

**City University of Hong Kong  
Course Syllabus**

**offered by Division of Building Science and Technology  
with effect from Semester A 2018/19**

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**Part I Course Overview**

**Course Title:** Thermal Science

**Course Code:** BST12511

**Course Duration:** 1 semester

**Credit Units:** 3 credits

**Level:** A1

Arts and Humanities

**Proposed Area:**  
*(for GE courses only)*

Study of Societies, Social and Business Organisations

Science and Technology

**Medium of Instruction:** English

**Medium of Assessment:** English

**Prerequisites:**  
*(Course Code and Title)* Nil

**Precursors:**  
*(Course Code and Title)* Nil

**Equivalent Courses:**  
*(Course Code and Title)* BST11511 Thermodynamics

**Exclusive Courses:**  
*(Course Code and Title)* Nil

## Part II Course Details

### 1. Abstract

(A 150-word description about the course)

Thermodynamics is the study of energy, its transformations, and its relation to states of matter. This course aims to provide students with fundamental knowledge of thermal science; and invoke students' awareness of the importance of thermodynamics relating to the mechanical services. Through a series of learning activities, students are expected to gain a good understanding of laws of thermodynamics, to be able to analyse thermodynamic cycles and to apply their knowledge in practical applications.

### 2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	solve problems related to fundamental laws in classical thermodynamics.	12.5		✓	✓
2.	use saturated and superheated steam tables.	12.5	✓	✓	
3.	analyse simple thermodynamic and psychometric processes.	37.5		✓	
4.	analyse simple thermodynamic cycles.	37.5		✓	✓
		100%			

\* If weighting is assigned to CILOs, they should add up to 100%.

# Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

**3. Teaching and Learning Activities (TLAs)**  
*(TLAs designed to facilitate students' achievement of the CILOs.)*

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Pre-Class Study	A Pre-Class Study is a combination of selected reference books and/or lecture notes reading and question generation which requires students to read relevant reference book sections and generate questions before a class.	✓*	✓*	✓*	✓*	No direct contribution to contact hours
Seminar (Average class size: Around 50 students)	Seminar is an in-class activity in groups involving oral presentation by lecturers and discussion with students on a selected topic through illustrating exercises, real-life examples and question generation by the students and answering by peers or by the lecturer.	✓	✓	✓	✓	3hrs/wk for 13 weeks
Assignment	An Assignment is a combination of case problems and/or calculation exercises for guided students' learning.	✓*	✓*	✓*	✓*	No direct contribution to contact hours

\* this will not directly contribute to contact hours

Note: There are generally 2 seminars, since the number of students are over 100.

**4. Assessment Tasks/Activities (ATs)**  
*(ATs are designed to assess how well the students achieve the CILOs.)*

Assessment Tasks/Activities	CILO No.				Weighting*	Remarks
	1	2	3	4		
Continuous Assessment: 40%						
Assignment/Test/Project	✓	✓	✓	✓	40%	
Examination: 60% (duration: 2.5 hours, if applicable)						
* The weightings should add up to 100%.					100%	

Note:

1. There are at least three continuous assessments.
2. A student must obtain a minimum mark of 35 in both coursework and examination and an overall mark of 40 to pass the course.

## 5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignment / Test / Project	1.1 Understanding of the scientific principles and the working mechanisms. 1.2 Capability to identify and explain how the principles are applied to thermodynamic process/cycles. 1.3 Evidence of original thinking.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Examination	2.1 Understanding of the scientific principles and the working mechanisms. 2.2 Capability to identify and explain how the principles are applied to thermodynamic process/cycles. 2.3 Evidence of original thinking.	High	Significant	Moderate	Basic	Not even reaching marginal levels

### Part III Other Information (more details can be provided separately in the teaching plan)

#### 1. Keyword Syllabus

(An indication of the key topics of the course.)

Fundamental of thermodynamics: work; first law of thermodynamics; non-flow energy equation.

Working fluid: steam; perfect gas.

Processes: reversible and irreversible processes; second law of thermodynamics.

Cycles: heat engine; positive displacement machines; vapour compression cycle.

Moist air: psychrometry and psychrometric chart.

#### 2. Reading List

##### 2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Eastop T D and McConkey, A (1993). <i>Applied Thermodynamics for Engineering Technologists</i> . 5th ed. Essex: Longman.
2.	McGovern, J A (1996). <i>The Essence of Engineering Thermodynamics</i> . Hertfordshire: Prentice-Hall.

##### 2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Jones, J B and Dugan, R E (1996). <i>Engineering Thermodynamics</i> . Eaglewood Cliffs: Prentice-Hall.
2.	Hsieh, J S (1993). <i>Engineering Thermodynamics</i> . Eaglewood Cliffs: Prentice-Hall.
3.	Anderson, E E (1994). <i>Thermodynamics</i> . Boston: PWS Publisher.
4.	Engineering Thermodynamics. <a href="http://en.wikibooks.org/wiki/Engineering_Thermodynamics">http://en.wikibooks.org/wiki/Engineering_Thermodynamics</a>
5.	E 115: Engineering Thermodynamics Website. <a href="http://www.nuc.berkeley.edu/courses/classes/E-115/Class%20Info.html">http://www.nuc.berkeley.edu/courses/classes/E-115/Class%20Info.html</a>