UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

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220015 - Thermodynamics

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 724 - MMT - Department of Heat Engines
Academic year: 2019
Degree: BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
ECTS credits: 6 Teaching languages: Catalan

Teaching staff

Coordinator: Joaquim Rigola Serrano

Others: Yolanda Calventus, John Hutchinson, Frida Roman, Carles Oliet

Prior skills

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Requirements

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Degree competences to which the subject contributes

Specific:

1. GrETA/GrEVA - An understanding of the thermodynamic cycles of generators of mechanical power and thrust

5. Understanding and mastery of basic concepts about the general laws of mechanics, thermodynamics and electromagnetism fields and waves and their application to solving problems in engineering.

Transversal:

2. EFFECTIVE USE OF INFORMATI0N RESOURCES - Level 2. Designing and executing a good strategy for advanced searches using specialized information resources, once the various parts of an academic document have been identified and bibliographical references provided. Choosing suitable information based on its relevance and quality.

Teaching methodology

The subject is divided in:
1- Big group lessons: in these lessons are developed the theory lessons and part of the problem lessons, as well as the evaluation that belongs to the first and second midterms and the level tests. The model will be fixed by the teacher, being it the one that he considers more suitable to the objectives of the subject.
2- Medium group lessons: These lessons correspond to problems lessons. The problems can be fixed by the teacher, or proposed by the students to be solved if they are part of the autonomous learning. If it is considered appropriate there can be guided activities during these hours.
3- Little group lessons: In these hours the laboratory practices take place, as well as the generic competence CG6 "Solvent use of the information resources"

The Atenea platform will be used in order to support the three types of lessons detailed above. It will be used as a way of communication between teachers and students.
A) Teacher-Student:
1) Schedule of activities and information
2) Learning material
3) Grades
B) Student-Teacher
1) Task delivery
2) Questions, comments and suggestions about the development of the subject and it apprenticeship.
C) Student-Student
1) Use of the forum as place to find information and discuss topics.

Learning objectives of the subject

· Acquiring the basic knowledge for later studies in heat transfer, fluid mechanics and thermic motors.
· Acquiring the ability of applying the thermodynamics to related subjects.
· Acquiring the ability of making hypothesis in real systems.
· Learning the use of laboratory instruments.
· Improve the use of different units and magnitudes, as well as tables and equations. Using of software for the calculation of thermo-physic properties.
· Learning how to perform an efficient use of bibliography

Study load

Total learning time: 150h	Hours large group:	32h	21.33%
	Hours medium group:	14h	9.33%
	Hours small group:	14h	9.33%
	Self study:	90h	60.00%

Content

1. Previous concepts about the approach of Thermodynamics.	Learning time: 13h Theory classes: 4h Practical classes: 1h Laboratory classes: 2h Self study : 6h

Description:
(ENG) contingut 1

Related activities:
(ENG) m

Specific objectives:
(ENG) m

2. Volumetric properties of a pure substance, simple and compressible.	Learning time: 27h Theory classes: 5h Practical classes: 2h Laboratory classes: 2h Self study : 18h

3. The first law of thermodynamics	Learning time: 50h Theory classes: 10h Practical classes: 5h Laboratory classes: 5h Self study : 30h

4. Second law of thermodynamics.	Learning time: 47h Theory classes: 9h Practical classes: 5h Laboratory classes: 5h Self study : 28h

5. Thermodynamic cycles.	Learning time: 13h Theory classes: 4h Practical classes: 1h Self study : 8h

Planning of activities

(ENG) CLASSES DE TEORIA	Hours: 68h Theory classes: 26h Self study: 42h

(ENG) CLASSES DE PROBLEMES	Hours: 40h Practical classes: 14h Self study: 26h

(ENG) PRÀCTIQUES DE LABORATORI	Hours: 36h Laboratory classes: 14h Self study: 22h

(ENG) EXAMEN 1R PARCIAL	Hours: 2h Theory classes: 2h

(ENG) EXAMEN 2N PARCIAL (FINAL)	Hours: 2h Theory classes: 2h

(ENG) PROVES PARCIALS DE NIVELL	Hours: 2h Theory classes: 2h

Qualification system

First midterm exam "N1P" : weigh 30%
Second midterm exam: "N2P" : weigh 40%
Laboratory practices: "NL" : weigh 20%
Level tests "Nc": weigh 10%

The course will provide for procedures to recover unsatisfactory results obtained in the first evaluation, inside the final exam (for students with a mark lower than 5 with a degree between 0 and 5).

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Regulations for carrying out activities

1) The self-evaluation questionnaires won't be used in order to fix a grade.
2) The lack of assistance to a laboratory session would lead to a mark of zero without the possibility of doing it at other moment. A tardiness of more than 15 min would lead to the same. The laboratories inform can be made by group or individually and would be delivered the next session. There would be an exposition session. If a student doesn't attend the exposition the mark would be a zero too.
3) The exams must be made without the use of external material, except the book "Taules I Gràfics" y the formula sheet.

Bibliography

Basic:

Çengel, Yunus A.; Boles, Michael A. Termodinámica [on line]. 7ª ed. México: McGraw-Hill, 2009 [Consultation: 21/05/2014]. Available on: <http://site.ebrary.com/lib/upcatalunya/docDetail.action?docID=10747893&p00=9781456213381>. ISBN 9786071507433.

Moran, Michael J. [et al.]. Fundamentos de termodinámica. 2a ed. Barcelona: Reverté, 2004. ISBN 8429143130.

Wark, Kenneth [et al.]. Termodinámica. 6a ed. Madrid: McGraw-Hill, 2001. ISBN 844812829X.

Complementary:

Montserrat, S. [et al.]. Pràctiques de laboratori de termodinàmica. 6a ed. Terrassa: U.D.I. Termodinàmica i Físico-química E.T.S.E.I.A.T., 2010.

Professors del Departament de Màquines i Motors Tèrmics. Termodinàmica : taules i gràfiques de propietats termodinàmiques. 2a ed. Barcelona: ETSEIB. CPDA, 2000.

Others resources:

Audiovisual material

Apunts realitzats pel professorat de l'assignatura