

Kingdom of Saudi Arabia

**The National Commission for Academic Accreditation &
Assessment**

COURSE SPECIFICATION

HEAT AND THERMODYNAMIC (Phys-241)

Course Specification

For Guidance on the completion of this template, please refer to of Handbook 2 Internal Quality Assurance Arrangements

Institution	King Khaled University
College/Department	College of Science - Physics Department

A Course Identification and General Information

1. Course title and code: HEAT AND THERMODYNAMIC (Phys-241)
2. Credit hours 3.0
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) Physics Department
4. Name of faculty member responsible for the course Dr. Ashraf Mahmoud Ibrahim
5. Level/year at which this course is offered third level (2st year)
6. Pre-requisites for this course (if any) PHYS 101, MATH 101
7. Co-requisites for this course (if any)
8. Location if not on main campus -----

B Objectives

1. Summary of the main learning outcomes for students enrolled in the course.

A brief description of the main learning outcomes for students enrolled in the course. The student recognizes one of the most important natural phenomena in physics. learn and understand the basic principles of the branch of the heat and thermal estimates and the laws of thermodynamics and its applications scientific and technical. Get scientific innovation in this area and capacity development and application innovation.

2. Briefly describe any plans for developing and improving the course that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

- Electronic materials and computer based programs are used to support the lecture course material. This material accompanies the course textbook (see section E below)
- Part of the course material is posted on the Web CT that is accessed by the students enrolled in the course only. Course related material is also posted on the instructor's web site.
- The homework is posted on line and corrected through the Web set.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1 Topics to be Covered		
Topic	No of Weeks	Contact hours
heat transfer and thermal estimates.	2	6
heat capacity - thermal conductivity - thermal radiation.	2	6
thermal phenomena and measuring methods - physical property and thermometers - thermal expansion.	2	6
kinetic theory of gases - Ideal gas and real and their laws.	1	3
equation of state - gas liquefaction and relative humidity and methods of measurement	1	3
work and heat - systems of thermodynamics - Equilibrium - thermal types of actions - the first law of thermodynamics and its applications.	3	9
Quartet thermal cycles - Carnot cycle - Otto cycle - cycle diesel - heat pump - the second law of thermodynamics.	2	6

2 Course components (total contact hours per semester):			
Lecture: 39 hours	Tutorial:	Practical/Fieldwork/Internship:	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average for the semester not a specific requirement in each week)

6 hours per week for reading on the subject, solving homework, preparing for quizzes, and reviewing the material for major exams and the final exam.

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

The student will be able to:

- * Classify thermometers to different kinds.
- * Understand that the temperature scale is construct and convert from one scale to another.
- * Understand the meaning of absolute zero Kelvin temperature.
- * Define thermal expansion coefficient.
- * Describe the ideal gas law and explain the process of diffusion
- * Understand the meaning of the equipartition theory and the expression of internal energy of gases.
- * Distinguish the various unit of heat
- * Define the mechanical equivalent of heat and the specific heat capacity.
- * Explain how the specific heat of materials are measured using the technique of calorimetry.
- * Describe the three methods of heat transfer.
- * Define thermodynamic system, state of a system and explain how thermal processes affect such system.
- * Explain the relationship among internal energy, heat and work as expressed by the first law of thermodynamic.
- * Describe the four fundamental processes using an ideal gas.
- * State the second law of thermodynamics.
- * Explain the concept of entropy
- * Define the efficiency of Carnot 's cycle as a heat engine.

(ii) Teaching strategies to be used to develop that knowledge

Select some suitable references and books and some web side related to the course- variety lectures using power point- concentrate on ways showing such as drawing or figures that related to the course.

(iii) Methods of assessment of knowledge acquired

- Quizzes in recitations
- Homework

One or two major tests and final exam.

b. Cognitive Skills

(i) Cognitive skills to be developed

- Solve problems using proper number of significant figures and proper units in conversion factors.
- Relate our physics concept to life.
- Ability to search in the internet and find the information related to the course.
- Understanding the physical phenomena and used it in our life.

(ii) Teaching strategies to be used to develop these cognitive skills

- Gain attention, state purpose, stimulate interest and provide overview.
- Stimulate recall, present information, focus attention, monitor the effect of thinking aloud, practice difficult tasks and evaluate feedback.
- Provide summary then re-motivate by reminding students to practice to gain proficiency.

(iii) Methods of assessment of students cognitive skills

The conceptual questions used in quizzes, majors and exams are designed to involve the processing or evaluating or retrieving and organizing information and require analytical thinking and deductive or inductive reasoning to arrive at their solution.

c. Interpersonal Skills and Responsibility

(i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Work independently and as part of a team.
- Manage resources, time and other members of the group
- Communicate results of work to others

<p>(ii) Teaching strategies to be used to develop these skills and abilities</p> <ul style="list-style-type: none"> • Encouraging them to discuss their homework results when working in groups and arrive at interpretations that are common to the group or that are different if they disagree with each other and reach different interpretations. • Solving problems in groups during classes. • Use demos to understand the physics concepts.
<p>(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility</p> <ul style="list-style-type: none"> • Evaluating the performance of the students during the classes. • Grading the homework, quizzes and exams.
<p>d. Communication, Information Technology and Numerical Skills</p>
<p>(i) Description of the skills to be developed in this domain.</p> <ul style="list-style-type: none"> • Use numerical skills in solving physics problems. • Use Web CT, Smart-classroom computers, e-mail, internet in communication with students.
<p>(ii) Teaching strategies to be used to develop these skills</p> <ul style="list-style-type: none"> • Encourage students to seek information via the internet
<p>(iii) Methods of assessment of students numerical and communication skills</p> <p>use information and communication technology effectively.</p>

e. Psychomotor Skills (if applicable)
(i) Description of the psychomotor skills to be developed and the level of performance required Not found
(ii) Teaching strategies to be used to develop these skills Not found
(iii) Methods of assessment of students psychomotor skills Not found

5. Schedule of Assessment Tasks for Students During the Semester			
Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	*Class activities *quizzes *Homework	weekly	20%
2	Class exams-1	7	15%
3	Class exams-2	13	15%
4	Final exam	16	50%
Total			100%

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week)

Official six office hours per week + by appointment + Occasionally help session

E Learning Resources

1. Required Text(s)

- 1- J. D. Wilson, A. J. Buffa and B. Luo, "College physics", fifth Ed., Pearson Education (2003)
- 2- Halliday, Resnick and Walker" Fundamentals of Physics", fifth Ed., New York (1997).

2. Essential References

R. A. Serway, "Physics", fourth Ed., San Francisco, (1996).

3- Recommended Books and Reference Material (Journals, Reports, etc) (Attach List)

- 1- A. B. Gupta, "Collage Physics" vol.1, Arunabha Sen, (2005).
- 2- R. L. Weber, K. V. Manning. M. W. White and G. A. Weygand, "Collage Physics" fifth Ed. , McGraw-Hill, (1974)

4-.Electronic Materials, Web Sites etc

- **Websites on the internet that are relevant to the topics of the course such as:**

http://www.hazemsakeek.com/Physics_Lectures/gp1_lectures.htmh

5- Other learning material such as computer-based programs/CD, professional

standards/regulations

- **Multi media associated with the text book and the relevant websites**

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- **Class rooms for lectures not greater than 25 disks.**
- **Rooms listening not greater than 70 disks for groups lectures.**

2. Computing resources

- **Adequate computer facilities are available for students all over the campus.**
- **Each student will need a scientific calculator.**

3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

Not found

G Course Evaluation and Improvement Processes

1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- **Asking students for input after each major exam.**
- **Course evaluation by students at the end of the semester.**

2 Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- **After each major exam, the instructor presents the results and**

<p>analysis of the exams during the following class.</p> <ul style="list-style-type: none"> • Chairman meets with the students.
<p>3 Processes for Improvement of Teaching</p> <ul style="list-style-type: none"> • Attending workshops on teaching and learning methodologies. • Sharing the experiences of other instructors such as the peer reviewer
<p>4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)</p> <ul style="list-style-type: none"> • Providing samples of all kinds of assessments in the departmental course portfolio of the course. • Either conducting standard exams such as that of The American Chemical Society or incorporation of questions from such exams into the tests used in the course.
<p>5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.</p> <ul style="list-style-type: none"> • The course material and learning outcomes are periodically reviewed and the changes to be taken are approved in the departmental council. • The head of the department and faculty take the responsibility of implementing the proposed changes.

Course Lecturer: Dr. Ashraf Mahmoud Ibrahim

Assignment:

Program Coordinate: Dr. Ashraf Mahmoud Ibrahim

Date: