Last update: 05-10-2018

220342 - Extension of Jet Engines

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering

Teaching unit: 220 - ETSEIAT - Terrassa School of Industrial and Aeronautical Engineering

Academic year: 2018

Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: English

Teaching staff

Coordinator: Manel Soria Guerrero
Josep Oriol Lizandra Dalmases

Opening hours

Timetable: By agreement between teacher and student

Prior skills

Previous concepts include knowledge of propulsion systems for aircraft and spacecraft, given in any bachelor?s degree in aerospace engineering and reviewed in previous subjects of this Master?s degree, as well as familiarity with the use of computing tools for engineering.

Degree competences to which the subject contributes

Specific:

CEEPROP1. MUEA/MASE: Sufficient applied knowledge of aspects of measurement, calculation and numerical resolution in experimental and computational aerodynamics (specific competency for the specialisation in Propulsion).
CEEPROP2. MUEA/MASE: Advanced applied knowledge of the design, manufacture and maintenance of propulsion systems (specific competency for the specialisation in Propulsion).

Teaching methodology

Classroom lectures combined with assignments to be solved during the class with the help of the professor

Learning objectives of the subject

-Understand the current state of jet engine techologies, their limits and their future trends.

-Understand how jet engines can be modelled and optimized for different applications.

-Acquiere a hands-on experience with test-benches of small-scale jet engines and their instrumentation.

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Study load

Total learning time: 125h	Hours large group:	30h	24.00%
	Hours small group:	15h	12.00%
	Self study:	80h	64.00%

Content

Module 1: Introduction. Current jet engine technology, limits and future trends

Learning time: 40h

Theory classes: 10h
Practical classes: 5h
Self study : 25h

Description:
Review of previous concepts
Supersonic propulsion
SCRAMJET
Turborockets

Module 2: Numerical models of jet engines and multiheuristic optimization

Learning time: 40h

Theory classes: 10h
Practical classes: 5h
Self study : 25h

Description:
System engineering numerical models of jet engines
Multiheuristic optimization
Hands-on work

Module 3: Testing of jet engines

Learning time: 45h

Theory classes: 10h
Practical classes: 5h
Self study : 30h

Description:
Instrumentation
Data logging
Hands-on work

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Qualification system

Assignments 30%
Project 40%
Exam 30%
Students with a grade below 5.0 in the assignments and / or the project, will be able to do an additional exam in order to compensate for the poor results. The new grade will replace the original only if it is higher. The maximum grade that can be obtained with this additional exam is 5.0.

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.
If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

Bibliography

Basic:

Horowitz, P.; Hill, W. The art of electronics. 3rd ed. New York: Cambridge University Press, 2015. ISBN 9780521809269.

Curran, E. T.; Murthy, S. N. B. Scramjet propulsion. Washington: American Institute of Aeronautics and Astronautics, 2000. ISBN 9781563473227.

Saravanamuttoo, H. I. H. [et al.]. Gas turbine theory. 6th ed. Harlow, England; New York: Pearson Prentice Hall, cop. 2009. ISBN 9780132224376.

Heiser, W. H.; Pratt, D. Hypersonic airbreathing propulsion. New York, N.Y: American Institute of Aeronautics and Astronautics, 1994. ISBN 9781563470356.

Dixon, S.L.; Hall, C.A. Fluid mechanics and thermodynamics of turbomachinery. 7th ed. Amsterdam: Butterworth-Heinemann, 2013. ISBN 9780124159549.