ENV 335H Environmental Design
Winter 2020

Time:
Wednesdays 1200 – 1500
Location: ES B142

Instructor J. Alstan Jakubiec
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Office Hours
Alstan's Office Hours:
DA 321 (1 Spadina Cres)
- Tuesdays 1000 – 1200
- Or by appointment

Sarah's Office Hours
(TBD)

Course Description
Environmental design, in the context of this course, refers to design strategies that account for the ability of supporting ecosystems to continue to meet human needs and those other lifeforms without diminishing biological diversity or environmental quality. This course takes a hands-on approach to investigating several environmental issues specific to architectural design: climate-responsive design, energy consumption, health and comfort, natural lighting, natural ventilation, mechanical HVAC systems, and on-site renewable energy generation. The Environmental Design course will expound upon these concepts through lectures, case studies, and hands-on measurement and calculation activities in class.

By the end of the term, students will propose a design of a net-zero energy/carbon residential building in groups of three. Five homework assignments will be given throughout the term. Two quizzes (midterm and final) will also be administered during the class.

By the end of this course, a successful learner will be able to do the following:

1. Understand the impacts of architectural design on operational and embedded energy.
2. Predict and describe the impacts of architectural design on energy consumption and human health and comfort.
3. Analyze a subset of environmental design issues in architecture based on measured data, mathematical estimations, or physically-based performance simulations.
4. Make recommendations towards the design of a net-zero energy (or carbon) housing development based upon novel analysis (group analysis project).

Evaluation Scheme

Attendance	10% of final marks
Homework assignments	40% of final marks
Midterm quiz	15% of final marks
Analysis project	20% of final marks
Final exam	15% of final marks

Weekly Course Schedule (1 – 4)

Date (Week)	**Topic**	**Activities & Assignments**
(Week 1)	Course introduction Architectural goals: comfort, energy, productivity, and program Case Study Berkeley CBE survey results Payette glazing study	Activity Evaluating the comfort of our class compared to measurements
(Week 2)	Toronto climate analysis Definition of net-zero "something" buildings: energy, carbon, site, and source Case Study Bullitt Center	Activity Using 'Climate Consultant' with different data sources
(Week 3)	Building heat balance and introduction to heat transfer Envelope design: Conduction Case Study Solar decathlon houses (opaque envelope)	Activity Conductive heat transfer calculations under steady state conditions Assignment HW#1 – Conductive heat transfer (Out)
(Week 4)	Envelope design: Convection and Radiation Case Study Solar decathlon houses (transparent envelope)	Activity Convective and radiative heat transfer calculations Assignment HW#2 – Radiant heat transfer (Out)

Weekly Course Schedule (5 – 8)

Date (Week)	Topic	Activities & Assignments
(Week 5)	Envelope design: Shading design Case Study Solar decathlon houses (fixed / dynamic shading systems)	Activity Simple geometric shading design calculations Assignment HW#1 – Conductive heat transfer (Due) HW#3 – Shading design (Out)
(Week 6)	External thermal loads, internal thermal loads Quiz review	Activity (None today) Assignment HW#2 – Radiant heat transfer (Due)
(Reading Week)		
(Week 7)	Midterm quiz	
(Week 8)	Thermal simulations, beyond the steady state Case Study Graduate school of design	Activity Spreadsheet thermal simulation tool Assignment HW#3 – Shading design (Due) HW#4 – Thermal simulations (Out)

Weekly Course Schedule (9 – 12)

Date (Week)	Topic	Activities & Assignments
(Week 9)	Daylighting and electric lighting systems Case Study Residential daylighting score (Dogan and Park) Residential lighting studies in Singapore Daylight pattern guide	Activity Daylight factor estimations and benchmarking for the Toronto climate Assignment HW#5 – Daylight factor estimations (Out)
(Week 10)	Natural ventilation Case Study HULIC building, Tokyo BRE building, Watford, UK	Activity Coolvent thermal and natural ventilation combined simulations Assignment HW#4 – Thermal simulations (Due)
(Week 11)	HVAC systems, removing and adding heat and humidity	Activity Learning the psychrometic chart Assignment HW#5 – Daylight factor estimations (Due)
(Week 12)	Renewable energy sources Embedded carbon vs. operational energy Case Study Cambridge, MA	Activity NREL's PVWatts calculator tool and back of the envelope PV calculations Assignment Analysis project (Due)
	Final exam/quiz to be scheduled.	

Late Work

All assignments are due at the specified time and date. Late submission will result in a 10% deduction (of each assignment's total grade) per day. In the case of illness or other special circumstance, notification should be given to the Instructors and the Registrar as soon as possible and before the deadline in question; where required, the official University of Toronto Verification of Student Illness or Injury form must be submitted. Additional information is available on the Verification of Illness or Injury is available online: http://www.illnessverification.utoronto.ca/Frequently-Asked-Questions.php

Final Due Date

Due dates are set by the Instructor in the schedule and evaluation sections of this outline. All term work must be submitted on or before the deadline date stipulated by the instructor. Students who for reasons beyond their control are unable to submit an assignment by its deadline must obtain approval from their Instructor for an extension within the term. The last date of the term is April 25, 2020. Any work submitted after the stipulated deadline and before the end of term without an approved extension will not be accepted. Students will be required to petition for an extension if they will be unable to submit their work by April 25, 2020. http://www.sgs.utoronto.ca/Documents/Extension+to+Complete+Coursework.pdf

Students are advised to contact their professors in advance of a deadline, where possible. Those students registered with Accessibility services should provide you with a letter from their advisor that confirms their registration and indicates their required accommodations.

Preparedness at UofT

Students are advised to register for UTAlert, the University's alert system, at http://alert.utoronto.ca/. UTAlert sends important messages to registrants via text, email, and phone.

Accessibility Needs

The University provides academic accommodations for students with disabilities in accordance with the terms of the Ontario Human Rights Code. This occurs through a collaborative process that acknowledges a collective obligation to develop an accessible learning environment that both meets the needs of students and preserves the essential academic requirements of the University's courses and programs.

If you are a student who identifies with one or more of the broad categories below, we encourage you to register with Accessibility Services (http://www.accessibility.utoronto.ca/). New student registration packages need to be submitted by February 7, 2020 in order to receive Exam accommodations. For any questions or assistance, please see the staff in the Office of the Registrar and Student Services.

- Attention Deficit Hyperactivity Disorder (ADHD)
- Autism Spectrum Disorder
- Brain Injury and Concussion
- Chronic Health
- Deaf and Hard of Hearing
- Learning Disability
- Mental Health
- Mobility and Functional
- Low Vision / Legally Blind
- Temporary Injuries

English Language and Writing Support

The University of Toronto expects its students to write well, and it provides a number of resources to help. Please consult the University of Toronto writing site (http://www.writing.utoronto.ca/) for advice and answers to your questions about writing. Please pay special attention to "Advice on Writing: Academic Writing."

Academic writing carries with it certain expectations about properly citing, quoting, and referencing source material. Your research must be conveyed in a language commonly shared by others in the discipline. The style guidelines preferred by the Daniels Faculty are put forth in the Chicago Manual of Style and can be found here:
http://www.chicagomanualofstyle.org/16/contents.html
https://owl.english.purdue.edu/owl/resource/717/01/

The Centre for International Experience (CIE) English Language Support is also available to support students:
https://www.studentlife.utoronto.ca/cie/els

Academic Integrity

Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters (www.governingcouncil.utoronto.ca/policies/behaveac.htm) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. The Code of Behavior on Academic Matters states: "It shall be an offence for a student knowingly […] to represent as one's own any idea or expression of an idea or work of another in any academic examination or term test or in connection with any other form of academic work, i.e, to commit plagiarism." The Code also states: "Wherever in the Code an offence is described as depending on 'knowing,' the offence shall likewise be deemed to have been committed if the person ought reasonably to have known."

Potential offences include, but are not limited to:

In papers and assignments:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University, including (but not limited to) doctor's notes.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources. For information about academic integrity at the University of Toronto, please see www.academicintegrity.utoronto.ca

Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com website.

For accepted methods of standard documentation formats, including electronic citation of internet sources please see the U of T writing website at: http://www.writing.utoronto.ca/advice/using-sources/documentation. Please also refer to "Reading and Using Sources: How Not to Plagiarize" on the University of Toronto writing site (http://www.writing.utoronto.ca/).