UCLouvain

lmeca2550

2023

Aircraft propulsion systems.

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	1. Fundamentals of air-breathing propulsion 1.1) Dynamical and energetic aspects 1.2) Concepts and domains of use 2. Analysis of propulsion systems 2.1) The airscrew 2.2) The jet engine 2.3) The Ramjet and Scramjet engines 2.4) Inlets and nozzles 2.5) Technological aspects 3. Advanced concepts and future trends
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 " Master's degree civil engineer mechanics ", 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, AA3.2 • AA5.4, AA5.5, AA5.6 • AA6.3, AA6.4 Aims to provide an analytical description of systems used in aircraft propulsion, to model their behaviour and to introduce students to performance evaluation and component dimensioning.
Evaluation methods	**Homeworks and laboratories** The laboratory sessions and 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. It is mandatory to participate physically in each of the laboratory sessions led by an assistant. No laboratory report will be accepted with the name of a student who did not participate in the laboratory. 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/laboratory 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 evaluation and system design 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	1. Fundamentals of air-breathing propulsion 1.1) Dynamical and energetic aspects 1.2) Concepts and domains of use 2. Analysis of propulsion systems 2.1) The airscrew 2.2) The jet engine 2.3) The Ramjet and Scramjet engines 2.4) Inlets and nozzles 2.5) Technological aspects 3. Advanced concepts and future trends
Inline resources	https://moodle.uclouvain.be/course/view.php?id=1539
Other infos	Lectures: • Fluid mechanics and transfer phenomena (LMECA1321) • Thermodynamics and energetics (LMECA1855) • Fluid mechanics and transfer II (LMECA2322) : can be followed concurrently • Aerodynamics of external flows (LMECA23232) : optional as it is complementary Programming skills: Matlab or Python
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		