TÉCNICO LISBOA

Mestrado em Engenharia e Gestão da Energia

Master in Energy Engineering and Management

Student Handbook

2020/2021

Abbreviations

IST	Instituto Superior Técnico
MEGE	Portuguese Acronym of Master's Degree in Energy Engineering and Management
ECTS	European Credit Transfer and Accumulation System

Contents

Welcome to the Master's Degree (MSc) in Energy Engineering and Management!

"Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did. So throw off the bowlines, sail away from the safe harbor, catch the trade winds in your sails. Explore. Dream. Discover." - ***Mark Twain***

Would you like to change the World in a creative and innovative way?
Do you want to attend a unique Master Program in a prestigious institution?
Welcome to the Master's Degree (MSc) in Energy Engineering and Management!

Energy, a challenge of our days!

Energy is one of today's global challenges! It is the golden thread that connects economic growth, increased social equity and environment. Energy enables businesses to grow, generates jobs, and creates new markets. It enables children to study after dark. It enables clinics to store life-saving vaccines. It enables countries to grow more resilient, with competitive economies.

Access to Energy is far from being universal. For example, currently, 1.2 billion (1 200 000 000) people worldwide lack access to electricity. Additionally, the environmental impact of the currently used energy sources implies an imperative search for new solutions for the Energy of the future. These solutions will enable countries to build economies based on sustainable Energy and will also lead to relevant investment and business opportunities.

A unique and innovative Master Program with the quality of Instituto Superior Técnico

For the challenges in the Energy field highly qualified engineers will be needed. Instituto Superior Técnico is, since its creation in 1911, the largest and most reputed school of Engineering, Science, Technology and Architecture in Portugal. It provides higher education of excellent quality with intensive contact with Research, Development and Innovation.

The Master's Degree (MSc) in Energy Engineering and Management provides through high-level teaching, scientific knowledge in an **interdisciplinary** way and will give you a variety of opportunities to exercise and apply your knowledge, both in theory and in practice.

Furthermore, the MSc in Energy Engineering and Management offers a strong component of studies in **Economy and Innovation**, giving special emphasis to skills related to **creativity**, **entrepreneurship** and **leadership**. These skills are important to catalyze the generation of new ideas and their transformation into innovative policies, processes, services and products. This MSc also includes courses in legal and ecological aspects of the implementation of the Energy technologies.

We believe that the enormous potential of our students may be revealed with an education of high quality. We want to empower you with solid background knowledge that will enable your departure to a professional life in which you can make the difference!

The MSc in Energy Engineering and Management team

To whom is this MSc intended?

The MSc in Energy Engineering and Management is intended for students with a BSc in Engineering or Engineering Sciences in different areas. As a requirement, the knowledge in Mathematics, Physics, Chemistry, Information Systems, and Economy and Management that you obtained in your previous cycle of studies should be, in scope and depth, equivalent to the knowledge acquired in the first cycle of studies (BSc) at Instituto Superior Técnico (see table 1).

Tabela 1. First Cycle ECTS at IST (Engineering).

Mathematics	36 ECTS
Physics	18 ECTS
Chemistry	6 ECTS
Information Systems	6 ECTS
Economy and Management	6 ECTS

The scientific committee of the MSc, after analyzing your academic curriculum, will decide on the equivalency to your first cycle of studies. If your education does not fulfill the required equivalence, do not worry! Your study plan may include additional propaedeutic curricular units up to a maximum of 18 ECTS to fill the gap, so that you can follow the MSc adequately.

What type of degree will I obtain with this MSc?

Master's Degree (MSc) in Energy Engineering and Management - Level 7 (International Standard Classification of Education -2011).

What is the duration of this MSc?

The MSc in Energy Engineering and Management has the duration of 4 semesters, full time.

In which language will the classes be taught?

All classes of this MSc are taught in **English**.

How is the study plan of this MSc?

Each student of the MSc in Energy Engineering and Management has the opportunity to build its personalized study plan. This means that you can choose curricular units according to your preferences and previous education. The choice of your study plan will be closely followed by a professor. A final validation of your study plan is done by the MEGE coordinator.

Start by choosing a specialization among the five available ones (Figure 1).

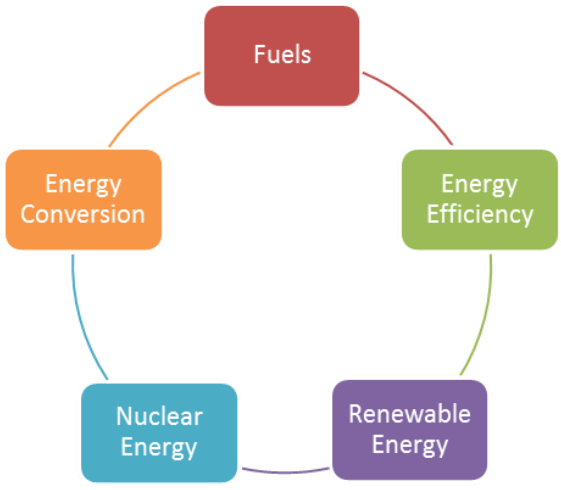
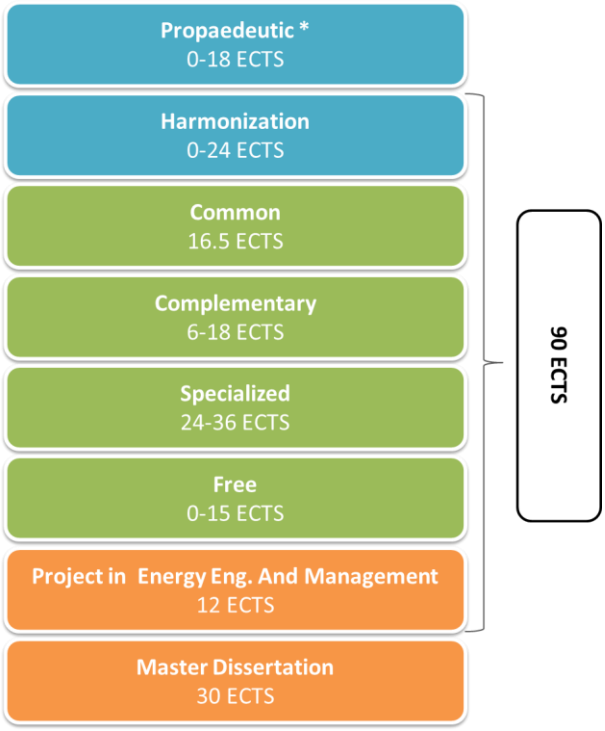


Fig. 1. Specializations available in the MSc in Energy Engineering and Management.

To finish the MSc in Energy Engineering and Management you have to complete a total of 120 ECTS. The curricular education corresponds to 90 ECTS and the master's dissertation to 30 ECTS. The 90 ECTS of the curricular part correspond to different types of courses (Figure 2).



** Only for students lacking the minimum requirements for admission. Maximum: 18 ECTS. These ECTS are not accounted for in the required credits for graduation.*

Fig. 2. General study plan for MSc in Energy Engineering and Management.

The **propaedeutic courses** are only intended for students who were not awarded with an equivalency to the required level for admission. (Please see also the section "How is the study plan of this MSc?")

The **harmonization courses** are introductory courses. Their purpose is to harmonize the knowledge you acquired in your previous cycles of study with the knowledge that you will need for the chosen specialization (Fuels, Energy Conversion, Energy Efficiency, Nuclear Energy and Renewable Energy). In this way, we guaranty that, independently from your previous studies, you will obtain the fundamental knowledge to your specialization.
The **common courses** are already dedicated to the areas of Energy and Management, and are a compulsory part of the study plan of all the students enrolled in the MSc in Energy Engineering and Management.

The **specialized courses** enable you to focus on the Energy area according to your preferences, and will define your specialization domain (Fuels, Energy Conversion, Energy Efficiency, Nuclear Energy and Renewable Energy).

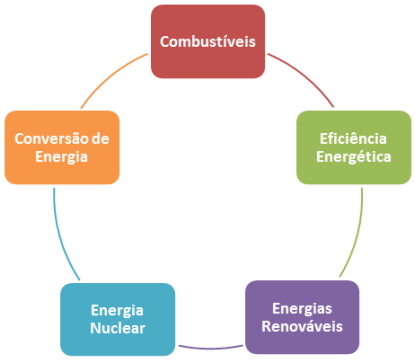
To allow you choosing freely the curricular units, which complement your study plan, the MSc in Energy Engineering and Management offers two additional types of courses. The **complementary courses** in the area of Energy, and the **free courses** in different areas, as for example, in Economy, in Innovation and Risk.

In the curricular units of **project** in Energy Engineering and Management you will have to develop a project in the area of Energy.

The **master's dissertation** occupies the 4th semester. During this period you will be dedicated to a topic, which may be part of a research or innovation project. Depending on your chosen topic you may develop your work in a company and/or in a research institution.

Which Curricular Units may I choose?

In the following tables you can see the available curricular units in the MSc in Energy Engineering and Management. In the top of the tables the number of required ECTS for each type of courses is given.
For each curricular unit the following information is given:
1) obtained ECTS after completing the curricular unit;
2) level of the curricular unit (**L=BSc; M=MSc; D=PhD**);
3) semester in which the curricular unit is taught(**1= 1st semester; 2=2nd semester**);
4) mandatory or optional nature of the curricular unit.



For all Specializations:

Common (16.5 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Economics and Energy Markets	6,0	M	1	X	-
Energy Management	4,5	M	1	X	-
Decision Support Models	6,0	M	2	X	-

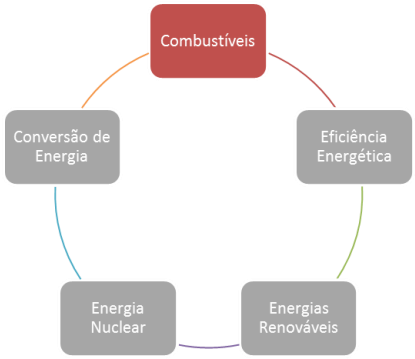
Dissertations (42 ECTS)

Dissertations	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Project in Energy Eng. and Management I	6,0	M	1/2	X	-
Project in Energy Eng. and Management II	6,0	M	1/2	X	-
Master thesis	30	M	1/2	X	-

Free (0-15 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Free optional	-	-	1/2	-	X
Technology Based Entrepreneurship	7,5	M	1/2	-	X
Corporate Control and Corporate Governance	6,0	M	1	-	X
Engineering Economics	6,0	M	1	-	X
Environmental and Sust. Challenges in Engineering	1,5	M	1	-	X
Environmental Impacts	6,0	M	1	-	X
Industrial Organization	6,0	M	1	-	X
Public Policies for Energy	6,0	M	1	-	X
Seminars on Innovation and Sustaina. Development	6,0	M	1	-	X
Ambient Intelligence	7,5	M	2	-	X
Analysis and Synthesis of Algorithms	6	L	2	-	X
Commercial & Strategic Management	6,0	M	2	-	X
Economics	6,0	L	2	-	X
Embedded Computational Systems	6,0	M	2	-	X
Fundamentals of Operations Research	6,0	L	2	-	X
Industrial Safety and Health	6,0	M	2	-	X
Marketing Management	6,0	M	2	-	X
Natural & Technological Risks	4,5	M	2	-	X
Project Risk Evaluation and Management	6,0	M	2	-	X
Topics on Batteries	6,0	M	2	-	X

For a specialization in Fuels:



Harmonization – Fuels (0-24 ECTS depending on your BSc; check with MEGE coordinator)

Curricular Units	ECTS	Level	Sem.	Type	
				Obrigatório	Optional
Chemical and Biological Process Engineering	4,5	M	1/2	-	X
Chemical Thermodynamics	6,0	L	1/2	-	X
Instrumentation and Measurement	7,5	L	1/2	-	X
Transport Phenomena I	6,0	L	1	-	X
Catalysis and Catalytic Processes	6,0	M	1	-	X
Electric and Electromechanical Systems	6,0	L	1	-	X
Electronic Fundamentals	6,0	L	1	-	X
Fluid Mechanics I	6,0	L	1	-	X
Chemical Reaction Engineering I	4,5	L	2	-	X
Energy and Mass Transfer	6,0	L	2	-	X
Geological Resources	6,0	L	2	-	X
Hydraulics I	6,0	L	2	-	X
Multiphase Systems Operations	4,5	L	2	-	X
Organic Chemistry	6,0	L	2	-	X
Thermodynamics and Transport Phenomena*	6,0	M	2	-	X

* Taught on Campus Taguspark (Oeiras)

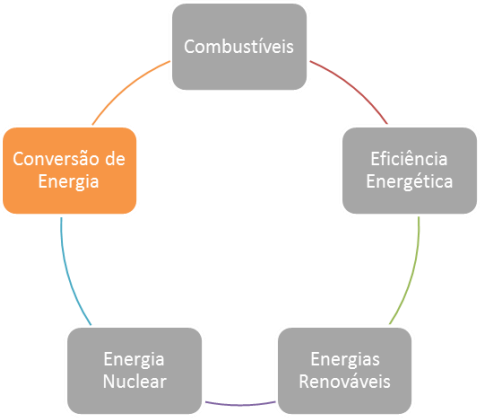
Specialized - Fuels (24-36 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Biofuels	6,0	M	1	-	X
Oil and Gas	6,0	M	1	-	X
Waste to Energy	6,0	M	1	-	X
Alternative Fuels	6,0	M	2	-	X
Chemical Engineering Laboratory III	3,0	M	2	-	X
Combustion	6,0	M	2	-	X
Petroleum Refining	6,0	M	2	-	X
Process Synthesis and Integration	6,0	M	2	-	X
Stochastic Modelling of Oil Reservoirs	6,0	M	2	-	X

Complementary - Fuels (6-18 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Obrigatória	Opcional
Production and Demand of Electric Energy	6,0	M	1	-	X
Project Appraisal*	6,0	M	1		X
Sustainable Development, Energy and Environment	6,0	D	1	-	X
Air Pollution and Treatment of Gaseous Effluents	4,5	M	2	-	X
Energy Services	6,0	M	2		X
Energy Systems Optimization	6,0	D	2	-	X
Engineering Management Projects	6,0	M	2		X
Industrial Processes Automation	6,0	M	2	-	X
Logistic Management and Operations	6,0	M	2		X

* Taught on Campus Taguspark (Oeiras)



For a specialization in Energy Conversion:

Harmonization – Energy Conversion (0-24 ECTS depending on your BSc; check with MEGE coordinator)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Instrumentation and Measurement	7,5	L	1/2	-	X
Transport Phenomena I	6,0	L	1	-	X
Electric and Electromechanical Systems	6,0	L	1	-	X
Electronic Fundamentals	6,0	L	1	-	X
Fluid Mechanics I	6,0	L	1	-	X
Hydraulics II	6,0	L	1	-	X
Combustion	6,0	M	2	-	X
Electrical and Servicing Systems	7,5	M	2	-	X
Energy and Mass Transfer	6,0	L	2	-	X
Fluid Mechanics II	6,0	L	2	-	X
Hydraulics I	6,0	L	2	-	X
Thermodynamics and Transport Phenomena*	6,0	L	2	-	X

* Taught on Campus Taguspark (Oeiras)

Specialized – Energy Conversion (24-36 ECTS)

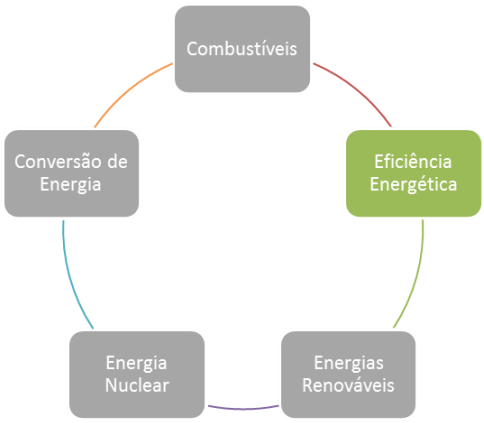
Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Electrical Machines	6,0	M	1	X	-
Production and Demand of Electrical Energy	6,0	M	1	X	-
Hydropower	6,0	M	1	-	X
Internal Combustion Engines	6,0	M	1	-	X
Nuclear Reactors	6,0	M	1	-	X
Electrochemistry and Energy	6,0	M	2	-	X
Renewable Sources and Distributed Power Generation	6,0	M	2	-	X
Thermal Equipments	6,0	M	2	-	X
Turbomachinery	6,0	M	2	-	X

Complementary -Energy Conversion (6-18 ECTS)

Curricular Units	ECTS	Level	Sem.	Tyoe	
				Mandatory	Optional
Air-conditioning in Buildings	6,0	M	1	-	X
Computational Fluid Mechanics	6,0	M	1	-	X
Energy in Transports	4,5	M	1	-	X
Industrial Refrigeration	4,5	M	1	-	X
Project Appraisal*	6,0	M	1		X
Sustainable Development, Energy and Environment	6,0	D	1	-	X
Waste to Energy	6,0	M	1	-	X
Air Pollution and Treatment of Gaseous Effluents	4,5	M	2	-	X
Energy Services	6,0	M	2		X
Energy Systems Optimization	6,0	D	2	-	X
Engineering Management Projects	6,0	M	2		X
Industrial Processes Automation	6,0	M	2	-	X
Logistic Management and Operations	6,0	M	2		X
Nuclear Energy	6,0	D	2	-	X
Propulsion	6,0	M	2	-	X

* Taught on Campus Taguspark (Oeiras)

For a specialization in <u>Energy Efficiency</u>:



Harmonization – Energy Efficiency (0-24 ECTS depending on your BSc; check with MEGE co-ordinator)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Chemical and Biological Process Engineering	4,5	L	1/2	-	X
Instrumentation and Measurement	7,5	L	1/2	-	X
Transport Phenomena I	6,0	L	1	-	X
Electric and Electromechanical Systems	6,0	L	1	-	X
Electronic Fundamentals	6,0	L	1	-	X
Environmental Design I	6,0	L	1	-	X
Fluid Mechanics I	6,0	L	1	-	X
Electrical and Servicing Systems	7,5	M	2	-	X
Energy and Mass Transfer	6,0	L	2	-	X
Hydraulics I	6,0	L	2	-	X
Thermodynamics and Transport Phenomena*	6,0	L	2	-	X
Transports, Land-Use, Energy and Environment	6,0	M	2	-	X

* Taught on Campus Taguspark (Oeiras)

Specialized – Energy Efficiency (24-36 ECTS)

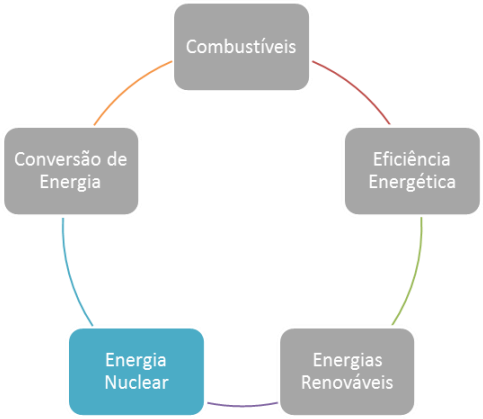
Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Air-conditioning in Buildings	6,0	M	1	-	X
Built Environments and Impacts	4,5	M	1	-	X
Energy in Transports	4,5	M	1	-	X
Indoor Comfort in Buildings	4,5	M	1	-	X
Process Synthesis and Integration	6,0	M	2	-	X
Pump and Hydro Power Systems	6	M	2	-	X
Water Resources Modelling and Planning	6,0	M	2	-	X

Complementary – Energy Efficiency (6-18 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Computational Fluid Mechanics	6,0	M	1	-	X
Production and Demand of Electric Energy	6,0	M	1	-	X
Project Appraisal*	6,0	M	1		X
Regions and Networks	6,0	M	1	-	X
Renewable Energies	4,5	M	1	-	X
Road Traffic Engineering	4,5	M	1	-	X
Sustainable Development, Energy and Environment	6,0	D	1	-	X
Energy Services	6,0	M	2	-	X
Energy Systems Optimization	6,0	D	2	-	X
Engineering Management Projects	6,0	M	2		X
Industrial Processes Automation	6,0	M	2	-	X
Logistic Management and Operations	6,0	M	2		X
Urban Mobility Management	4,5	M	2	-	X

* Taught on Campus Taguspark (Oeiras)

For a specialization in Nuclear Energy:



Harmonization – Nuclear Energy (0-24 ECTS depending on your BSc; check with MEGE coordinator)

Curricular units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Fluid Mechanics I / Hydraulics I	6,0	L	1/2	-	X
Instrumentation and Measurement	7,5	L	1/2	-	X
Transport Phenomena I	6.0	L	1		X
Electric and Electromechanical Systems	6,0	L	1	-	X
Electronic Fundamentals	6,0	L	1	-	X
Hydraulics II	6,0	L	1	-	X
Energy and Mass Transfer	6,0	L	2	-	X
Fluid Mechanics II	6,0	L	2	-	X
Nuclear Physics	6,0	M	2	-	X
Quantum Structure of Matter	6,0	L	2	-	X
Thermodynamics and Transport Phenomena*	6,0	L	2	-	X

* Taught on Campus Taguspark (Oeiras)

Specialized – Nuclear Energy (24-36 ECTS)

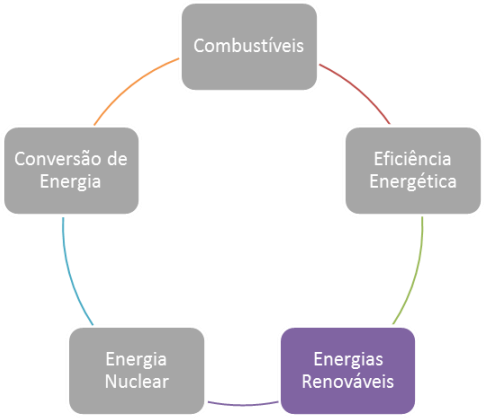
Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Nuclear Reactors	6,0	M	1	X	-
Radiological Safety and Protection	6,0	M	1	X	-
Nuclear Fission and Fusion Technologies	6,0	M	2	X	-
Radiation Physics and Technology	6,0	M	2	X	-
Material Science and Nuclear Technologies	6,0	M	1	-	X
Nuclear Instrumentation Techniques	6,0	M	2	-	X

Complementary – Nuclear Energy (6-18 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Opcional
* Project Appraisal*	6,0	M	1		X
Structural Dynamics and Earthquake Engineering	4,5	M	1	-	X
Sustainable Development, Energy and Environment	6,0	D	1	-	X
Energy Systems Optimization	6,0	D	2	-	X
Engineering Management Projects	6,0	M	2		X
Industrial Processes Automation	6,0	M	2	-	X
Logistic Management and Operations	6,0	M	2		X

* Taught on Campus Taguspark (Oeiras)

For a specialization in <u>Renewable Energy</u>:



Harmonization – Renewable Energy (0-24 ECTS depending on your BSc; check with MEGE co-ordinator)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Instrumentation and Measurement	7,5	L	1/2	-	X
Transport Phenomena I	6.0	L	1	-	X
Electric and Electromechanical Systems	6,0	L	1	-	X
Electronic Fundamentals	6,0	L	1	-	X
Fluid Mechanics I	6,0	L	1	-	X
Combustion	6,0	M	2	-	X
Electrical and Servicing Systems	7,5	M	2	-	X
Energy and Mass Transfer	6,0	L	2	-	X
Hydraulics I	6,0	L	2	-	X
Thermodynamics and Transport Phenomena*	6,0	L	2	-	X

* Taught on Campus Taguspark (Oeiras)

Specialized – Renewable Energy (24-36 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Renewable Energies	4,5	M	1	X(1)	-
Renewable Sources and Distributed Power Generation	6,0	M	2	X(1)	-
Offshore Wind Energy	6,0	M	1/2	-	X
Biofuels	6,0	M	1	-	X
Electrical Machines	6,0	M	1	-	X
Energy Storage	6,0	M	1	-	X
Hydropower	6,0	M	1	-	X
Photovoltaic Solar Energy	6,0	M	1	-	X
Power System Network Analysis	6,0	M	1	-	X
Solar Thermal Energy	6,0	M	1	-	X
Electrochemistry and Energy	6,0	M	2	-	X
Hydromineral and Geothermal Resources	6,0	M	2	-	X
Marine Current & Tidal Energy	6,0	M	2	-	X
Pump and Hydro Power Systems	6,0	M	2	-	X
Turbomachinery	6,0	M	2	-	X
Wave Energy	6,0	M	2	-	X

(1) The student must choose one of these curricular units.

Complementary – Renewable Energy (6-18 ECTS)

Curricular Units	ECTS	Level	Sem.	Type	
				Mandatory	Optional
Production and Demand of Electric Energy	6,0	M	1	-	X
Project Appraisal*	6,0	M	1		X
Sustainable Development, Energy and Environment	6,0	D	1	-	X
Waste to Energy	6,0	M	1	-	X
Air Pollution and Treatment of Gaseous Effluents	4,5	M	2	-	X
Energy Services	6,0	M	2	-	X
Energy Systems Optimization	6,0	D	2	-	X
Engineering Management Projects	6,0	M	2		X
Industrial Processes Automation	6,0	M	2	-	X
Logistic Management and Operations	6,0	M	2		X
Power Electronics for Renewable Energy	6,0	M	2	-	X
Renewable Energy Resources	6,0	D	2	-	X

* Taught on Campus Taguspark (Oeiras)

How should I select my specialization?

All the specializations of the MSc in Energy Engineering and Management enable a strong capacity for solving scientific and technological problems and the access to a wide array of job opportunities. You should choose your specialization according to the skills you want to acquire/develop and to the sectors in which you want to be active in the future! In the case of doubt you can always contact the professor responsible for your academic program.

Specialization in Fuels:

Knowledge areas: conventional fuels, biofuels and other alternative fuels, involving thermodynamics, transfer phenomena, catalysis and kinetics of reactions in production pro-

cesses of fuels, waste to energy and geo-resources, with the aim of optimizing the energy resources and the industrial processes, including their economic analysis and cost/benefit evaluation.

Learning outcomes: 1) ability to identify and quantify the physical and chemical phenomena associated with the production and the use of fuels; 2) ability to select for each specific case the adequate technological solution through solid knowledge in the technologies and industrial processes available in the market and perspectives of their future development; 3) ability to perform economic analysis and cost/benefit and risk evaluation.

Economy sectors/ job opportunities: 1) all companies and institutions involved in the production and management of fuels (in particular, large corporations related to the production of conventional and alternative fuels; 2) R&D centers at industrial and academic level; 3) management of urban and industrial waste, in particular production of energy from waste covering a diversified area from the use of biomass to urban and industrial waste; 4) industrial production of fuels from different sources and their use.

Specialization in Energy Conversion:

Knowledge areas: Energy conversion processes in its different forms (mechanical, electrical, chemical, nuclear, electrochemical) for the efficient integration, installation, operation and maintenance of equipment in industry, buildings and transportation, including their economic analysis and cost/benefit evaluations.

Learning outcomes: 1) ability to identify and quantify the physical and chemical phenomena involved in energy conversion (general); ability to select for each specific case the technological solution considered more appropriate in terms of energy production and storage (with focus on the more relevant processes: electromechanical and thermomechanical); 3) ability to design energy conversion systems for industrial applications; 4) ability to analyze and evaluate the impact of energy conversion systems in the following aspects: economy, energetic sustainability and valuation of energetic resources.

Economy sectors/ job opportunities: industrial, urban and transportation sectors: 1) installations for high power electric energy; 2) installations for support emergency and cogeneration, wind farms, hydroelectric power pump and plants, thermal power plants, industrial refrigeration, air conditioning systems in buildings; 3) railway systems, maritime transport, electrical vehicles.

Specialization in Energy Efficiency:

Knowledge areas: Efficiency of complex energy systems involving their conception, design and exploitation in the industrial, urban and transportation systems in an integrated way, including their economic analysis, with the aim of optimizing the use of the natural resources and using the final energy in an efficient way.

Learning outcomes: 1) ability to develop simulation models of energy systems; 2) ability to incorporate intelligent energy management systems based on information, control and automation systems; 3) ability to implement management and operation strategies of systems that promote the reduction of energy intensity use, supporting the use of more efficient equipment; 4) ability to perform the energetic evaluation of buildings, transport and industrial systems.

Economy sectors/ job opportunities: companies using or producing energy in the industrial, urban and transport sector.

Specialization in Nuclear Energy:

Knowledge areas: Physical processes and technologies associated to Nuclear Energy Engineering and Management; diagnostic techniques for materials, radiation detection and protection; economic analysis and cost/benefit evaluation.

Learning outcomes: 1) ability to follow the state of the art of the Nuclear Energy socio-economics, namely its public acceptance and its economic and environmental performance; 2) ability to actively participate in the development of technologies for fuel and nuclear residues treatment, and anti-seismic construction resistant to different types of loads; 3) knowledge of the architecture and design principles of third generation nuclear power plants; 4) ability to analyze and develop certification processes, methods for evaluation risk and reliability, and passive and active safety strategies; 5) ability to follow-up the state of the art of fourth generation nuclear power plants; 6) ability to offer technical support to the government in the area of certification and legislation of Nuclear Energy.

Economy sectors/ job opportunities: The issues of the use of Nuclear Energy cross borders, demanding professionals that are able to be involved in all the phases from the law creation and the regulation of this sector to its technological development. The ability to evaluate the risk and prevent accidents in the area of Nuclear Energy is of outmost importance for any community. In the last decades this capacity has received little attention, giving a high priority to the studies in this area.

Specialization in Renewable Energy:

Knowledge areas: Sources of renewable energy, namely solar, wind, hydro, geothermal, ocean, biomass and biofuels, including their energy resource, the available technologies to their use and the economic analysis and cost/benefit evaluation.

Learning outcomes: 1) ability to identify and quantify the physical and chemical processes associated to energy conversion in general; 2) ability to develop simulation/identification models of the available potential of renewable energies; 3) ability to evaluate the specific technological solutions, having in consideration the economic and environmental aspects; 4) ability to evaluate systems of electric, thermal and mechanical energy, both for generation and storage or distribution of energy from renewable sources; 5) ability to conceive and design systems to feed isolated grids or to be connected to the transportation or energy distribution grid; 6) ability to analyze and evaluate the integration and technical and economic viability of energy production systems from renewable sources.

Economy sectors/ job opportunities: 1) wind farms, hydroelectric power plants, biomass power plants, co-generation power plants, photovoltaic or thermoelectric power plants and power plants for emergency and support, systems for heat generation, etc.

Academic Calendar

1st Semester

Welcome week:
28 Sept.- 2 Oct. 2020

Classes:
21 Sept.- 18 Dec. 2020

Winter break:

19 Dec. 2020 – 10 Jan. 2021

Examination period:
11 - 27 Jan. 2021 (normal)
2 - 10 Feb. 2021 (appeal)

Deadline for publication of results:
26 Feb. 2021

2nd Semester

Classes:
1 Mar. - 4 June 2021

Easter break:

29 Mar – 2 Apr. 2021

Exam preparation period (free):
7 Jun 2021 - 13 Jun. 2021

Examination period:

14 - 30 Jun. 2021 (normal);

6 - 14 Jul. 2021 (appeal)

Deadline for publication of results:
19 Jul. 2021

Special Examination Period

Examination period: 21 – 27 Jul. 2021

Deadline for publication of results:
31 Jul. 2021

Contacts

Instituto Superior Técnico

Alameda Campus
Av. Rovisco Pais, 1
1049-001 Lisboa, Portugal
Tel: (+351) 218 417 000
Fax: (+351) 218 499 242
http://tecnico.ulisboa.pt/

MEGE

https://fenix.tecnico.ulisboa.pt/cursos/mege

Academic issues:
Prof. Edgar Fernandes
edgar.fernandes@tecnico.ulisboa.pt

Marta Abrantes
marta.abrantes@tecnico.ulisboa.pt