

FACULTY OF **ENGINEERING**

DEGREE COURSE: **INDUSTRIAL ENGINEERING**

MASTER DEGREE: **INDUSTRIAL ENGINEERING / ENERGY**

SUBJECT: ENERGY AND ENVIRONMENTAL SCIENCE

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OBJECTIVES

Purpose of the course is to provide the fundamentals of energy sciences, in particular the knowledge of energy sources (fossils and renewable), the technologies for their exploitation and environmental impact evaluation.

CONTENTS

Exergetic analysis.

The international energy scenario.

Fossil fuels. Nuclear energy.

Renewable energy: Solar energy, Hydraulic energy, Wind energy, Geothermic energy, Energy from waste, Biomass and biofuels

Carbon Capture and Storage; Energy storage systems

Cogeneration and combined cycles

Hydrogen, Fuel cells

Energy saving

LEARNING OUTCOMES

- 1) The student has to know the world energy scenario, available resources and exploitation technologies.
- 2) The student has to be able to perform energetic and exergetic analysis.
- 3) The student has to be able to evaluate the environmental impact and the techno-economic analysis of each technology for energy sources exploitation.

ASSESSMENT

Written exam: multiple-choice tests and open-ended questions

RECOMMENDED TEXTBOOKS

John Andrews, Nick Jelley, Energy Science: Principles, Technologies, and Impacts
Paperback – Oxford 2007

Recommended for further in-depth study of the exergy analysis:

Adrian Bejan, George Tsatsaronis, Michael Moran, Thermal Design and Optimization –
Wiley 1995
