Onboard systems design

Academic Year: (2024 / 2025) **Review date: 21-01-2025**

Department assigned to the subject: Aerospace Engineering Department

Coordinating teacher: GARCIA-HERAS CARRETERO, JAVIER

Type: Electives ECTS Credits : 3.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic knowledge in Systems Engineering and in Aircraft Systems.

SKILLS AND LEARNING OUTCOMES

CE.TE.VA5: Adequate and applied engineering knowledge of: Aircraft systems and automatic flight control systems of aerospace vehicles.
RA4: Graduates will be able to carry out initial research methods approaches commensurate with their level of knowledge involving literature searches, design and execution of experiments, data interpretation, selection of the best proposal and computer simulation.
RA5: Be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of aerospace engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

OBJECTIVES

Fundamental and applied knowledge on Onboard Systems Design.
Acquisition of the basic knowledge for Systems Engineering and its application to the Aircraft Onboard Systems.

The students shall be able to understand the complete cycle of the Onboards Systems Design and to understand the Certification and Safety requirements applicable to such kind of Systems.

DESCRIPTION OF CONTENTS: PROGRAMME

Onboard Systems Design and Avionic Systems Technology Introduction.

Avionics Systems Architectures and Integrated Modular Avionics.

Avionic Systems Technology: Discrete and Analogue Interfaces and Digital Data Buses (AFDX, ARINC 429 and MIL-STD-1553B) Introduction.

Certification Considerations for Onboard Systems Design: SAE ARP4754/A and SAE ARP4761 Introduction.

Development Assurance for Onboard Systems Design: SAE ARP4754/A, RTCA DO-178B/C and RTCA DO-254 Introduction.

Systems Engineering Overview. Systems Engineering Definition. Systems Engineering Frameworks. INCOSE Systems Engineering Introduction. Systems Engineering Technical Processes. Systems Engineering Management Processes. Systems Engineering Organizational Processes.

Aircraft Systems Verification and Validation. Integration Testing. RIG Testing. Ground Tests. Flight Tests.

Test Bench Practices.

Primary Flight Display Practice.

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.
Practical Exercises during the sessions.
Practices in Avionics Laboratory:
- OSMC Test Bench Practices.
- Primary Flight Display Design Practice.

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

ASSESSMENT SYSTEM

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

End-of-term exam: 25%.
Class Exercises and Practices: 75%..

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

BASIC BIBLIOGRAPHY

- Cary R. Spitzer (Ed.) The Avionics Handbook, CRC Press, 2001

- INCOSE INCOSE Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities, 4th Edition, Wiley, ISBN: 978-1-118-99940-0, 2015

- Ian Moir and Seabridge Aircraft Systems, John Wiley & Sons, 2008

ADDITIONAL BIBLIOGRAPHY

- ARP 4754 Certification Considerations for Highly-Integrated or Complex Aircraft Systems, SAE, 1996