Real time systems

Academic Year: (2020 / 2021) **Review date: 29-06-2020**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: ARMINGOL MORENO, JOSE MARIA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Computing Systems

OBJECTIVES

By the end of this content area, students will be able to have:

1. coherent knowledge of their branch of engineering including some at the forefront of the branch in real time systems;
2. the ability to apply their knowledge and understanding of computing systems to identify, formulate and solve engineering problems using established methods for deterministic systems;
3. the ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified time requirements;
4. an understanding of design methodologies, and an ability to use them.
5. workshop and programming skills.
6. the ability to select and use appropriate equipment, tools and methods;
7. the ability to combine theory and practice to solve problems of computing systems;
8. an understanding of applicable techniques and methods in computing systems, and of their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

1- Introduction to real-time systems.
   1.1 - Applications of Real-Time Systems
2- Concurrent Programming.
   2.1 - Concurrent components
   2.2 - Interaction and communication
3- Real-time operating systems.
   3.1 - Characteristics of Real-Time Systems
4- Methods-time measurement.
   4.1 - Time Services
   4.2 - Posix
5- Fault-Tolerant Real-Time Systems.
   5.1 - Components
   5.2 - Redundancy
   5.3 - Standards
6- Planning and task analysis.
   6.1 - Types of Real-Time Tasks
   6.2 - Task Scheduling
7- Response time.
   7.1 - Algorithms

LEARNING ACTIVITIES AND METHODOLOGY

- Skillful classes, classes of resolution of doubts in reduced groups, individual presentations of the students, individual tutorials and personal work of the student; oriented to the theoretical knowledge acquisition (3 credits ECTS).
- Practices of laboratory and individual classes of problems in reduced groups, individual tutorials and personal work of the student; oriented to the acquisition of practical abilities related to the program of the subject (3 credits ECTS).

ASSESSMENT SYSTEM

Continuous evaluation based on works, participation in class and tests of evaluation of abilities and knowledge.

% end-of-term-examination:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

BASIC BIBLIOGRAPHY

- Burns, A.; Wellings, A. Real-time systems and programming languages, Addison-Wesley, 2003
- Klein, M. A Practitioner¿s Handbook for Real Time Analysis, Kluwer , 1996
- Kopetz, Hermann Real-time systems : design principles for distributed embedded applications, Springer, 2011
- Phillip A. Laplante Real-Time Systems Design and Analysis, 3rd Edition, Wiley-IEEE Press, 2004
- Rajib Mall Real-Time Systems, Pearson India, On-line
- Sanjoy BaruahMarko BertognaGiorgio Buttazzo Multiprocessor Scheduling for Real-Time Systems, Springer, 2015

ADDITIONAL BIBLIOGRAPHY

- David Vallejo, Carlos González, Javier A. Albusac Programación Concurrente y Tiempo Real, http://creativecommons.org/licenses/by-nc-nd/3.0/, 2015
- Liu, Jane W.S. Real time systems , Prentice-Hall, 2000
- Mathai, J. Real Time Systems: Specification. Verification and Analysis, Prentice Hall , 1996
- Rajkumar, R. Synchronization in Real-Time Systems: a priority inheritance approach, Kluwer, 1991
- Stallings, W. Sistemas operativos, Prentice-Hall, 1997
- Williams, Rob Real-time systems development, Butterworth Heinemann, 2006

BASIC ELECTRONIC RESOURCES

- Springer . Real-Time Systems: http://http://link.springer.com/journal/11241