

Syllabus of CIVL 1210 - Fundamental of green building

Syllabus

Logistics

- Class
 - Time: 9:00-10:20 am Tue. & Thu.
 - Venue: Academic Building Room 5583
- Office hour
 - Time: 3:00-5:00 pm every Wed.
 - Venue: Room 3564 for the first half and Room 3590 for the second half

Instructor

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Teaching Assistant

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Course description

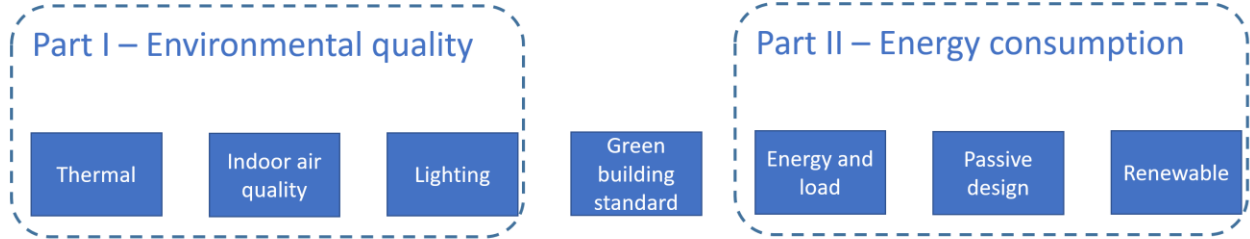
Over the past few decades, the process of urbanization has brought about significant changes to our surroundings. A large majority of people now spend more than 90% of their lives within buildings and cities. The quality of the built environment plays a vital role in ensuring the comfort, productivity, and overall health of urban residents. At the same time, buildings themselves account for a substantial portion, around 30% to 40%, of total energy consumption within cities. It is therefore imperative to reduce building energy consumption in order to promote sustainable development for humanity. The objective of green building is to create a comfortable built environment while minimizing energy usage.

The first half of this course will dive into the fundamental elements of green building at the building scale. We will focus on two key pillars: environmental quality and energy consumption. To begin with, we will explore four crucial aspects of indoor environmental quality: thermal environment, indoor air quality, lighting environment, and acoustic environment. We will discuss strategies and techniques to optimize each of these factors. Next, we will delve into building energy consumption and energy-efficient design, also known as passive design. We will examine the various opportunities and challenges associated with integrating renewable energy sources into green building practices. These discussions will shed light on how to achieve energy efficiency and sustainability in building design and operation. Lastly, we will familiarize ourselves with the prominent green building standards followed worldwide. This will provide insight into the mainstream approaches and guidelines that shape green building practices globally.

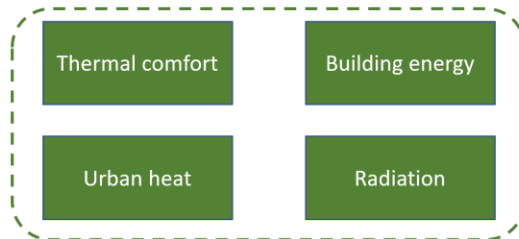
The second half of this course will examine green building at the city scale. We will cover the basic principles of surface energy balance under the influence of anthropogenic activities. Students are expected to learn fundamental knowledge on how thermal properties affect the temperature behavior of engineering materials, and how building design interacts with the outdoor environment. Lectures will cover the underlying mechanisms that can lead to green buildings in an interactive built environment.

Gaining a solid understanding of green building principles equips you with valuable insights into various aspects of the built environment. It enables you to comprehend energy-efficient building design, the micro-climate dynamics within cities, and the intricate relationship between buildings and the surrounding micro-climate. This knowledge proves particularly beneficial for those aspiring to pursue careers in the building industry, such as civil engineering, urban planning, and building services engineering. By acquiring fundamental knowledge of green building, you are better prepared to contribute effectively to sustainable and environmentally conscious practices within respective fields.

First half: building scale



Second half: neighborhood/city scale



Calendar

Week	Date	No.	Lecture	Assignment
1	5 th Sep.	1	Introduction	
	7 th Sep.	2	The property of air	
2	12 th Sep.	3	Thermal environment	HW 1 released
	14 th Sep.	4	Indoor air quality and air flow management	
3	19 nd Sep.	5	Lighting environment	HW 1 due
	21 st Sep.	6	Building energy consumption	HW 2 released
4	26 th Sep.	7	Building thermal load	
	28 th Sep.	8	Reduced load	HW 2 due
5	3 rd Oct.	9	Passive design and energy recovery	HW 3 released
	5 th Oct.	10	Renewable energy and smart micro-grid	
6	10 th Oct.	11	Green building standard	HW 3 due
	12 th Oct.	12	First half course review	
7	17 th Oct.	13	In-class exam	
	19 th Oct.	14	Urban surface property	
8	24 th Oct.	15	Radiation exchange in cities	
	26 th Oct.	16	Radiation exchange in cities	HW 4 released
9	31 st Oct.	17	Surface energy balance	
	2 nd Nov.	18	Surface energy balance	HW 4 due
10	7 th Nov.	19	Surface energy balance	HW 5 released
	9 th Nov.	20	Outdoor thermal comfort	
11	14 th Nov.	21	Building energy consumption	HW 5 due
	16 th Nov.	22	Urban observation and modelling	HW 6 released
12	21 st Nov.	23	Urban heat island	
	23 rd Nov.	24	Urban heat island	HW 6 due
13	28 th Nov	25	Second half course review	
	30 th Nov	26	Final exam	

Grading

- Assignments: $5\% \times 6 = 30\%$
- Mid-term exam: 35%
- Final exam: 35%

Assignments

A total of six homework assignments let you practice and apply the concepts learned in lecture and section. The assignments will be due one week since it is released.

Assignment late policy

All assignments must be turned in on time (deadline is 23:59 pm on the due date). We will allow a total of five late days (Weekends and holidays counted) cumulatively. The late days are intended to provide for exceptional circumstances, and you are advised not to use them unless absolutely necessary. Any assignments that are submitted late (with insufficient late days remaining) will not be graded.

Integrity

Cheating is strictly not allowed for either assignments or exams.

All assignments should be done individually. You are allowed to discuss homework questions with other students, but not allowed to copy solutions or share your solution to a question with other students who haven't completed the question already. Cheating on assignments or final exam results in 0 points, so you really do not want to cheat.

Please, do your own work. Thank you!

Citizenship

A diversified, inclusive and equitable environment would benefit everyone of our community. For exceptionally rude or disrespectful behavior toward the course staff or other students, your final grade will be lowered by up to a full letter grade (e.g., from an A- to a B-) at the discretion of the course instructors. You don't need to be concerned about this policy if you treat other human beings with even a bare minimum of respect and consideration and do not engage in behavior that is actively harmful to others.