

IBTM 5150 – Advanced HVAC Systems

Syllabus

Instructor

Zhe Wang, Assistant Professor, Department of Civil and Environmental Engineering, HKUST

Email: cezwang@ust.hk

Personal website: <https://walterzwang.github.io/>

Course description

HVAC system is an important part of modern buildings. People spends 85% of time indoors. Providing a comfortable, healthy, and productive indoor environment is critical to the well-being of occupants. Additionally, air conditioning alone accounts for 16% of total energy usage of Hong Kong in 2019. Understanding how HVAC system works and the major components of modern HVAC system is critical and required for engineers of intelligent building industry.

This course provides the theoretical and practical knowledge of modern HVAC systems. It has three modules as shown below: review of fundamentals of how HVAC system works, major components of HVAC system, and advanced topics about intelligent HVAC system.

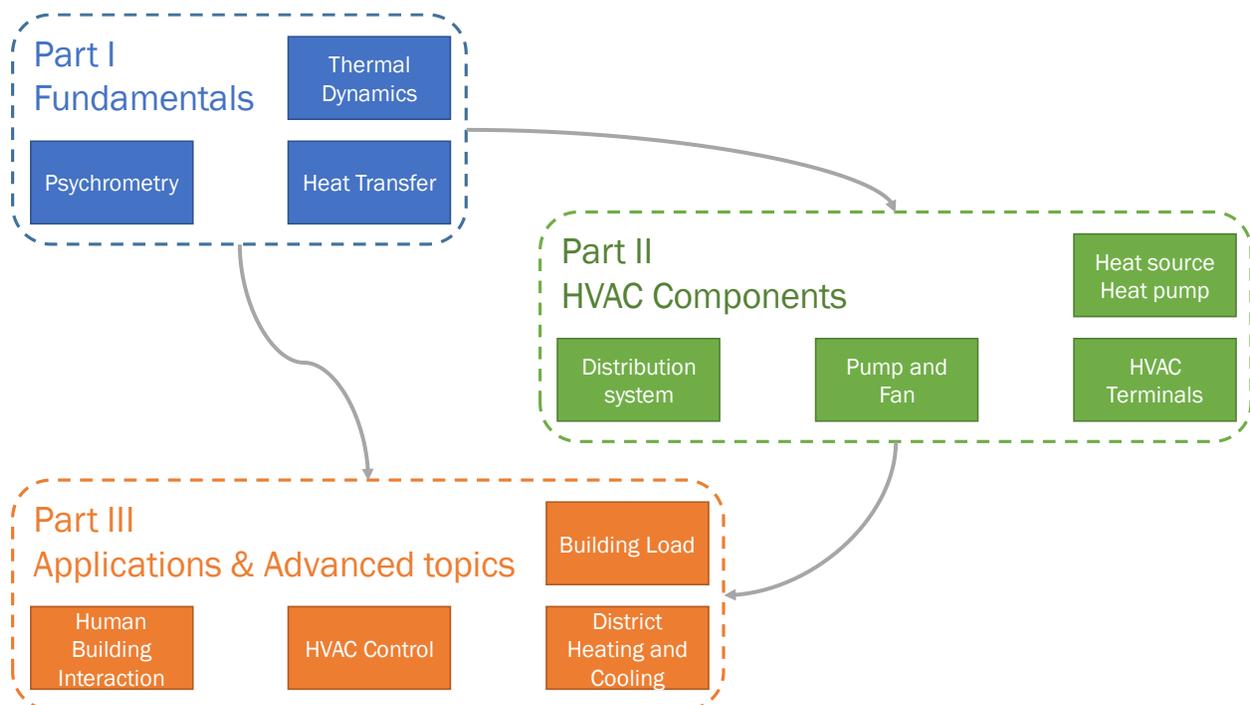


Figure 1. Course structure

Calendar

Date	Lecture	Homework
4 th Feb.	<ul style="list-style-type: none">• Introduction• Review of thermal dynamics	
11 th Feb.	<ul style="list-style-type: none">• Review of heat transfer	
18 th Feb.	<ul style="list-style-type: none">• Psychrometry	Homework 1 released
25 th Feb.	<ul style="list-style-type: none">• Building thermal load	Homework 1 due
4 th Mar.	<ul style="list-style-type: none">• HVAC Introduction	
11 th Mar.	<ul style="list-style-type: none">• Heat source	
18 th Mar.	<ul style="list-style-type: none">• Heat pump	
25 th Mar.	<ul style="list-style-type: none">• Distribution system, pump and fan	Homework 2 released
1 st Apr.	<ul style="list-style-type: none">• HVAC terminal	Homework 2 due
8 th Apr.	<ul style="list-style-type: none">• Human Building Interaction	
15 th Apr.	<i>Holiday</i>	
22 nd Apr.	<ul style="list-style-type: none">• HVAC control	Homework 3 released
29 th Apr.	<ul style="list-style-type: none">• District heating and cooling	Homework 3 due
6 th May	<ul style="list-style-type: none">• Course Review	

Grading

- Class participation: 10%
- Assignments: 10%*3
- Final exam: 60%

Class participation

You are expected to attend every lecture, and encouraged to actively participate in class activities. We will provide attendance list for your signature at every class. Your class participation score will be equal to your class participation rate.

Assignments

Four homework assignments let you practice and apply the concepts learned in lecture and section. They will usually be released on Friday night and be due the following Friday.

Assignment late policy

All assignments must be turned in on time (deadline is 23:59 pm Fri.). We will allow a total of five late days (Weekends and holidays counted) cumulatively. We will not make any additional allowances for late assignments: the late days are intended to provide for exceptional circumstances, and students should avoid using them unless absolutely necessary. Any assignments that are submitted late (with insufficient late days remaining) will not be graded.

Integrity

Cheating is strictly NOT accepted 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.

Office hour

- Time: 3-5 pm every Wed.
- Venue: Room 3564

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)