UCLouvain

lmeca2830

2026

Aerospace dynamics.

5.00 credits	30.0 h + 30.0 h	Q1

Teacher(s)	Chatelain Philippe ;
Language :	English > French-friendly
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, AA2.4, AA2.5 • AA3.3 • AA4.1, AA4.2, AA4.3, AA4.4 • AA5.1, AA5.2, AA5.3, AA5.4, AA5.5, AA5.6 • AA6.1, AA6.4 Introduce students to the specific issues of aircraft dynamics, launcher systems and dynamics, and satellite dynamics.
Evaluation methods	**Homeworks** The homeworks correspond to work that is mandatory and that must be performed during the quadrimester; each within a well-defined time period and with a given deadline for the report, that is graded. The homework assignments are individual unless announced otherwise. It is not possible to do, or even re-do, any of the work mentioned above outside of the time period that was defined for it within the quadrimester. **Final evaluation** The final evaluation is based on a written exam and homework report marks. A report must be produced for each within a specified time frame during the quadrimester and the marks are definitive (these assignments cannot be retaken). The exam is subdivided into 2 parts: • theory • practical 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.
Teaching methods	**Lectures** Combined use of a slides and virtual board Slides and virtual board contents are provided to the students every other lecture at the latest Course notes are available for the first part of the course: introduction and propellers; the second part (jet propulsion) is being worked on.
Content	Aeronautics • Aircraft performance: range, endurance, loads, • Aircraft static stability • Aircraft dynamics: summary of rigid body mechanics, • Special topics: glider performance flight and/or helicopter flight Space • Rocket propulsion • Launcher dynamics and staging optimisation. • Satellite dynamics : orbits, transfers, rendezvous, attitude stability.

Inline resources	https://moodle.uclouvain.be/course/view.php?id=1538
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		
Master [120] in Energy Engineering	NRGY2M	5		