Study Plan

School: School of Sciences and Technology
Degree: Master
Course: Solar Energy Engineering (cód. 442)

1st Year - 1st Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
EME10368M	The Solar Resource	Renewable Energy Engineering	6	Semester	156
EME10369M	Electricity as an Energy Carrier	Electrotechnical Engineering	6	Semester	156
EME10370M	Conversion and Storage Technologies	Renewable Energy Engineering	6	Semester	156
EME10371M	Thermal Solar Energy Technologies	Renewable Energy Engineering	6	Semester	156
EME10372M	Management and Energy Planning. Projects.	Renewable Energy Engineering	6	Semester	156

1st Year - 2nd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
EME10373M	Power Electronics	Electrotechnical Engineering	6	Semester	156
EME10374M	Solar Concentration Technologies	Renewable Energy Engineering	6	Semester	156
EME10375M	Solar Photovoltaic Energy Technologies	Renewable Energy Engineering	6	Semester	156
EME10376M	Special Topics - Other Applications of Solar Energy	Renewable Energy Engineering	6	Semester	156
Dissertation					

2nd Year - 3rd Semester

Component code	Name	Scientific Area Field	ECTS	Duration	Hours
Dissertation					

Conditions for obtaining the Degree:

*** TRANSLATE ME: Para aprovação na componente curricular é necessário a aprovação (através de avaliação ou creditação) das seguintes unidades curriculares: {\}newline

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1º Semestre: {\}newline

5 UC obrigatórias num total de 30 Ects{\}newline

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2º Semestre: {\}newline

4 UC obrigatórias num total de 24 Ects{\}newline

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Para obtenção do grau, é necessário também a aprovação na Dissertação, com um total de 36 ECTS, no 3.º Semestre. ***

Program Contents

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The Solar Resource (EME10368M)

1. The solar constant

2. Earth-Sun Astronomical relations

3. Interaction of solar radiation with the earth's atmosphere and surface

4. Solar radiation at the surface

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Electricity as an Energy Carrier (EME10369M)

1. Introduction
- Evolution of the power systems. Fuels. Electric power plants.
2. Mathematical programming problem
- Utility and basic definitions. Identification of the great. Karush-Kuhn-Tucker theorem. Lagrandeana relaxation. Dynamic programming.
3. Electricity market
- Market for electric energy. Equilibrium market. Environmental and economic dispatch. Solution without considering line losses.
4. Short-term planning for hydric groups
- Problem Formulation. Solution considering fixed fall.
5. Short-term planning for thermal groups
- Characterization of thermal groups. Solution using Lagrangian relaxation. Solution using dynamic programming
6. Short term hydrothermal coordination
- Problem formulation. Cases study using the Karush Kuhn Tucker theorem. Decomposition and coordination.

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Conversion and Storage Technologies (EME10370M)

Introduction

Thermal-chemical conversion: combustion

Thermal conversion - power: solar thermal and biomass

Electrical-mechanical conversion

Conversion chemistry - physical, electrical power y

Other energy storage technologies

Electricity generation centralized and decentralized

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Thermal Solar Energy Technologies (EME10371M)

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Management and Energy Planning. Projects. (EME10372M)

European regulations.

National energy landscape.

Regulatory framework for the national energy sector.

"Energy Resource Assessment "

Introduction to energy audit

Methodologies for environmental impact studies produced by energy projects.

Introduction to project management of energy

Professional ethics and environmental crimes

Economic and financial analysis of projects

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Power Electronics (EME10373M)

1. Introduction to power electronic converters
The importance of inverters in the context of electrical systems; Structure of converters.

2. Naturally commutated converters
The rectifier using diodes and thyristors with ideal adjacent circuits; connection of the converter to the generator using adjacent non-ideal circuits; Converters AC-AC; Modeling and control.

3. Forced commutated converters
Study of forced commutated circuits; DC-DC with ideal adjacent circuits and non-ideal circuits; Modeling and control.

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Solar Concentration Technologies (EME10374M)

1.Introduction

2.Fundamentals of Optics Concentration

3. Types of Concentrators

4. Solar Trackers: technological aspects and implementation

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Solar Photovoltaic Energy Technologies (EME10375M)

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Special Topics - Other Applications of Solar Energy (EME10376M)