Real-time Systems

Academic Year: (2023 / 2024)   **Review date: 26-04-2023**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: CASTRO GONZALEZ, ALVARO

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Programming (Course: 1/ Semester: 1)

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. Characteristics.
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.
8- Real-time algorithms

LEARNING ACTIVITIES AND METHODOLOGY

THEORETICAL PRACTICAL CLASSES.
Knowledge and concepts students must acquire. Receive course notes and will have basic reference texts. Students partake in exercises to resolve practical problems.

TUTORING SESSIONS.
Individualized attendance (individual tutoring) or in-group (group tutoring) for students with a teacher. Subjects with 6 credits have 4 hours of tutoring/ 100% on- site attendance.

STUDENT INDIVIDUAL WORK OR GROUP WORK.
Subjects with 6 credits have 98 hours/0% on-site.

WORKSHOPS AND LABORATORY SESSIONS.
Subjects with 3 credits have 4 hours with 100% on-site instruction. Subjects with 6 credits have 8 hours/100% on-site instruction.

ASSESSMENT SYSTEM

- Continuous assessment: 100%.
o First midterm exam (30%, if passed the content will be removed for the final exam).
o Second midterm exam (30%, if passed the content will be removed for the final exam)
o Lab exercises: 40%.

- Final exam:
o 0%: if the student follows the continuous assessment, this exam will be taken only with the part(s) not passed in the midterm(s).
o 100%: if the student has not followed the continuous assessment, he/she will take the final exam with

all the content (including content of the lab sessions) and the final mark will be worth 60% of the mark obtained.

- Extraordinary exam: 100% with all the content (including content of the lab sessions).

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

BASIC BIBLIOGRAPHY

- Burns, A.; Wellings, A. Sistemas de Tiempo Real y Lenguajes de Programación, Addison-Wesley, 2003
- Klein, M. A Practitioner's Handbook for Real Time Analysis, Kluwer, 1996

ADDITIONAL BIBLIOGRAPHY

- 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

- Sanjoy Baruah, Marko Bertogna, Giorgio Buttazzo Multiprocessor Scheduling for Real-Time Systems, Springer, 2015