

Academic Year: (2017 / 2018)

Review date: 28-04-2017

Department assigned to the subject: Department of Bioengineering and Aerospace Engineering

Coordinating teacher: CAVALLARO , RAUNO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 2

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Introduction to Flight Mechanics
 Flight Mechanics
 Control Of Aerospace Systems
 Aerodynamics

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

Sound knowledge of the stability, and control of fixed-wing aircraft.

Understanding of the equations of motion of the aircraft, configuration aerodynamics, and methods for analysis of linear systems.

Facility in evaluating aircraft kinematics and dynamics, trim conditions, inertial properties, stability derivatives, longitudinal and lateral-directional transients, transfer functions, state-space models, and frequency response.

Improved skills for presenting ideas. Improved ability to analyze complex, integrated problems. Demonstrated computing skills, through knowledge and application of MATLAB and Simulink.

Understanding of on-board systems and its design process.
 Fundamental and applied knowledge on Systems Engineering.

DESCRIPTION OF CONTENTS: PROGRAMME

Block I: Advanced Mechanics of Flight

1. Introduction
2. General Equations of Unsteady Motion
3. The Stability Derivatives
4. Longitudinal Stability of Uncontrolled Motion
5. Lateral-Directional Stability of Uncontrolled motion
6. Response to Actuation of the Controls
7. Closed-Loop Control

Block II: Onboard systems design

Onboard Systems Design and Avionic Systems Technology Introduction.

Avionics Systems Architectures and Integrated Modular Avionics.

Avionic Systems Technology: Discrete and Analogue Interfaces, Digital Data Buses, ARINC 429, CAN Bus 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.

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.
Case studies sessions.
Works in groups and oral presentations.

ASSESSMENT SYSTEM

Continuous evaluation: class tests, laboratories group, assignments and Case Studies (100%)

In order to pass the subject, it is required to have a MINIMUM mark of 5.0/10 in the continuous evaluation.

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

BASIC BIBLIOGRAPHY

- Bernard Etkin and Lloyd Duff Reid Dynamics of Flight: Stability and Control (Third Edition). , Wiley. , 1996
- Ian Moir and Seabridge. Aircraft Systems. , John Wiley & Sons., 2008
- Michael V. Cook. Flight Dynamic Principles (Third Edition). , Butterworth-Heinemann. , 2012

ADDITIONAL BIBLIOGRAPHY

- -. INCOSE Systems Engineering Handbook v3.2. , INCOSE., 2010
- null ARP 4754. Certification Considerations for Highly-Integrated or Complex Aircraft Systems. , SAE., 1996
- Cary R. Spitzer (Ed.). The Avionics Handbook. , CRC Press. , 2001