ISEL
INSTITUTO SUPERIOR DE ENGENHARIA DE LISBOA

ISEL ADEM
Área Departamental de Engenharia Mecânica

Sheet course ()

Course	MSc IN MECHANICAL ENGINEERING		
Unit	Technical Installations Maintenance	Mandatory	☐
		Optional	☒
Unit scientific area	Control Systems	Category	B

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

Year: 1st	Semester: 2nd		ECTS: 5,0			
Contact time	Total:	T:	TP: 45,0	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	Charter Engineer	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 the basic notions about the management and maintenance of technical installations in buildings and industrial plants. The knowledge to be transferred concerns techniques, technologies and equipment, as well as strategies and working procedures, to allow a critical systemic analysis of building and industrial plants technical installations and to plan and prepare their operation and maintenance. It is to be taken into account operation costs, reliability and components life, environmental risks, component recycling, power consumption and technical performance. Each theme will be illustrated with application examples in engineering field.

Students should acquire basic skills to enable them to know the basic operation of technical installations and adapt to the demands of managing a maintenance department.

Syllabus

(max. 1000 characters)

Periodicity and Planning

Levels of intervention: Maintenance organisation. Softwares used to manage maintenance

Energetic Analysis: Fluid Moving, Electromechanical drives and variable speed, Soft starting, Microgeneration.

Procedures for Equipment Maintenance and Networking: Fluid networks - Liquids and gases; Piping, valves, actuators and sensors. Electrical Networks - Cabling, electrical boards, power converters and electrical machines; Lighting. Communication Networks - Analog and numerical; Structured cabling, coax cable, optical

fiber and wireless networks; Communications networks in buildings, plants and vehicles; Noise, EMI and EMC. Thermal Sources and Terminal Equipments.

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 and 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 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 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 about managing and maintenance of technical facilities in buildings and industrial plants.

The laboratory demonstration sessions allow to develop skills in the practice of testing and inspection of equipment and technical facilities.

Guided visits to services buildings and industrial plants allow to observe and listening to explanations about the existing technical 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, guided visits, lab work and public presentations, taking into account the communications skills – oral while doing the public presentations or answering questions during the activities or written on the reports.

Main Bibliography

(max. 1000 characters)

- Some texts about technical installation maintenance made available by docents
- ABB, ABB Industrial Manual

ABB Edition, 1998

- Eastop & Watsoon, Mechanical Services for Buildings

Longman, USA, 1992

- GRUNDFOS, Segurança contra Incêndios

GRUNDFOS Edition, 2006

- ANACOM, Manual ITED

Edição Unex, 2004

- Regulamento Técnico de Segurança contra Incêndio em Edifícios

Portaria nº. 1532 de 29 de Dezembro de 2008

- Regulamento das Características de Comportamento Térmico dos Edifícios (RCCTE)

Decreto-Lei 80/2006, de 4 de Abril

- Regulamento dos Sistemas Energéticos de Climatização em Edifícios (RSECE)

Decreto-Lei 79/2006, de 4 de Abril

- RTIEBT – Regras Técnicas das Instalações Eléctricas de Baixa Tensão, 1ª Edição Anotada

DGGE, 2007, Volumes I, II e III

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