

**Course instruction as prepared  
by  
Yoon Tiem Leong  
for  
JIF 314/3  
Thermodynamics  
Academic year 08/09**

**Syllabus:** Heat and temperature. Simple thermodynamic system. Equations of State. Work. The First Law of Thermodynamics. Ideal gas. Entropy. The Second Law of Thermodynamics. Carnot cycle. Heat engine. Kinetic Theory of Gases. Distribution of gas molecular velocity. Transport phenomenon.

Text book: Mark Zemansky and Richard Dittman, *Heat and thermodynamics*, Mcgraw-Hill international editions 1997.

**Instructor:** Yoon Tiem Leong, School of Physics, USM, Room 115,

**Contact:** Tel: 04-6533674, tlyoon@usm.my.

**General comment:**

In this course students are expected to use the text book by Zemansky as a major source of reference. The text book is well-written and particularly suitable for distant learning students. Zemansky is written in a clear and particularly simple manner so that it could be understood easily. The author develops the concepts in a step-by-step manner, explaining each definition and rationale of thermodynamically-related concepts systematically in plain language. Readers who bother to invest serious attempt to study the book shall find the content of the book comprehensible. A fair comparison between Zemansky and the STPM-level physics can be made. For those who have ever sat the STPM level physics shall find that many topics discussed in Zemansky are very similar to what were been taught in STMP, such as the zeroth law, first law and second laws. Here Zemansky is slightly 'advanced' than STPM physics in the sense that Zemansky tries to expound with more rigorous clarity the logical development of the thermodynamical concepts. For each definition mentioned in the text attempts were made to explain its relevance and importance that are tied to empirical considerations. In STPM, many of the thermodynamical concepts are fed to the students via rigid formulae without much emphasis in the explanation of how these formulae comes about, nor the reasoning behind these formulae. Students following Zemansky's are expected to not only memorise formula but also display understanding of the conceptual development of the physical reasoning these formula represents. In addition, the questions in Zemansky are 'tougher' than that in STPM.

**'Prerequisites':**

Irrespective of the existence of formal prerequisites (prasyarat kursus) for this course, students are assumed to have been familiar with some basic mathematics at STPM or Matrikulasi level, such as simple differentiation, integration, trigonometry, basic algebra, geometry, and of course arithmetic of addition, subtraction, division and multiplication. Students who have a good foundation in the pre-U level mathematics and physics would definitely have an advantage despite these requirements are not formally needed.

In addition, since this course will be conducted in English, students of course must also be able to understand, to read and to write in English.

### **Consultation hours**

There is no specific timeslots allocated for consultation with Yoon Tiem Leong. You can come to see him in his office anytime as long as he is free to entertain you. However, in order to avoid inconveniences students are advised to call up (ext 3674) or email him (tlyoon@usm.my) before rushing into his office. His door at Room 115, School of Physics, Universiti Sains Malaysia, is always open to you.

### **Additional reference:**

The textbook by Zemansky will be used exclusively. All exam questions and assignment questions are to be taken from it.

Students are also advised to take a look at the past year exam questions. These questions shall give you some ideas of the kind and format of questions that could be asked in the exam. But it is unlikely that the exam questions you will see in your exam be a repeated version of the previous ones (!!!).

### **Moodle**

Every student is expected to access the e-learning portal for JIF 314 (I shall call it the 'Moodle' in short) at <http://el.usm.my/pppjj/>. Course-related material and notices will be uploaded there (e.g. tutorial questions, latest coursework grades, etc.)

### **Coursework assessment**

There will be TWO assignments for this course. Please send completed assignments to the General Office of PJJ. The contributions of course work assignment is 5% + 5% = 10%.

Deadlines: 15 October 2008 (previously 30 September 08, which is now postponed).

30 January 2009 for the second assignment

Continuous examination: The continuous examination will be held during the intensive course. The contribution of continuous examination is 20%.

Final exam: The contribution of continuous examination is 70%.

### Study Instruction

For examination purpose, not all chapters in Zemanski will be covered. The following is the list of topics you should study. Those that are not listed would not be examinable.

| Chapter | Topic  |
|---------|--|
| 1       | 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13, 1.14, 1.15, 1.17. |
| 2       | 2.1, 2.2, 2.3, 2.4, 2.5, 2.9, 2.10   |
| 3       | 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.13,                         |
| 4.      | 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.9, 4.10, 4.11, 4.12, 4.13, 4.14, 4.15, 4.16       |
| 5.      | 5.1, 5.2, 5.3, 5.4, 5.5, 5.8, 5.9,   |
| 6.      | 6.1, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14                                  |
| 7.      | 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7  |
| 8.      | 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13, 8.14              |

Assignment 1: (Due date: 15 October 2008 (previously 30 September 08, which is now postponed).

Questions from Chapter 1: 1.1, 1.3, 1.9.

Questions from Chapter 2: 2.1, 2.2.

Questions from Chapter 3: 3.2, 3.3, 3.6.

Assignment 2: (Due date 30 January 2009).

Questions from Chapter 4: 4.1, 4.14, 4.16, 4.25.

Questions from Chapter 5: 5.11(a), 5.28(a), 5.9.

Questions from Chapter 6: 6.5, 6.6.

Questions from Chapter 7: 7.1, 7.2.

By  
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13 September 2008