

Sheet course ()

Course	MSc IN MECHANICAL ENGINEERING		
Unit	Electromechanical Systems	Mandatory	<input checked="" type="checkbox"/>
		Optional	<input type="checkbox"/>
Unit scientific area	Control Systems	Category	B

Unit category: B - Basic; C - Core Engineering; E - Specialization; P - Complementary.

Year: 2nd	Semester: 1st	ECTS: 6,0				
Contact time	Total:	T:	TP: 67,5	PL:	S:	OT:

T - Lectures; TP - Theory and practice; PL - Lab Work; S - Seminar; OT - Tutorial Guidance.

Unit Director	Title	Position
Nuno Paulo Ferreira Henriques	Master of Science	Associate Professor

Learning Objectives (knowledge, skills and competences to be developed by students)

(max. 1000 characters)

The aim of this course is to provide students with a solid set of basic knowledge in the electrical and electromechanical systems, enabling them to understand the use of electrical power in buildings and industry, aiming the design and dimensioning of an electrical installation, drive control systems and management and automation of electrical systems.

Being the course directed to mechanical engineers, it is intended that students know the advantages, limitations and implications of using electrical power, as well as its risks and the electrical installations safety rules. It is also intended that students become familiar with the language and methods of electrical engineering, easing their future interaction with electrical engineers.

Syllabus

(max. 1000 characters)

- General Concepts on Production, Transport, Distribution and Utilization of Electrical Power
- Contractual Conditions for Power Supplying
- Safety Regulations for Electrical Installations
- Conception of Electrical Installations
- Techniques for Dimensioning Electrical Installations

- Techniques for Rational Use of Electrical Power
- Complements on Power Electronics
- Starting and Braking Electrical Machines
- Open and Closed Loop Control of Electrical Machines
- Maintenance of electrical and electromechanical systems

Demonstration of consistency of the syllabus with the objectives of the course

(max. 1000 characters)

Each basic skill that should be acquired by students is directly linked with each course main theme. Skills could be acquired by lectures, practical classes assistance, lab sessions and by the execution of a set of pedagogically fundamental activities for continuous evaluation, each one related with one course main theme.

Teaching methodology (evaluation included)

(max. 1000 characters)

The course teaching is based on lectures, guided visits and laboratory sessions, done in small groups. Students are motivated to take an active approach on search of basic information and on solving practical problems. It is also required the planning, preparation and execution of continuous evaluation works and laboratory sessions.

In order to successfully complete this course, students must succeed:

☐ two evaluation testes or a final examination (35%) allowing to evaluate if the necessary knowledge about course themes was acquired;

☐ a set of pedagogically fundamental activities for continuous evaluation (65%), in small groups, consisting on developing several small electrical projects.

The continuous evaluation activities and final examination are compulsory and their classifications are minimum values of 10. Individual oral examination can be requested if necessary.

Demonstration of consistency of teaching methods with the learning objectives of the course

(max. 3000 characters)

Lectures are oriented to discussion and exposure of the syllabus and practical classes are used for the analysis and resolution of practical problems, allowing students to acquire the expertise needed to understand electrical and electromechanical systems, mainly the design and dimensioning of an electrical installation, drive control systems and management and automation of electrical systems.

Laboratory sessions allowing the observation of electrical and electromechanical systems and equipment operation, including the simulation of faults and malfunctions.

Guided visits to services buildings and industrial plants allow to observe and listening to explanations about the existing electrical and electromechanical equipment and systems. The aim of each visit is to show to the students solutions used in the technical facilities of buildings and industrial plants.

The continuous evaluation depends on the group mark of continuous evaluation activities and individual performance along the classes, lab demonstrations and guided visits, taking into account the communications skills – oral while answering questions during the activities or written on the reports.

Main Bibliography

(max. 1000 characters)

- ☐ Josué L. Morais & José M. G. Pereira, Guia Técnico das Instalações Eléctricas
CERTIEL, 2007
- ☐ Nuno Henriques, Técnicas de Projecto de Instalações Eléctricas de Distribuição e Utilização
Edição do autor, 1989
- ☐ Gunter G. Seip, Electrical Installations Handbook, Part I, II and III
Siemens Aktiengesellschaft
John Wiley & Sons, 1987
- ☐ F. Labrique & João Santana , Electrónica de Potência
Fundação Calouste Gulbenkian, 1991
- ☐ L.M. Vilela Pinto, MG Calc
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INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA



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