UNIVERSITY OF NICOSIA
ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

MENG-260 Thermodynamics

Course Code	**Course Title**	**ECTS Credits**
MENG-260	Thermodynamics	6
Department	**Semester**	**Pre-requisites**
Engineering	Spring	PHYS-150
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Year of Study**	**Lecturer**
1st Cycle	2nd	Dr Constantinos Hadjistassou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None
Course Days/Times	**Course Venue**	**Student Consultation Hours**
Mon/Wed: 14:30-16:00		M/W: 14:00-14:30 or by appointment with instructor
	E-mail	**Office Room**

Objectives of the Course:

The main objectives of the course are to:

- State the principle of energy (physics) and its relevance to engineering and society;
- Outline what dimensions, units, systems and control volumes constitute;
- Explain system properties, states, equilibrium, temperature, pressure;
- Describe internal and mechanical forms of energy and heat transfer;
- Present the concept of work and mechanical forms of work;
- Detail the First Law of Thermodynamics and energy conversion;
- Help attendees understand T-v, P-v and P-T diagrams, ideal & compressible gases;
- Analyse the energy balance of closed systems, enthalpy & specific heats of solids and gases;
- State the Second Law of Thermodynamics, explain heat engines & Carnot cycle;
- Introduce the concept of entropy, entropy change in solids, liquids and ideal gases;
- Elaborate on compressor work and entropy balance;
- Explain exergy change of systems and exergy destruction;
- Present the Otto, Diesel, and Brayton cycles;
- Summarize refrigeration cycles and heat pumps, vapour compression cycles & cogeneration;

Learning Outcomes:

After completion of the course students are expected to:

- Understand the concept of energy (physics) & thermodynamics;
- Appreciate the significance of dimensions, units, control volumes & systems;
- Learn about system properties, states, equilibrium, temperature, pressure;
- Be able to explain internal and mechanical energy & heat transfer;
- State the relationship between heat and work;
- Be able to explain the First Law of Thermodynamics and energy conversion;

- Utilize T-v, P-v and P-T diagrams, ideal & compressible gases;
- Apply energy balance to closed systems, enthalpy & specific heats of solids & gases;
- Know what is conservation of mass, energy analysis in steady-flow systems & devices;
- Apply the Second Law of Thermodynamics to heat engines and the Carnot cycle;
- Comprehend the concept of entropy & entropy change in solids, liquids and ideal gases;
- Determine compressor work and entropy balance;
- Analyse exergy change of systems and exergy destruction;
- Know the characteristics of the Rankine, Otto, Diesel, and Brayton cycles;
- Obtain the efficiencies of heat pumps, vapour compression cycles & cogeneration.

Course Contents:

- Thermodynamics and energy;
- Dimensions, units, systems, and control volumes;
- Properties, states, equilibrium, temperature, pressure;
- Forms of energy: internal & mechanical, heat transfer;
- Concept of work, mechanical forms of work;
- First Law of Thermodynamics, energy conversion;
- Phase-change diagrams: T-v, P-v and P-T diagrams; ideal gases & compressibility;
- Energy balance of closed systems, enthalpy and specific heats of solids & gases;
- Conservation of mass, energy analysis of steady-flow systems & devices;
- Second Law of Thermodynamics, heat engines, Carnot cycle;
- Entropy, entropy change in solids, liquids and ideal gases;
- Compressor work and entropy balance;
- Exergy change of systems and exergy destruction;
- Rankine cycle, Otto cycle, Diesel cycle, Brayton cycle;
- Refrigeration cycles and heat pumps, vapour compression cycles & cogeneration.

Teaching Methods:

Lectures, problem sheets, exercises, exams

Assessment Methods:

Final Examination (comprehensive)	40%
Mid-Term Examination	25%
Homework	15%
Assignment	15%
Class Participation	5%

Required Textbooks:

Authors	**Title**	**Publisher**	**Year**	**ISBN**
Moran J., Shapiro N. M. and Boettner D. D.	Fundamentals of Engineering Thermodynamics, 8th Ed.	Wiley	2014	9781118412930

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Blundell J. S. and Blundell M. K.	Concepts in Thermal Physics, 2nd ed.	Oxford University Press	2010	9780199562107
Rajput R. K.	Engineering Thermodynamics	Laxmi Publications	2007	9780763782726