UNIVERSITY of NICOSIA

Course Code	Course Title	ECTS Credits
MENG-482	Energy Conversion Systems	6
Department	**Semester**	**Prerequisites**
Engineering	Fall, Spring	MENG-262
Type of Course	**Field**	**Language of Instruction**
Required	Engineering	English
Level of Course	**Year of Study**	**Lecturer(s)**
1st Cycle	4th	Dr Constantinos Hadjistassou
Mode of Delivery	**Work Placement**	**Co-requisites**
Face-to-face	N/A	None

Objectives of the Course:

- Detail gas power cycles as used in engineering applications;
- Explain vapour power cycles and cogeneration cycles;
- Present refrigeration cycles including vapour-compression and gas refrigeration;
- Analyse basic concepts and application of gas power cycles to gas turbines;
- Elaborate on basic concepts and application of vapour power cycles to steam turbines;
- Present basic concepts and application of hydraulic engines.

Learning Outcomes:

- Learn the principles and methods of analysis of the operation of gas cycles;
- Comprehend the functions of vapour power cycles and cogeneration units;
- Know the thermodynamics of refrigeration cycles;
- Learn about the application of gas power cycles to gas turbines;
- Comprehend the application of vapour power cycles to steam turbines;
- Understand applications and characteristics of application of hydraulic machines.

Course Contents:

- Performance of gas power cycles, the Carnot cycle, assumptions & simplifications;
- Reciprocating engines, the Otto cycle and the Diesel cycle;
- The Stirling cycle, Brayton cycle and jet-propulsion systems;
- Vapour power cycles and the Second Law, the Rankine power cycle, reheat and regenerative vapour power cycles;
- Refrigerators and heat pumps, the Reversed Carnot cycle and actual vapour compression refrigeration;
- Shaft power cycles; gas turbine cycles for aircraft propulsion; centrifugal compressors; axial flow compressors; combustion systems; axial and radial flow turbines; prediction of performance of simple gas turbines; and prediction of performance;
- Variable load operation of steam turbines. Basic concepts of gas dynamics as

applied to steam turbines as well as design and construct ion of steam turbines and their details with regard to mechanical strength. Description of turbines of various manufacture;
- Fluid dynamics of liquid turbomachines, particularly pumps;
- Centrifugal pumps, rotary pumps, reciprocating pumps, special service pumps;
- Basic pump design and performance principles.
- Hydraulic accumulators, power transmission, hydraulic cylinders and control valves;
- Flow features, cavitation parameters and inception, bubble dynamics, cavitation effects on pump performance, and unsteady flows and vibration in pumps.

Learning Activities and Teaching Methods:

Lectures, in-class examples and exercises

Assessment Methods:

Homework, exams, final exam.

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Granet I. & Bluestein M.	Thermodynamics & Heat Power, 8th Ed.	CRC Press	2015	978-1-4822-3856-3

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Struchtrup H.	Thermodynamics and Energy Conversion	Springer	2014	978-3-662-43715-5
H.I.H. Saravanamuttoo; G.F.C. Rogers; H. Cohen; Paul Straznicky	Gas Turbine Theory (6th Edition)	Pearson Education Limited	2009	978-0132224376
P. Shlyakhin	Steam Turbines: Theory and Design	University Press of the Pacific	2005	978-1410223487
Christopher E. Brennen	Hydrodynamics of Pumps, 1st Edition	Cambridge University Press	2011	978-1107002371