

## Course guide

# 820767 - EEMPEI - Energy Economy and Comprehensive Energy Planning Models

Last modified: 16/04/2024

**Unit in charge:** Barcelona School of Industrial Engineering  
**Teaching unit:** 709 - DEE - Department of Electrical Engineering.

**Degree:** MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2013). (Optional subject).  
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).  
MASTER'S DEGREE IN ELECTRIC POWER SYSTEMS AND DRIVES (Syllabus 2021). (Optional subject).  
MASTER'S DEGREE IN ENERGY ENGINEERING (Syllabus 2022). (Optional subject).

**Academic year:** 2024    **ECTS Credits:** 5.0    **Languages:** Catalan, Spanish, English

## LECTURER

**Coordinating lecturer:** Martin Cañadas, Maria Elena

**Others:**

## TEACHING METHODOLOGY

Lectures, guided study sections

## LEARNING OBJECTIVES OF THE SUBJECT

The aim of the course is to bring students to the fundamentals of energy economics, providing them the basic tools needed to understand the current energy problems and their interconnection with other fields.

## STUDY LOAD

Type	Hours	Percentage
Self study	80,0	64.00
Hours large group	45,0	36.00

**Total learning time:** 125 h

## CONTENTS

### 1. INTRODUCTION.

**Description:**

- 1.1. Basic definitions: primary and secondary, renewable and non-renewable, commercial and non-commercial, conventional and non-conventional energy products.
- 1.2. Energy supply chain components.
- 1.3. Flow of energy products.

**Full-or-part-time:** 4h

Theory classes: 4h

## 2. ENERGY BALANCE.

### Description:

2.1. Definition of energy balance, structure and typologies.

2.2. Analysis of the information of the energy balance. Energy supply mix, self-reliance in supply, share of renewable energies, efficiency of electricity generation, power generation mix, refining efficiency, overall energy transformation efficiency, per capita consumption of primary and final energy, energy intensity.

**Full-or-part-time:** 9h

Theory classes: 9h

## 3. ECONOMIC FOUNDATIONS OF ENERGY DEMAND.

### Description:

3.1. Microeconomics basic concepts.

3.2. Analysis of the consumer's demand for energy: Utility maximization problem. Consumer's preferences, utility function, budget line, indifference curves. The method of Lagrange multipliers. Energy demand curve of an individual, energy demand curve of the market.

3.3. Cost minimization problem of the producer. Production function, isoquant curves, total cost of production, isocost lines, conditional factor demand functions, production expansion path

**Full-or-part-time:** 56h

Theory classes: 56h

## 4. ALTERNATIVE APPROACHES TO ENERGY DEMAND ANALYSIS.

### Description:

4.1. Descriptive analysis. Growth rates: year-on-year growth rate and annual average growth rate over a period. Demand elasticities. Energy intensities.

4.2. Index decomposition analysis. Analysis of change in total energy demand. Analysis of change in energy intensities.

**Full-or-part-time:** 81h

Theory classes: 81h

## GRADING SYSTEM

$N = 0,4 \cdot N1 + 0,3 \cdot N2 + 0,3 \cdot N3$

N1: Final Exam

N2: Delivery of exercises

N3: Final Work

## BIBLIOGRAPHY

### Basic:

- Bhattacharyya, S.C. Energy economics : concepts, issues, markets and governance [on line]. London; New York: Springer, 2011 [Consultation: 26/08/2022]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-0-85729-268-1>. ISBN 9780857292674.

- Dorsman, A. Energy economics and financial markets [on line]. Heidelberg: Springer, 2013 [Consultation: 07/09/2022]. Available on: <https://link-springer-com.recursos.biblioteca.upc.edu/book/10.1007/978-3-642-30601-3>. ISBN 9783642306013.