Arab Academy for Science, Technology & Maritime Transport
College of Engineering & Technology
Department of Basic and Applied Science

University/Academy: Arab Academy for Science, Technology & Maritime Transport
Faculty/Institute: College of Engineering & Technology
Program: B.Sc. Mechanical Engineering

Form No. (12)
Course Specification

1- Course Data

Course Code:	Course Title:		Academic Year/Level:
BA 114	**Physics II**		**1st** year / **2nd** semester
Specialization:	No. of Instructional Units	Lecture	Practical
All Programs	**3 Credits**	**2hrs.**	**2hrs.**

2- Course Aim

1- To introduce heat, work, and the laws of thermodynamics.
2- To introduce the applications of these physical concepts to engineering problems.
3- To expand upon and reinforce these concepts in the laboratory.

3- Intended Learning Outcome (ILO's)

a- Knowledge and Understanding	1) Concepts and theories of mathematics and sciences, appropriate to the discipline. Explain the formulation of work energy Formulate the first law of thermodynamics as the law of conservation of energy Explain heat, work, internal energy, enthalpy in connection with the mentioned quasi-static processes Explain heat, work, internal energy, enthalpy in connection with the mentioned quasi-static processes Describe entropy as a property of the system Explain Fourier's law of conduction K2) Basics of information and communication technology (ICT) Introduce the concept of heat energy Define ideal gases. Explain phase transformations. Explain the equipartition theorem of statistical mechanics and apply it to obtain the internal energy of an ideal gas, making use of the degrees of freedom Explain the formulation of work energy Formulate the first law of thermodynamics as the law of conservation of energy Explain heat, work, internal energy, enthalpy in connection with the mentioned quasi-static processes Explain heat, work, internal energy, enthalpy in connection Motivate the necessity of the second law of thermodynamics. with the mentioned quasi-static processes Describe entropy as a property of the system Explain Fourier's law of conduction Explain the phase diagram of water, and the use of the steam tables

b- Intellectual Skills	I2) Select appropriate solutions for engineering problems based on analytical thinking. Compare between ideal and non-ideal gases Apply integration techniques to obtain the work on the PV- diagram Relate real life experiences with the first law of thermodynamics. Apply the quasi-static processes in thermodynamic cycles. Relate everyday's experiences with the second law. Apply the second law of thermodynamics for obtaining the maximum efficiency of a heat engine and coefficient of performance of a refrigerator. Compare between Fourier's law and Ohm's law.
c- Professional Skills	P5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results. Interpret lab data.
d- General Skills	

4- Course Content

Lecture		
Wk	Hrs	Description
1	2	Heat energy and phase transformations.
2	2	Ideal gases and degrees of freedom.
3	2	Equipartition theorem and internal energy.
4	2	Work energy.
5	2	First law of thermodynamics.
6	2	Isochoric, isobaric, isothermal processes.
7	2	7th week exam
8	2	Adiabatic, polytropic processes.
9	2	Thermodynamics cycles.
10	2	Second law of thermodynamics: Entropy.
11	2	Heat engines and refrigerators.
12	2	12th week exam
13	2	Heat transfer by conduction.
14	2	Phase diagram and steam tables.
15	2	Revision.
16	2	Final Exam

5- Teaching and Learning Methods

Lectures
Tutorials
Lab work

6- Teaching and Learning Methods for Students with Special Needs

1. Consulting with lecturer during office hours.
2. Consulting with teaching assistant during office hours.
3. An academic supervisor is appointed for handicapped students. Constant follow ups are done for handicapped students after each assessment to evaluate their academic level of achievement.

7- Student Assessment

a- Procedures used:	Written examinations to assess the intended learning outcomes. Continuous assessment (reports, discussions, projects……) to assess the intellectual skills.
b- Schedule:	Assessment 1: 7th Week Written Exam Assessment 2: 12th Week Written Exam Assessment 3: Continuous Assessments Assessment 4: 16th Week Final Written Exam
c- Weighing of Assessment:	7th Week Examination : 30 % 12th Week Examination: 10 % Final-term Examination: 40 % Oral Examination : 0 % Practical Examination : 10 % Semester Work : 10 % Total : 100%

8- List of References:

a- Course Notes	No notes
b- Required Books (Textbooks)	Physics for Scientists and Engineers with Modern Physics. John W. Jewett, Jr., Raymond A. Serway Applied Thermodynamics for Engineering Technologists Eastop & McConkey
c- Recommended Books	
d- Periodicals, Web Sites, ..., etc.	

Course coordinator: **Program Manager:**