ISEL
ADEM
Área Departamental de Engenharia Mecânica

Curricular Unit Form (FUC)

Course:	**FIRST CYCLE IN MECHANICAL ENGINEERING**					
Curricular Unit (UC)	**Fluid Power Systems**			Mandatory		
				Optional	**X**	
Scientific Area:	**Energy and Control Systems**					
Year: **3rd**	Semester: 5th	ECTS: 4,0		Total Hours: **3,0**		
Contact Hours:	T:	TP:**45**	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
João Manuel Ferreira Calado		**Doctor / Habilitation**		**Associate Professor**		

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

Entry into Force	Semester: **Winter**	Academic Year: **2016/2017**

Objectives of the curricular unit and competences (max. 1000 characters)

The aim of this Curricular Unit is to endow the future mechanical engineers, with the necessary knowledge to interpret and elaborate hydraulic circuits for industrial applications. It is equally intended to sensitize to the maintenance associated to this type of systems.

The students should acquire the following skills:

- Understanding of the physical intrinsic properties of fluid power systems;
- To interpret fluid power circuits in symbology C.E.T.O.P - Comité European des Transmissions Oléohydrauliques et Pneumatiques;
- To detect and repair common failures in fluid power systems;
- To project and mount real schemes in this specialty;
- To design simple fluid power systems;

To manage the operation and maintenance of industrial fluid power systems.

Syllabus (max. 1000 characters)

1. Comparison between pneumatic and fluid power systems
2. Symbology
3. Work fluid main characteristics
4. Pumps

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5. Valves

6. Hydraulic Cylinders

7. Hydraulic Motors

8. Hydraulic Accumulators

9. Filtering - contamination

10. Elementary hydraulic circuits - Practical applications of the theoretical concepts; Virtual and practical simulations:

- Speed regulation
- Lowering control
- Movements sequence

11. Fluid power systems design notions.

12. Fault diagnosis - Symptoms and their probable causes.

Demonstration of the syllabus coherence with curricular unit's objectives (max. 1000 characters)

The Curricular Unit Syllabus aims to deliver to the student's knowledge about the working principles of hydraulic and pneumatic devices used in the implementation of fluid power circuits and automation circuits. Furthermore, methodologies to detect and isolate faults in the mentioned circuits are also taught.

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

Teaching methodologies:

- Exposition;
- Demonstration;
- Activities.

The assessment in this curricular unit is obtained through one of the following ways:

1. Continuous Evaluation

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Three reports, a research report (NC) with weight of 0.3, a report as an outcome of an experimental work at the laboratory (NL) with weight 0.2, (both pedagogically fundamental), and a project (NP) with weight 0.5, being the final mark (NF) determined by the following formula: NF=0.3 x NC + 0.2 x NL + 0.5 x NP.

2. Final Exam.

Will be composed by the first two reports pedagogically fundamental referred at point 1 (NC and NL) and a Final Exam (NE), being the final mark (NF) determined by the following formula: NF=0.3 x NC + 0.2 x NL + 0.5 x NP.

In order to get approved on this curricular unit it will be necessary to obtain a minimal final mark of 10. For all the rest, it will be applied the general ISEL assessment rules.

Demonstration of the teaching methodologies coherence with the curricular unit's objectives (max. 3000 characters)

The teaching methodologies used in the Curricular Unit allow students to achieve theoretical knowledge about the working principles of the main hydraulic and pneumatic devices used in the implementation of fluid power systems and automation circuits, allowing students to be able to perform with scientific rigour performance analysis of that circuits and get a practical perception of the components mentioned above.

Main Bibliography (max. 1000 characters)

- BOSCH, Hidráulica. Teoria e Aplicações. Robert Bosch Gmbh
- Recommended:
- ESPOSITO, A.; Fluid Power - With Applications; Prentice Hall; 7th edition; 2009
- MAJUMDAR, S.R.; Oil Hydraulic Systems - Principles and Maintenance; McGraw-Hill Professional; 1st edition; 2002
- NOVAIS, J.; Ar Comprimido Industrial, Produção, Tratamento e Distribuição; 1997
- PINCHES, M., ASHBY; J. Power Hydraulics; 1996
- Planning and Design of Hydraulic Power Systems, Rexroth Hydraulics (Volume 3)