

Curricular Unit Form (FUC)

Course:	SECOND CYCLE IN MAINTENANCE ENGINEERING					
Curricular Unit (UC)	Electrical Power Applications				Mandatory	
					Optional	X
Scientific Area:	Control Systems					
Year: 1º	Semester: 2º	ECTS: 5,0		Total Hours: 3,0		
Contact Hours:	T:	TP: 45,0	PL:	S:	OT:	TT: 45,0
Professor in charge		Academic Degree /Title		Position		
Nuno Paulo Ferreira Henriques		Mestre		Professor Coordenador		

T- Theoretical ; TP – Theory and practice ; PL – Laboratory ; S – Seminar ; OT –Tutorial ; TT – Total of contact hours

Entry into Force	Semester: Winter	Academic Year: 2011/2012
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Objectives of the curricular unit and competences (max. 1000 characters)

The aim of this course is to provide students with a solid knowledge about techniques allowing a critical systemic analysis of building and industrial plants power systems use, in order to understand the design and dimensioning of their technical installations and optimize the use and maintenance.

After completing this course students should have acquired basic skills enabling them:

- to basically know the systems for support, protection, measurement and control of processes involving the use of electrical power;
- to check the function, characteristics and use of electrical, electronic and electropneumatic equipment and how to control their power supply and safely and efficiently operate them;
- to understand and design schemes for description and project of power supply and using systems;
- to adopt methods and techniques for efficient power use.

Syllabus (max. 1000 characters)

Electrical Installations: Concepts on the production and transmission of electricity. Organization and design of electrical installations. Standardization and Regulation concerning electrical installations.

Communications Facilities: Infrastructures for telecommunications in buildings. Information technologies. Computer networks.

Security and Safety Installations: Fire detection systems. Fire extinguishing systems. Intrusion and access control. Closed circuit television (CCTV).

Building Automation: Remote management and centralized management systems. Management of electrical power.

Partaining Electrical Installations: Controls and regulation of electrical machines. Electrical installations associated with A.V.A.C. and cooling. Electrical installations associated with electropneumatic systems.

Electrical Power Rational Use: Tariff for selling electricity. Assessment of losses in electrical installations. Electric power rational use. in the industrial lighting and motive power. Reactive power and power factor compensation. Power quality.

Demonstration of the syllabus coherence with curricular unit's objectives (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 and practical classes assistance, lab work and by the execution of a set of pedagogically fundamental activities for continuous evaluation, each one related with one course main theme.

Teaching methodologies (including evaluation) (max. 1000 characters)

The course teaching is based on lectures, practical classes and lab work. Students are motivated to take an active approach on search of basic information, on solving practical problems and to prepare the laboratory work. It is also required a proper attitude in the laboratory, in compliance with the safety rules, equipment handling rules and test procedures.

In order to successfully complete the course, students must succeed a set of pedagogically fundamental activities for continuous evaluation, in small groups, consisting on two small projects (75%) and a public presentation related with a course theme (25%).

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

Demonstration of the teaching methodologies coherence with the curricular unit's objectives

(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 about techniques, technologies and equipments used in electronic and electric installations that exist in buildings and industrial plants.

The laboratory work, carried out in small groups, allow the observation of electrical and electromechanical systems and equipment operation, including the simulation of faults and malfunctions.

Guided visits to important buildings allow to show to the students solutions used in buildings technical installations and industrial plants.

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

Main Bibliography (max. 1000 characters)

- Josué L. Morais & José M. G. Pereira, Guia Técnico das Instalações Eléctricas CERTIEL, 2007, ISBN: 9789729518058
- 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 John Wiley & Sons, 1987, ISBN: 0-471-91343-X
- L.M. Vilela Pinto, MG Calc Edição Merlin Gerin, Grupo Schneider, 1993, ISBN: 972-95831-1-0
- ABB, ABB Industrial Manual ABB Edition, 1998, ISBN: 91-970956-6-4
- GRUNDFOS, Segurança contra Incêndios GRUNDFOS Edition, 2006, ISBN: 972-99554-1-7