

## Advanced mechanics of flight

Academic Year: ( 2017 / 2018 )

Review date: 28-04-2017

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

Coordinating teacher: SANJURJO RIVO, MANUEL

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

## 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 aircraft equations of motion, 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.

## DESCRIPTION OF CONTENTS: PROGRAMME

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
8. Flying Qualities

## LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.  
 Problem sessions working individually and in groups.  
 Lab-sessions with simulation software.

## ASSESSMENT SYSTEM

There are three assignments through the semester. Each assignment represents 25% of the total grade. Final exams correspond to the remaining 25%. Required minimum mark on final exam: 4/10

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| <b>% end-of-term-examination:</b>   | 25 |
| <b>% of continuous assessment (assignments, laboratory, practicals...):</b> | 75 |

## BASIC BIBLIOGRAPHY

- Bernard Etkin and Lloyd Duff Reid Dynamics of Flight: Stability and Control (Third Edition), Wiley, 1996
- Malcolm J. Abzug, E. Eugene Larrabee Airplane Stability and Control: A History of the Technologies that Made Aviation Possible, Cambridge Aerospace Series, 2nd edition , 2002
- Michael V. Cook Flight Dynamic Principles (Third Edition), Butterworth-Heinemann, 2012