Advanced Flight Mechanics

Academic Year: (2020 / 2021) **Review date: 10/07/2020 07:26:17**

Department assigned to the subject: Bioengineering and Aeroespace Engineering Department

Coordinating teacher: SANJURJO RIVO, MANUEL

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 1

OBJECTIVES

COMPETENCES

Knowledge and understanding to provide a basis or opportunity for originality in developing and / or applying ideas, often within a research context

Students should be able to apply their knowledge and ability to solve problems in new or unfamiliar environments within broader contexts (or multidisciplinary) contexts related to their field of study

Students should be able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments

Students can communicate their conclusions and the knowledge and rationale underpinning to specialists and non-specialists in a clear and unambiguous way.

Students should adquire the learning skills to allow them to continue studying in a self-directed or autonomous way.

Ability to analyze and solve aerospace problems in new or unfamiliar environments within broader and complex contexts

Understanding and mastery of the Atmospheric Flight Mechanics (Performances and Static and Dynamic Stability and Control) , and Orbital Mechanics and Attitude Dynamics .

SKILLS

The student should be able at the end of the course to:
Assess the stability of aerospace vehicles in atmospheric flight.
Solve aerospace vehicle attitude dynamics problems.
Design control algorithms for attitude control of aerospace vehicles.
Know the necessary elements (among them, recursive algorithms of statistical filtering) for aerospace navigation.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
2.- General equations of non-stationary motion
    2.1 - Derivatives of stability
    2.2.- Longitudinal stability of uncontrolled motion
    2.3.- Lateral-directional stability of uncontrolled motion
    2.4.- Response to the action of controls. Open loop.
3.- Aerospace navigation elements.
4.- Closed loop control
5.- Handling qualities

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES

Lessons
Exercises
Laboratory sessions in computer rooms.
Student individual work

Methodology

Presentations in class with teacher support and audiovisual media, in which the main concepts of the subject are developed and the literature is provided to supplement student learning.

Critical reading recommended by the subject teacher texts: reports, manuals, and / or scholarly articles, either for subsequent class discussion, either to expand and consolidate the knowledge of the subject.

Solving practical cases, problems, etc.. posed by the teacher individually or in group

Preparation of papers and reports individually or in group

ASSESSMENT SYSTEM

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

There are a modular assignment through the semester. The overall assignment represents 75% of the total grade. Final exams correspond to the remaining 25%. Required minimum mark on final exam: 4/10

BASIC BIBLIOGRAPHY

- Ashish Tewari Atmospheric and Space Flight Dynamics, Birkhäuser, 2007

- Bernard Etkin and Lloyd Duff Reid Dynamics of Flight: Stability and Control (Third Edition), Wiley, 1996

ADDITIONAL BIBLIOGRAPHY

- H. Schaub, J. Junkins Analytical Mechanics of Space Systems, AIAA; 2 edition , October 1, 2009

- Michael V. Cook Flight Dynamic Principles (Third Edition), Butterworth-Heinemann, 2012