Aerospace vehicles: complement I

Academic Year: (2017 / 2018) **Review date: 22-01-2017**

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

Coordinating teacher: FAJARDO PEÑA, PABLO

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 2

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Advanced Mathematics
Fluid Mechanics
Aerodynamics
Stability and Integrity of Aerospace Structures

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

Fundamental and applied knowledge of Aerodynamics.
Fundamental and applied knowledge of the principles that allow the prediction of forces and moments on bodies moving through a fluid. In particular, generation of lift, drag and moments on wings (subsonic and supersonic regimes) and fuselage.
Fundamental and applied knowledge of Aeroelasticity.
Fundamental and applied knowledge of the numerical methods applied in Aerodynamics and Aeroelasticity.

DESCRIPTION OF CONTENTS: PROGRAMME

Wings of finite span in incompressible flows. Lifting surface theory. Numerical lifting surface method.

Wings of finite span in subsonic flows. Prandtl Glauert analogy. Swept wings.

Introduction to hypersonic flow.

Aeroelasticity and Dynamic loads. Getting stared.

2D aeroelasticity. Unsteady 2D aerodynamics. Wagner, Küssner and Theodorsen. Divergence and control reversal.

3D aeroelasticity. Structural model and the normal modes. Unsteady 3D aerodynamics. Doublet Lattice Method.

The experimental modal analysis and the GVT. Dynamic model validation.

Flutter equation and its solution. Parameters affecting flutter. Flight Flutter Test. Aeroelastic model validation.

Dynamic loads. Dynamic landing and taxing. Gust and turbulence response. Buffet.

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.
Problem sessions working individually and in groups using specific software

ASSESSMENT SYSTEM

The course is composed of two parts: Aerodynamics and Aeroelasticity.

- Aerodynamics (50%)
- Aeroelasticity: (50%)

The evaluation will be done with class participation, Homeworks and Quizzes.

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

BASIC BIBLIOGRAPHY

- J. Katz and A. Plotkin. Low-Speed Aerodynamics., Cambridge University Press..
- Wright, J.R. and Cooper, J.E.. Introduction to Aircraft Aeroelasticity and Loads. , John Wiley & Sons, 2007