

FACULTY OF **ENGINEERING**

DEGREE COURSE: **INDUSTRIAL ENGINEERING BS**

SUBJECT: ENERGY SYSTEMS DESIGN

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OBJECTIVES

The course is aimed at:

- 1) providing essential knowledge in order to evaluate and design most of the energy systems (in particular, gas and steam turbines power plants - and their components - hybrid cycles, technologies for distributed generation - fuel cells, ORC, microturbines ...- are discussed in detail). Technologies are usually evaluated considering a techno-economical approach.
- 2) giving knowledge of combined heat and power plants (CHP) and tri-generation systems, focusing on micro-CHP (Pel <50 kWel), mini-CHP (Pel <1MWel) and cogeneration (P> 1MWel) technologies.
- 3) presenting the methodology needed to evaluate the feasibility to install co-trigeneration plants in residential, commercial and industrial sectors.

CONTENTS

Gas turbine power plants
Steam turbine power plants
Combined cycle power plants
Combined heat and power plants
Hybrid cycles
Technologies for distributed generation

LEARNING OUTCOMES

At the end of this course students will:

- have the essential knowledge for evaluating and designing the most important energy systems: gas turbines and steam turbine power plants, combined cycle power plants and m-chp technologies
- be able to carry out a technical and economic analysis of a co-trigeneration power plant in residential, commercial and industrial sectors.

ASSESSMENT

Written exam: multiple choice and open questions

RECOMMENDED TEXTBOOKS

H.I.H. Saravanamuttoo, G.F.C. Rogers, H. Cohen, Paul Straznicky, Gas Turbine Theory, 6th edition, 2008.

R. Kehlhofer, F. Hannemann, F. Stirnimann, B. Rukes, Combined cycle Gas and Steam Turbine Power Plants, PennWell, 2009

M. Pehnt, M. Cames, C. Fischer, B. Praetorius, L. Schneider, K. Schumacher, J.-P. Voß, Micro Cogeneration (Towards Decentralized Energy Systems), 2006.

