Last update: 13-02-2014

300322 - PA-OA - Aircraft Propulsion

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering

Teaching unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering

Academic year: 2013

Degree: BACHELOR'S DEGREE IN AIR NAVIGATION ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN AIRPORT ENGINEERING (Syllabus 2010). (Teaching unit Optional)

ECTS credits: 6

Teaching staff

Coordinator: Definit a la infoweb de l'assignatura.

Others: Definit a la infoweb de l'assignatura.

Learning objectives of the subject

Study load

Total learning time: 150h	Hours medium group:	53h	35.33%
	Hours small group:	13h	8.67%
	Self study:	84h	56.00%

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Content

Introduction to Aeronautical Propulsion Systems

Learning time: 11h
Theory classes: 5h
Self study : 6h

Description:
Aeronautical propulsion system types, basic working principles, uses and limitations.

Performances and thermodynamical cycle

Learning time: 22h
Theory classes: 5h
Practical classes: 5h
Self study : 12h

Description:
Gas turbine engine performance parameters. Fundamentals of aerothermodynamics, the ideal gas generator, sources of losses, component efficiencies and impact on engine performances.

Components

Learning time: 53h
Theory classes: 10h
Practical classes: 10h
Laboratory classes: 3h
Self study : 30h

Description:
Description, analysis, design overview and implementation details of ducting (intake/diffuser, nozzle, mixer), turbomachinery (compressor, fan, turbine) and heating components (combustion chamber, afterburner, heat exchangers)

Subsystems

Learning time: 33h
Theory classes: 10h
Practical classes: 5h
Self study : 18h

Description:
Accessory components and systems: structural (shafts/spools, casing, bearings...), thermal (bleeds, cooling system), fuel, lubrication, ignition and start, monitoring...

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Applications	Learning time: 24h Theory classes: 5h Practical classes: 2h Laboratory classes: 3h Self study : 14h

Description:
Details of implementation for the application of the gas generator to turbojet, turbofan, turboprop, turboshaft...

Maintenance and handling	Learning time: 7h Theory classes: 3h Self study : 4h

Description:
Introduction to engine operation, handling and maintenance.

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Planning of activities

THEORETICAL FUNDAMENTALS OF AERONAUTICAL PROPULSION	Hours: 68h Theory classes: 14h Practical classes: 12h Self study: 42h

Description:
Theory lectures, problem statement and numerical resolution of practical exercices.

PRACTICAL FUNDAMENTALS OF AERONAUTICAL PROPULSION	Hours: 82h Theory classes: 24h Practical classes: 10h Laboratory classes: 6h Self study: 42h

Description:
Theory lectures, practical descriptions and components and subsystems dissection.

Support materials:
Slides, class notes, basic and advanced bibliography.

Descriptions of the assignments due and their relation to the assessment:
Occasional delivery of practical session reports and oral presentations preparation.

Specific objectives:
Acquisition of a series of practical knowledge related to aeronautical propulsion.

Bibliography

Basic:

Kerrebrock, Jack L. Aircraft engines and gas turbines. 2nd ed. Cambridge: Ed. MIT Press, 1992. ISBN 0262111624.

Saravanamuttoo, H.I.H. Gas turbine theory. 6th ed. England: Ed. Pearson Prentice Hall, 2009. ISBN 9780132224376.

Complementary:

Walsh, Philip P.; Fletcher, Paul. Gas turbine performance. 2nd ed. Malden: Ed. Blackwell Science, 2004. ISBN 9780632064342.

Oates, Gordon C. Aircraft propulsion systems technology and design. Washington: Ed. American Institute of Aeronautics and Astronautics, 1989. ISBN 093040324X.

Mattingly, Jack D. Elements of propulsion: gas turbines and rockets. Reston: Ed. American Institute of Aeronautics and Astronautics, 2006. ISBN 1563477793.

Dixon, S.L. Fluid mechanics, thermodynamics of turbomachinery. 5th ed. Oxford: Ed. Butterworth-Heinemann, 2005. ISBN 0750678704.