lmeca2830

2022

Aerospace dynamics.

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Chatelain Philippe ;Schrooyen Pierre (compensates Chatelain Philippe) ;
Language :	English
Place of the course	Louvain-la-Neuve
Main themes	• Universal gravitation and applications. • Aircraft dynamics : equilibrium, stability and control. • Launchers. • Satellite orbits and attitude stability.
Learning outcomes	**At the end of this learning unit, the student is able to :** 1 In consideration of the reference table AA of the program "Masters degree in Mechanical Engineering", this course contributes to the development, to the acquisition and to the evaluation of the following experiences of learning: • AA1.1, AA1.2, AA1.3 • AA2.1, AA2.2, AA2.3 • AA3.1, AA3.3 • AA5.1, AA5.2, AA5.4 • AA6.1, AA6.2 Introduce students to the specific issues of aircraft dynamics, launcher systems and dynamics, and satellite dynamics.
Evaluation methods	The final evaluation is based on a written exam and 3 homeworks. The homework assignments are individual and mandatory. A report must be produced for each within a specified time frame and the marks are definitive (these assignments cannot be retaken). The exam is subdivided into 2 parts: • theoretical questions • exercises: performance, stability, control... In case of technical issues or in case of fraud suspicion, the lecturers may reserve the right to replace the written exam by an oral exam.
Content	• Summary of rigid body mechanics. • Aircraft dynamics and performance : aerodynamic loads, translational and rotational dynamics, steady state motion, propulsion, stability, controls. • Launcher dynamics and staging optimisation. • Satellite dynamics : orbits, transfers, rendezvous, attitude stability.
Inline resources	http://moodleucl.uclouvain.be/enrol/index.php?id=8369
Bibliography	• J.D. ANDERSON, Introduction to Flight • B. ETKIN Dynamics of Flight - Stability and Control • L. GEORGE, J-F VERNET, J-C WANNER La mécanique du vol • J.W. CORNELISSE, H.F.R. SCHÖYER, K.F. WAKKER Rocket Propulsion and Spaceflight Dynamics
Other infos	Programming skills in matlab or python are recommended
Faculty or entity in charge	MECA

Programmes containing this learning unit (UE)				
Program title	Acronym	Credits	Prerequisite	Learning outcomes
Master [120] in Mechanical Engineering	MECA2M	5		🔍
Master [120] in Electro-mechanical Engineering	ELME2M	5		🔍