Course description
The course provides an overview of green buildings and their systems and technologies. 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 a lesson on using a different software tools and/or example problems. Several guest lectures and a possible tour will supplement the regular lectures.

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 spreadsheets.

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 information modelling (BIM) and 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
- The integrated design process (IDP)

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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<th>Component</th>
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<td>Assignments</td>
<td>20%</td>
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<td>Design project</td>
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<td>Final Exam</td>
<td>50%</td>
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Course Materials
The primary reference material will be posted to cuLearn. Course notes (slides and hand-written on the blackboard) will supplement these. Blackboard notes will not be posted on cuLearn.

Additional reference texts include:

- The ASHRAE Fundamentals Handbook. The SI-unit version is highly favourable. 2013 edition is available from the library website (can save PDFs and print them).
- ASHRAE Stds. 55, 62.1, and 90.1

Readings
1-2 readings, usually from the course package, will be assigned to be read before the weekly lectures. These will be discussed in class and are included in the examinable scope.

Assignments
They are due at the beginning of the lecture (as per the posted course schedule). 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 (except where explicitly marked); evidence of direct copying or plagiarism will be treated as cheating and will be handled according to university policy (see below).

Design project
Students will be assigned to groups formed by the professor to encourage distribution of all disciplines. 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.

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. Formula sheets may not contain examples, and theory other than formulas.

Building Design/Analysis Software (freely available and installed on lab computers for tutorials)
A major component of the course will be to learn and use a number of freely-available tools (mostly Window-based). Students are also encouraged to install them on their personal computers if possible.

Academic integrity
Students should familiarize themselves with Carleton’s Academic Integrity Policy (available here: http://www1.carleton.ca/studentaffairs/academic-integrity/). The professor has a zero-tolerance policy.