

FALL 2024
GREEN BUILDING DESIGN (GBD)
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
ENVE 4105/ASCE 3105

Lectures: Wednesdays, 18:05-20:55,

Instructor: Luminita Dumitrascu, PhD, luminidadumitrascu@cunet.carleton.ca; Office hours: by appointment.

Tutorials and Labs: various times/locations (see your schedule)

TAs: Information will be posted on Brightspace

Office hours TAs: Information will be posted on Brightspace

Course Description

The course provides an overview of green buildings and their systems, technologies, and design processes. The concepts will be supported with both theory and case studies. Emphasis will be placed on good design practice, the integrated design process, and quantitative design. A major objective of the course is to provide engineering students and architecture students an appreciation of their counterparts' roles in the building design process. The tutorial component will involve software, experiments, and/or practice problems.

All evaluation (assignments, exams) will be in SI units. However, it would be beneficial for students to be comfortable with basic conversions to IP units (e.g., inches and °F).

Required Background Knowledge

All students should be familiar with basic heat and mass transfer, trigonometry, basic calculus and algebra, and use of Excel or similar spreadsheet software.

Learning Objectives

After taking the course, students should be familiar with, and be able to apply concepts related to:

- Calculations and analysis for design of buildings and their subsystems at a wide range of details, from back-of-the-envelope to detailed simulations.
- Climate, weather, and site selection
- Building performance simulation (BPS)
- Solar geometry and energy
- Lighting and daylighting
- Building envelopes, fenestration, and shading
- Passive techniques
- HVAC systems and Building controls
- Occupant comfort (thermal, visual, acoustic)
- Indoor air quality and natural ventilation
- Occupant behaviour
- Building-integrated renewable energy systems
- Embodied energy
- Design processes

By the end of the course, students should be able to bring any green building-related aspects to conceptual design.

Evaluation

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|----------------|-----|
| Assignments | 30% |
| Design project | 20% |
| Final Exam | 50% |

Course Materials

The primary reference material will be posted to Brightspace. Course notes (slides and hand-written on the blackboard) will supplement these. Blackboard notes will not be posted.

Additional reference texts include:

- The ASHRAE Fundamentals Handbook. The SI-unit version is highly favourable
- ASHRAE Standard 55 – Thermal Environmental Conditions for Human Occupancy
- ASHRAE Standard 62.1 – Ventilation and Acceptable Indoor Air Quality
- ASHRAE Standard 90.1 – Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings
- Other posted readings and reference materials.

Assignments

The assignments are due by the beginning of the lecture on their due date. Late assignments will be accepted but at a reduced mark, at a rate of 1 percentage (of final grade point) per weekday. Assignments are to be completed individually (unless express permission is given otherwise); evidence of direct copying or plagiarism will be treated as cheating and will be handled according to university policy.

Design Project

Detailed to be posted approximately one month into the course. The project shall be structured such that students apply the concepts taught to a real building design (specification in a separate document). The project will contain written and oral components. Oral presentations will occur in the last few lectures.

Final Exam

The final exam covers all material of the course and will take place during the formal exam period. Students must bring a calculator, pen, pencil, eraser, and a single-sided 8.5 by 11-inch formula sheet.

Deferred Final Examinations

Students who are unable to write the final examination because of extenuating circumstances, as defined in the Academic Consideration Policy, may apply for accommodation by contacting the Registrar's office. Consult the Section 4.3 of the University Calendar.

Building Design/Analysis Software (freely available)

A major component of the course will be to learn and use several freely available tools (mostly Window-based). Students are encouraged to install them on their personal computers, if possible, as there is not a dedicated computer lab for the course.

Academic Dates

Students should be aware of the academic dates (e.g. last day for academic withdrawal) posted on the Registrar's office web site <https://carleton.ca/registrar/registration/dates/academic-dates/>

Academic Integrity and Plagiarism

- a) Please consult the Faculty of Engineering and Design information page about the Academic Integrity policy and our procedures: <https://carleton.ca/engineering-design/current-students/fed-academic-integrity> Violations of the Academic Integrity Policy will result in the assignment of a penalty such as reduced grades, the assignment of an F in a course, a suspension or, expulsion.
- b) One of the main objectives of the Academic Integrity Policy is to ensure that **the work you submit is your own**. As a result, it is important to write your own solutions when studying and preparing with other students and to avoid plagiarism in your submissions. The University Academic Integrity Policy defines plagiarism as “presenting, whether intentionally or not, the ideas, expression of ideas or work of others as one’s own.” This includes reproducing or paraphrasing portions of someone else’s published or unpublished material, regardless of the source, and presenting these as one’s own without proper citation or reference to the original source.

Examples of violations of the policy include, but are not limited to:

- any submission prepared in whole or in part, by someone else;
- using another’s data or research findings without appropriate acknowledgement;
- submitting a computer program developed in whole or in part by someone else, with or without modifications, as one’s own; and
- failing to acknowledge sources of information through the use of proper citations when using another’s work and/or failing to use quotations marks.

Copyright

The materials (including the course outline and any slides, posted notes, videos, labs, project, assignments, quizzes, exams and solutions) created for this course and posted on this web site are intended for personal use and may not be reproduced or redistributed or posted on any web site without prior written permission from the author(s).

Learning and Working Environment

The University and all members of the University community share responsibility for ensuring that the University’s educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the Department of Equity and Inclusive Communities at equity@carleton.ca

We will strive to create an environment of mutual respect for all through equity, diversity, and inclusion within this course. The space which we work in will be safe for everyone. Please be considerate of everyone’s personal beliefs, choices, and opinions.

Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

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Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at **613-520-6608** or pmc@carleton.ca.

You should request your academic accommodations in the [Ventus Student Portal](#), for each course at the beginning of every term. For in-term tests or midterms, please request accommodations at least two (2) weeks before the first test or midterm. Please consult the [PMC website](#) for the deadline to request accommodations for the formally-scheduled exam (if applicable).

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF\)](#).

Pregnancy Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Religious Obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF\)](#).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit the [Sexual Violence Prevention & Survivor Support](#).