SUBJECT TEACHING GUIDE

M1705 - Process, methodology and patterns for the development of Real time

Master's Degree in computing engineering

Academic year 2021-2022

1. IDENTIFYING DATA					
Degree	Master's Degree in computing engineering			Type and Year	Optional. Year 2
Faculty	Faculty of Sciences				
Discipline	Optional Subjects				
Course unit title and code	M1705 - Process, methodology and patterns for the development of Real time				
Number of ECTS credits allocated	3	Term		Semester based (1)	
Web					
Language of instruction	Spanish	English Friendly	No	Mode of delivery	Face-to-face

Department	DPTO. INGENIERÍA INFORMÁTICA Y ELECTRÓNICA
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Other lecturers	

3.1 LEARNING OUTCOMES

- The student will be able to carry on the activities needed to design and evaluate the behavior of a system in the context of a software development process. The student will know how to design real-time software over the basis of a sufficient set of patterns suitable to predict its timing behavior and will know how to extract its corresponding schedulability analysis models.

4. OBJECTIVES

The training offered aims to get comprehension of the main strategies used in industry to include real-time practices in the software development process. This implies:
To know the fundamental criteria on hardware and software to design real-time systems
To understand the structural implications of timing predictability requirements and the need of assessing timing responses from the earliest possible phases in a development process.
To identify stages in the development process for assessing timing requirements so that the system remains viable .
To have a view of the traditional methodologies for real-time software design and their adequacy to the concrete development process in use.
To know the main design patterns used to control indetermination , at the architectural as well as detailed design levels.
To know the analysis models corresponding to the basic design patterns and their use .
To know and have practical experience with tools to do timing evaluation of detailed as well as approximate timing models .

6. COURSE ORGANIZATION

CONTENTS	
1	A panoramic view of real-time systems design: - Motivation and main concerns of the subject - Defining characteristics of real-time systems - Managing complexity: modelling, abstraction and partitioning - Formalisms and tendencies used to design and implement real-time systems: Languages, operating systems and model driven design.
2	The development process: - The role of the development process in a software engineering context and the constraints for the industrial production of embedded systems - Processes used in the real-time and embedded systems domain.
3	Methodologies for the design of real-time systems: - Structured methodology - Object oriented methodologies - Model driven design and the UML extensions for real-time systems
4	Design Patters: - Application and extraction of patterns - Methodological and high structural level patters - Design patterns for: managing concurrency, memory, and shared resources, distributed applications, safety, reliability and fault tolerance
5	Practical case and analysis modelling. This will be implemented in order to apply: - The MAST modeling methodology to analyze real-time systems. - Composition of schedulability analysis models. - Schedulability analysis for object oriented strategies. - Timing verification of the main design patterns.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written quiz involving all topics discussed.	Written exam	No	Yes	30,00
Presentation of proposals to bring solutions for the practical case given as final assignment of the subject.	Oral Exam	No	Yes	10,00
Final assignment of the subject.	Work	No	Yes	60,00
TOTAL				100,00

Observations

The evaluation will be made along the teaching period of the subject.
The final grade is calculated as the weighted arithmetic average of all evaluations along the academic year, in the following way:
- 10% (O) Oral presentation of proposals intended as solutions for the practical case given as final assignment of the subject
- 30% (T) Written quiz involving all topics discussed.
- 60% (A) Written final assignment of the subject.

In order to be able to pass the subject a student needs to get a score of 4.00 or more in the written quiz (T).
To recover the oral (O) and written (T) exams, the students may ask for an additional exam in June and in the recovery period. This exam will evaluate the theoretical contents of the subject and will have in the final mark the weight of both, (O) and (T) exams (i.e. 40%).
The final assignment (A) must be delivered in printed or digital form ten days before the end of June, the latest. If it is delivered in the recovery period it can be delivered up to ten days before the date fixed by the Faculty to upload the final marks. There is only one call per academic year. If the subject is not passed in the regular evaluation periods it can be evaluated in the recovery exams period.
If the maximum number of “Matrículas de Honor” (outstanding marks) is fulfilled with those given in the regular evaluation period, students that sit for recovery exams in the recovery evaluation period cannot be eligible for any additional of those marks.

Observations for part-time students

The evaluation will be made along the teaching period of the subject. Part-time students have the opportunity to be evaluated in a similar way by sitting for the recovery examinations offered in June and the recovery exams period . Besides, the written final assignment of the subject can be delivered in a specific recovery period, which cannot be later than ten days before the date fixed by the Faculty to upload the final marks.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Real-Time Design Patterns: Robust Scalable Architecture for Real-Time Systems. Bruce Powel Douglass. Addison Wesley. 2002 ISBN: 0-201-69956-7