

### Curricular Unit Form (FUC)

Course:	<b>FIRST CYCLE IN MECHANICAL ENGINEERING</b>					
Curricular Unit (UC)	<b>Quality Inspection and Control</b>				Mandatory	
					Optional	<b>X</b>
Scientific Area:	<b>Mechanical Project, Manufacturing and Industrial Maintenance</b>					
Year: <b>3º</b>	Semester: <b>1º</b>	ECTS: <b>4,0</b>		Total Hours: <b>3,0</b>		
Contact Hours:	T:	TP: <b>45,0</b>	PL:	S:	OT:	TT:
Professor in charge		Academic Degree /Title		Position		
<b>Luís Manuel Vieira Gomes</b>		<b>Specialist</b>		<b>Invited Adjunct Professor</b>		

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

Entry into Force	Semester: <b>Winter</b>	Academic Year: <b>2016/2017</b>
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#### Objectives of the curricular unit and competences (max. 1000 characters)

The Quality Control and Inspection are of great importance in the evaluation and even to predict the mechanical behavior of parts and components with which the engineer works or design. This Curricular Unit intended that, at the end of the semester, students are able, depending on the type of equipment, choose the test method and the most appropriate test technique, know how to perform the complete test and interpret and evaluate information and take a decision to accept or reject of tested parts. They should also be able to report the results on a test report.

Regarding the skills to be developed, it is noted interest in knowing how to apply the physical principles of inspection method for penetrant test, magnetic particle test, industrial radiography and ultrasonic test, as well as understand and know how to characterize these non-destructive testing methods and identify its advantages and disadvantages, to enable the most appropriate choice depending on the product to be inspected. It must also ensure that students get to know the European standardization reference for the performance of those tests.

#### Syllabus (max. 1000 characters)

Function quality control.

Types of tests: Functional Metrological tests and nondestructive tests.

Inspection and test plans. Receiving inspection, ongoing and final inspection. Receiving inspection: material certification, including visual inspection and thickness tolerances

## Curricular Unit Form (FUC)

standards.

Sheet metal cutting processes, tolerances and cutting defects standards.

In progress and final tests depending on the manufacturing processes. Presentation of the main manufacturing processes in order to analyze the potential defects that may produce. Casting, forming deformation (rolling, forging, extrusion, bending), welding and machining and inherent defects.

Weld and mechanical construction tolerances standards.

Defects produced in service

Nondestructive methods for detection of defects in raw materials, processing and service. Penetrant testing, magneticle particle testing, industrial radiography and ultrasonic testing.

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

The contents in this Curricular Unit are completely directed towards the objectives to be achieved. First step presents the theoretical concepts applicable to each of the testing methods and then presented the methods or tests and their applicable standardization.

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

In this Curricular Unit, the teaching will be done through lectures and practical classes. It is also intended to instruct students to the importance of constantly search for updated literature, in order that students an complements the information necessary for understanding the operation of each test. The lectures will work with brief presentations on each topic, with practical examples, where it will asked the student to consolidate the concepts studied. In practical classes will be conducted performing test on parts with

## Curricular Unit Form (FUC)

discontinuities where students can apply the knowledge acquired, except for radiography where, for security reasons. On radiography practical classes students can evaluate films taken from several parts with internal defects. The knowledge gained will be further complemented with a visit to an industrial unit where most of these tests are applied.

The final grade (NF) in the Course is given by the note in a test during the semester or final examination (70%), a practical work, pedagogically fundamental (30%).

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

(max. 3000 characters)

Given the specific nature of this Curricular Unit, of predominantly practical nature, the teaching methodology used is optimized in accordance with existing resources in school and the objectives to be achieved. Thus, since it is intended that students know the tests and know to apply them in real situations. These are initially presented and described in a theoretical way, stressing however always their specificities, followed by the realization of testing to be carried out on practical classes provided for this purpose. Given its importance, the tests that are not possible to be performed in class, will be demonstrated in visits to industrial companies.

### Main Bibliography (max. 1000 characters)

Almeida, Filomena Pinto; Barata, John Barros Pedro, Nondestructive Testing (2000)  
- American Society of Nondestructive testing. Nondestructive Testing Handbook 10 Vols 2007  
- Institut de Soudure - Control Non Desctructif - Niveau 3. 4 Vols 1991