uc3m | Universidad **Carlos III** de Madrid

| Elements of critical software |

Academic Year: (2020 / 2021)   **Review date: 10-07-2020**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: GARCIA-HERAS CARRETERO, JAVIER

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)
Basic knowledge in Computers and Programming Languages.

OBJECTIVES
COMPETENCES:
1. Students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments.
2. Ability to integrate complex aerospace systems and multidisciplinary work teams.
3. Competence in all areas related to airport, aeronautical or space technologies that, by their nature, are not exclusive to other branches of engineering.
4. Adequate knowledge of Avionics and Onboard Software, and of the Simulation and Control techniques used in air navigation.
5. Adequate knowledge of the different regulations applicable to air navigation and transport and the ability to certify Air Navigation Systems.

LEARNING RESULTS:
The students shall be able to understand the complete Development Process of an Onboard Critical Software and to understand the Certification and Safety requirements applicable to such kind of Software.

DESCRIPTION OF CONTENTS: PROGRAMME
Elements of Critical Software Introduction.

Introduction to RTCA DO-178B.

Introduction to RTCA DO-178C.

SW Architectures Description.

Low Level Programming.

Real-Time Operating Systems.

SW Requirements Management Practice.

SW Design.

SW Design Practices.

SW Implementation.

SW Implementation Practices.

SW Verification.

SW Verification Practices.

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.
Practical Exercises during the sessions.
Practices in the Computers Room.
Practices in Laboratory.

In addition, 1 hour/week as Office Hour by the professor.

ASSESSMENT SYSTEM

End-of-term exam: 25%.
Class Exercises and Practices: 75% (with Class Exercise + Lab Exercises +
Theory Partial Exam + Practical Implementation Partial Exam).

In order to pass the subject, two requirements need to be met:

1) to have a MINIMUM mark of 4.0/10 in the end-of-term exam;

2) to have a minimum overall mark of 5.0/10 (weighing 25% the end-of-term exam mark and 75% the mark of the continuous evaluation):
        % end-of-term-examination: 25
        % of continuous assessment (assignments, laboratory, practicals...): 75

% end-of-term-examination:	25
% of continuous assessment (assigments, laboratory, practicals…):	75

BASIC BIBLIOGRAPHY

 - ARINC Avionics Software Standard Interface. ARINC Specification 653. , ARINC, 2003

 - Grady Booch, Ivar Jacobson & Jim Rumbaugh OMG Unified Modeling Language Specification, Version 1.3, OMG, 2008
 - RTCA DO-178C, ¿Software Considerations in Airborne Systems and Equipment Certification, RTCA, 2011

 - RTCA DO-178B, Software Considerations in Airborne Systems and Equipment Certification, RTCA, 1992

 - SAE ARP4754: Certification Considerations for Highly Integrated or Complex Aircraft Systems, SAE, 1996