The Hong Kong University of Science and Technology

UG Course Syllabus

[Course Title] CIVL4310 – Energy System Modeling for Buildings and Cities

[Course Code] CIVL4310

[No. of Credits] 3

[Any pre-/co-requisites]

Instruction team

- Instructor
  Zhe Walter WANG, Associate Professor, cezwang@ust.hk
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- Teaching Assistants
  Siqi LI, Ph.D. student, slifq@connect.ust.hk
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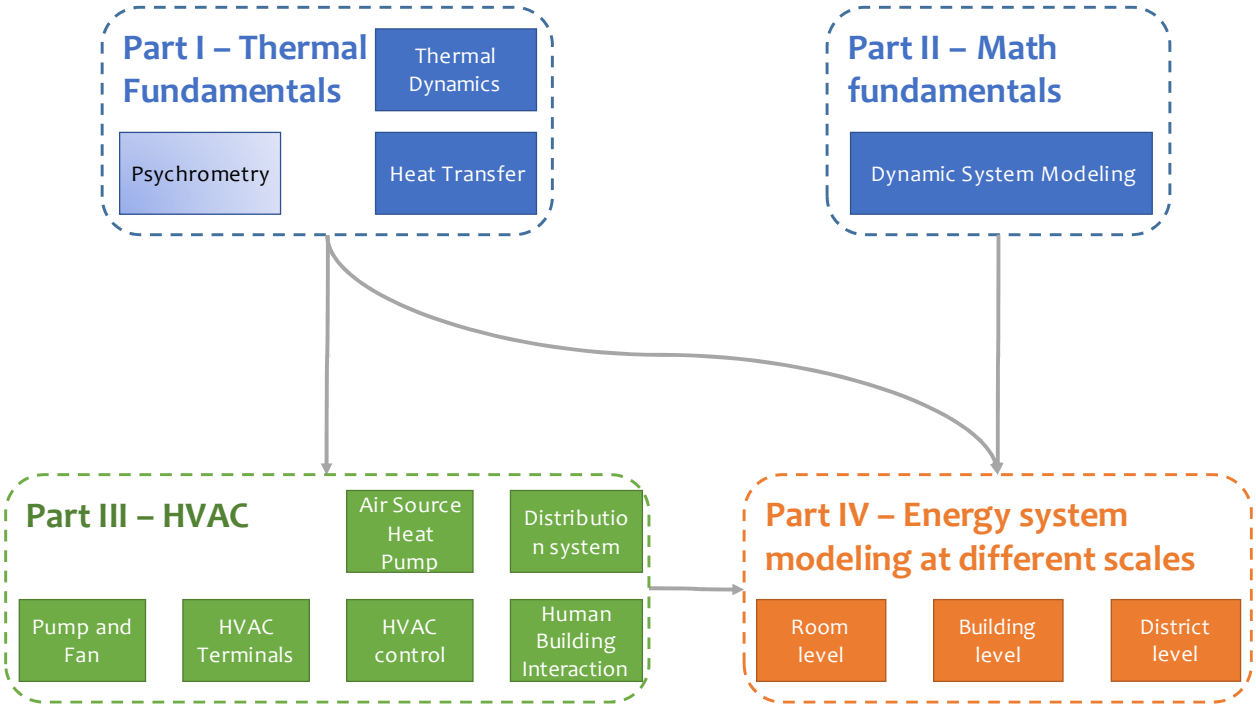
Course Description

The energy system plays a vital role in smart, low-carbon buildings and cities. Modeling the energy system is a fundamental step for predicting loads, designing energy-efficient solutions, and optimizing performance. This becomes even more crucial in the face of climate change and the pursuit of sustainable development. This course offers both theoretical knowledge and practical experience in energy system modeling for buildings and cities. The lectures will delve into the underlying principles, mathematical laws, and practical examples that are needed to model the energy systems for cities and buildings. From a theoretical standpoint, the course will explore the fundamentals of heat transfer and building thermal dynamics. In terms of practical applications, the course will introduce building energy systems, especially Heating, Ventilation, and Air Conditioning (HVAC) System. Additionally, the course will introduce energy systems at different scales, focusing on the building-scale energy system (HVAC) as well as the city-scale energy system (district heating and cooling system). This course has four modules as shown below: review of thermal fundamentals, math of dynamic systems modeling, major components of HVAC system, and energy system modeling at different scales.



Grading

- The average of the two best performing exams
    - Exam I: Cover lectures 1-6
    - Exam II: Cover lectures 7-15
    - Exam III: Cover lectures 16-25
- Format: half-open book.
    - You are allowed to bring at most 2 A4 sheets with you for each exam.

Assignments

This course does NOT have written assignments. But we do expect you to review the course contents after the class, and to prepare for the mid-term and final exams. We will also distribute mock exam questions and solutions to help you prepare for the exams.

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.

Reference

- **Stanford, H.W. and Spach, A.F., 2019. Analysis and Design of Heating, Ventilating, and Air-Conditioning Systems. CRC Press. (electronic version is available in the HKUST library)**