdown: https://www.architecturalrecord.com/articles/14489-continuing-education-carbon-crackdown

February 3 – Lecture 4 – Anna Beznogova

- Reflection Assignment 1 is due (10%)
- Continuation of material life cycles and building life cycle considerations for sustainability
- Discussion and questions about Building Catalogue assignment
- Readings: CaGBC Zero Carbon Building Standard - https://www.cagbc.org/CAGBC/Zero_Carbon/The_CaGBC_Zero_Carbon_Building_Program.aspx

February 10 – Lecture 5 – Andrew Judge

- Positioning the human in relation to environment, Anthropocene - humans reordering life on Earth, what do I take for granted?
- Reading(s): Lewis, S. L., & Maslin, M. A. (2015). Defining the Anthropocene. *Nature*, *519*(7542), 171-180. Chicago.
- Reflective Writing Assignment 1 Presentations (5%)

February 17 – (Reading Week – no class)

February 24 – Lecture 6 – Anna Beznogova

- Building Catalogue assignment is due (15%)
- Introduction to green building certification systems
- Case Study assignment introduction
- Resources:
  - LEED Credit Library: https://www.usgbc.org/credits?Version=%22v4.1%22&Rating+System=%22New+Construction%22
  - LEED Scorecard: https://build.usgbc.org/bdc41scorecard
  - LEED v4.1 homepage: https://www.usgbc.org/leed/v41
  - Living Building Challenge: https://living-future.org/lbc/
  - Passive House: https://www.passivehousecanada.com/passive-house-resources/
  - Passive House in 90 seconds: https://www.youtube.com/watch?v=CasrjYhZB1M

March 3 – Lecture 7 – Anna Beznogova

- Case study building selections are due (2%)
- Buildings and the energy system, passive strategies for energy use reduction
- Reading: Lechner Chapters 7, 9, 10, 13

March 10 – Lecture 8 – Anna Beznogova

- Annotated bibliography for case study is due (3%)
- Reflective Writing Assignment 2 is due (10%)
- Active building technologies that reduce energy use
- Reading: Lechner Chapters 8, 14, 16

(Monday, Tuesday COVID days)

March 17 – Lecture 9 – Andrew Judge

- Planning for future generations, polyphasic consciousness (consciousness development), polyculture and permaculture, how does design give back: creating consciousness embedded in design, intergenerational use, regenerative building materials (thinking of relationship to forests, lands, and water), examples in Mayan architecture
- Reading(s): Lumpkin, T. (2001). Perceptual diversity. Is polyphasic consciousness necessary for global survival? *Anthropology of Consciousness*, *12*(1-2), 37-70.
- Reflective Writing Assignment 2 Presentations (5%)

March 24 – Lecture 10 – Anna Beznogova

- Case Study assignment is due (15%)
- Buildings and the water system
- Final project introduction

March 31 – Lecture 11 – Erika Eitland

- Human health considerations in sustainable building design

April 7 – Lecture 12 – Anna Beznogova

- Climatic resilience / resilient design
- Opportunity for final project discussion and questions

April 21 – final assignment due (35%)

Remote Course Delivery Platforms & Communication

During remote learning, we will be using additional platforms to deliver, organize and share course content, learning and work. Here is a breakdown of tools we will use in this course:

MS TEAMS – Virtual Hub for the course. Used for organizing course documents, activities and discussions. Students will be added to the course team in the first week of class.

LEARN – Official communication, work submission, and grade recording and release.

Attendance Policy

Lectures will be recorded and can be viewed asynchronously. Reflective Writing Presentations are synchronous and must be attended to receive the grade.

Course Time Zone

All dates and times communicated in the document are expressed in Eastern Time (EDT Local time in Waterloo Ontario, Canada).

Winter 2021 COVID-19 Special Statement

Given the continuously evolving situation around COVID-19, students are to refer to the University of Waterloo's developing information resource page (https://uwaterloo.ca/coronavirus/) for up-to-date information on academic updates, health services, important dates, co-op, accommodation rules and other university level responses to COVID-19.

Student Notice of Recording

The course's official *Notice of Recording* document is found on the course's LEARN site. This document outlines shared responsibilities for instructors and students around issues of privacy and security. Each student is responsible for reviewing this document.

All live lectures, seminars and presentations including questions and answers will be recorded and made available through official course platforms (LEARN and/or MS Teams). Students wishing not to be captured in the recordings have the option of participating through the direct chat or question and answer functions in the meeting platforms used.

Course events, if any, that will not be recorded are indicated in the course schedule.

Participation in the Reflective Writing Presentations is required.

Late Work

Assignments that are handed in late will receive an initial penalty of 5% on the first calendar day late and a 5% penalty per calendar day thereafter. After 5 calendar days, the assignment will receive a 0%.

Failure to participate in Reflective Writing Presentations will result in a grade of 0%. Not submitting the Reflections on time will make it difficult to participate in the Presentations.

Only in the case of a justified medical or personal reason will these penalties be waived, and only if these have been officially submitted to the Undergraduate Student Services Co-Ordinator and accepted by the Undergraduate Office.

Students seeking accommodations due to COVID-19, are to follow Covid-19-related accommodations as outlined by the university here: (https://uwaterloo.ca/coronavirus/academic-information#accommodations).

Mental Health Support

All of us need a support system. We encourage you to seek out mental health supports when they are needed. Please reach out to Campus Wellness (https://uwaterloo.ca/campus-wellness/) and Counselling Services (https://uwaterloo.ca/campus-wellness/counselling-services).

We understand that these circumstances can be troubling, and you may need to speak with someone for emotional support. Good2Talk (https://good2talk.ca/) is a post-secondary student helpline based in Ontario, Canada that is available to all students.

Equity, Diversity and Inclusion Commitment

At the School of Architecture, we are committed to foster and support equity, diversity and inclusion. We recognize however, that discrimination does occur, sometimes through an isolated act, but also through practices and policies that must be changed. If you experience discrimination, micro-aggression, or other forms of racism, sexism, discrimination against LGBTQ2S+, or disability, there are different pathways to report them:

A) If you feel comfortable bringing this up directly with the faculty, staff or student who has said or done something offensive, we invite you, or a friend, to speak directly with this person. People make mistakes and dealing them directly in the present may be the most effective means of addressing the issue.

B) you can reach out to either the Undergraduate office, Graduate office, or Director (Anne Bordeleau). If you contact any of these people in confidence, they are bound to preserve your anonymity and follow up on your report.

C) You may also choose to report centrally to the Equity Office. The Equity Office can be reached by emailing equity@uwaterloo.ca. More information on the functions and services of the equity office can be found here: https://uwaterloo.ca/human-rights-equity-inclusion/about/equity-office.

Academic integrity, grievance, discipline, appeals and note for students with disabilities:

Academic integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check the Office of Academic Integrity for more information.]

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4. When in doubt, please be certain to contact the department's administrative assistant who will provide further assistance.

Discipline: A student is expected to know what constitutes academic integrity to avoid committing an academic offence, and to take responsibility for his/her actions. [Check the Office of Academic Integrity for more information.] A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate associate dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline. For typical penalties, check Guidelines for the Assessment of Penalties.

Appeals: A decision made or penalty imposed under Policy 70, Student Petitions and Grievances (other than a petition) or Policy 71, Student Discipline may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72, Student Appeals.

Note for students with disabilities: AccessAbility Services, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic

accommodations to lessen the impact of your disability, please register with AccessAbility Services at the beginning of each academic term.

Turnitin.com: Text matching software (Turnitin®) may be used to screen assignments in this course. Turnitin® is used to verify that all materials and sources in assignments are documented. Students' submissions are stored on a U.S. server, therefore students must be given an alternative (e.g., scaffolded assignment or annotated bibliography), if they are concerned about their privacy and/or security. Students will be given due notice, in the first week of the term and/or at the time assignment details are provided, about arrangements and alternatives for the use of Turnitin in this course.

It is the responsibility of the student to notify the instructor if they, in the first week of term or at the time assignment details are provided, wish to submit the alternate assignment.