

Hong Kong Baptist University
Faculty of Science – Department of Physics

Title (Units): **PHYS 4057 ENERGY MANAGEMENT II (3,3,1)**

Course Aims: This course focuses on building energy management for quantitative analysis of building energy use and performance. With application of experiential learning theory, students reflect on their learning through serving the community, or implementing practical a project.

Pre-requisites: PHYS 4056 Energy management I or consent of instructor.

Course Reviewed by: Dr. Junxue Fu & Dr. M.H. Chan

Course Intended Learning Outcomes (CILOs):

No.	Upon successful completion of this course, students should be able to:
1	Explain the principle of energy usage in buildings, for example, electrical, HVAC, motors, thermal energy storage, lighting, boiler and steam systems.
2	Analyze residential/industrial energy efficiency and energy management model.
3	Be aware of the needs of the community in learning and applications of energy management.
4	Develop communication skills with the community to promote efficient energy usage and energy saving.

Teaching & Learning Activities (TLAs)

CILOs	TLAs will include the following:
1 – 2	Conduct class discussion and demonstration related to selective topics of building energy management.
1 – 2	Discuss case studies and conduct building energy auditing practicum.
3 – 4	Group projects (eg., service-learning teaching the community of applications of energy management strategy in our daily-life buildings).

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Assessment Methods (AMs):

Type of Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
Service-Learning Group Project or Practical Group Project	50%	1-4	For service-learning group project, report, presentation, and reflection of group service project (eg., experiential learning cycle) are used to evaluate the quality of service learning.
Homework or Report	20%	1-4	A building energy audit practicum and a report of around 10 pages are required to evaluate how effectively the students have applied the relevant knowledge to conduct building energy audit.
Final Examination	30%	1-4	Final Examination questions are designed to test how far students have achieved their intended learning outcomes. Questions will primarily be analysis and skills-based to assess the students' capability in understanding and performing energy audit of buildings.

Learning Outcomes and Weighting:

Content	CILO No.	Teaching (in hours)
I. HAVC system energy management	1 – 2	5
II. Boiler and steam system energy management	1 – 2	4
III. Lighting energy management	1 – 2	5
IV. Motors and appliance energy management	1 – 2	4
V. Group Project (e.g., Service-Learning Project)	3 - 4	18

Textbook:

- Frank Kreith, D. Yogi Goswami, editor: *Energy Management and Conservation Handbook*, CRC Press, 2008.

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References:

1. B.L. Capehart, W.C. Turner, and W.J. Kennedy; Guide to Energy Management; 7th Ed., The Fairmont Press Inc. 2011
2. Frank Kreith, D. Yogi Goswami, editor: Energy Management and Conservation Handbook, CRC Press, 2008
3. Mike Montoya: Green Building Fundamentals, Prentice Hall, 2010.

Course Content in Outline:

	Topic	Hours
I.	HAVC system	5
	A. Coefficient of performance	
	B. Control, thermal storage, absorption system	
II	Boiler and steam system	4
	A. Boiler efficiency and improvement	
	B. steam system efficiency and improvement	
III	Lighting	5
	A. Economic evaluation of lighting improvements	
	B. HVAC related lighting management	
IV	Motors and appliance	4
	A. Cost-effective motors	
	B. Motor energy management	
V	Group Project (for example: Service-Learning Project)	18
	A. Pre-service preparatory work (such as development of teaching gadgets for energy management community education)	
	B. Pre-service training	
	C. Off-campus energy management educational service	