

[MHK103] THERMAL AND FLUIDS ENGINEERING

GENERAL INFORMATION

Studies	UNIVERSITY MASTER IN INDUSTRIAL ENGINEERING		Subject	ENERGY
Semester	2	Course	1	Mention / Field of specialisation
Character	COMPULSORY		Language	CASTELLANO
Plan	2017	Modality	Adapted Face-to-face	Total hours
Credits	5	Hours/week	3.44	62 class hours + 63 non-class hours = 125 total hours

PROFESSORS

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REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
Mechanical Physics Thermodynamics Fluid mechanics Heat transfer processes	<i>(No previous knowledge required)</i>

SKILLS

VERIFICA SKILLS

SPECIFIC

- MHC01** - To understand and be able to analyse and design electric energy generation, transport and distribution systems
- MHC05** - To understand and be able to analyse heat engines and machines, hydraulic machines and heating/cooling plants
- MHC06** - To be able to understand, analyse, operate and manage different energy sources

CROSS

- MHC47** - To select one measure or idea out of several and implement them in response to the needs or circumstances emerging in the work process
- MHC48** - To work with people, getting them involved and guiding them towards the achievement of a common goal, with a global vision of work and its characteristics (quality, deadlines, etc.), taking individual and group interests into account

BASIC

- M_CB10** - To have learning skills and the capacity for self-guided or independent subsequent learning.
- M_CB7** - To know how to apply the acquired knowledge and competencies and the ability to solve problems in new or unfamiliar contexts within wider (or multidisciplinary) environments related to their field of study
- M_CB8** - To be able to integrate different types of knowledge and make complex judgements based on information that, in spite of being partial or limited, includes ideas on the social and ethical responsibilities associated with the application of knowledge
- M_CB9** - To share knowledge, conclusions and their rationale with specialised and lay audiences in a clear, unambiguous manner

ENAE LEARNING RESULTS

	ECTS
ENA123 - Knowledge and comprehension: Deep knowledge and comprehension of mathematics and other basic sciences inherent in their engineering speciality, allowing them to achieve the other competencies of the degree.	0,5
ENA124 - Knowledge and comprehension: Deep knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree.	0,5
ENA126 - Knowledge and comprehension: Critical knowledge of the broad multidisciplinary context of engineering and the interrelations existing between the knowledge of the different fields.	0,5
ENA127 - Analysis in engineering: Ability to analyse new and complex engineering products, processes and systems within a broader multidisciplinary context; select and apply the most appropriate analysis, calculation and experimental methods already established, as well as innovative methods; and critically interpret the results of such analyses.	0,6
ENA129 - Analysis in engineering: Ability to identify, formulate and solve engineering problems defined incompletely, and/or with conflicts, which accept different valid solutions and require considering knowledge beyond those of their discipline and take into account the social, health and security, environmental, economic and industrial implications; to select and apply the most appropriate methods of analysis, calculation and experimental, as well as the most innovative methods for solving problems.	0,5
ENA138 - Practical application of engineering: Complete knowledge of the applicable techniques and methods of analysis, project and research, as well as their limitations.	0,5
ENA144 - Preparation of judgements: Ability to integrate knowledge and handle complex concepts and formulate judgements with limited or incomplete information, including reflection on ethical and social responsibility related to the application of their knowledge and opinion.	0,8
ENA146 - Communication and Teamwork: Ability to employ different methods to communicate their conclusions, clearly and unambiguously, and the knowledge and logical foundations that support them, to audiences specialised and not specialised in the issue, in domestic and international contexts.	0,6
ENA147 - Communication and Teamwork: Ability to operate effectively in domestic contexts as a member or leader of a team,	0,5

which may be composed of people of different disciplines and levels, and who can use virtual communication tools.

Total: 5

LEARNING RESULTS

RA111 Identifies and evaluates the working parameters of energy generation and consumption equipment.

LEARNING ACTIVITIES

	CH	NCH	TH
Individual study and work, tests and evaluations and check points	2 h.	10 h.	12 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	24 h.		24 h.
Individual and team solving of exercises, problems, and practices	2 h.	16 h.	18 h.

EVALUATION SYSTEM

W

Individual written and oral tests to assess technical skills of the subject 100%

Reports of solving exercises, case studies, computer practices, simulation practices and laboratory practices

Comments: All activities (control points, individual and group assignments, etc...) must have a minimum mark (5 minimum) and there will be an opportunity to retake every activity. In case of retake of the control point, the final mark will be the mark of the retake. Failed assignments, practices, etc... must be retaken and will be graded with a maximum mark of 5.

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: Tasks: - Minimum mark to pass: 5 - There will be a recovery option. Maximum mark after recovery: 5 - Minimum mark to obtain mean value between PBL and check point: 5 In order to pass the learning outcomes, minimum marks must be achieved in check points and tasks. If this minimum mark is not obtained in one of them, the minimum of these marks will be used and the mark of PBL will not be taken into account.

CH - Class hours: 28 h.

NCH - Non-class hours: 26 h.

TH - Total hours: 54 h.

RA112 Scales up structural elements under thermal and fluidic loads.

LEARNING ACTIVITIES

	CH	NCH	TH
Individual study and work, tests and evaluations and check points	2 h.	10 h.	12 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	24 h.		24 h.
Individual and team solving of exercises, problems, and practices	4 h.	10 h.	14 h.

EVALUATION SYSTEM

W

Individual written and oral tests to assess technical skills of the subject 100%

Comments: All activities (control points, individual and group assignments, etc...) must have a minimum mark (5 minimum) and there will be an opportunity to retake every activity. In case of retake of the control point, the final mark will be the mark of the retake. Failed assignments, practices, etc... must be retaken and will be graded with a maximum mark of 5.

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: Tasks: - Minimum mark to pass: 5 - There will be a recovery option. Maximum mark after recovery: 5 - Minimum mark to obtain mean value between PBL and check point: 5 In order to pass the learning outcomes, minimum marks must be achieved in check points and tasks. If this minimum mark is not obtained in one of them, the minimum of these marks will be used and the mark of PBL will not be taken into account.

CH - Class hours: 30 h.

NCH - Non-class hours: 20 h.

TH - Total hours: 50 h.

RA172 [!] *Analiza e interpreta sistemas térmicos*

LEARNING ACTIVITIES

	CH	NCH	TH
Development, writing and presentation of memorandums, reports, audiovisual material, etc.	4 h.	17 h.	21 h.

Relating to projects/POPBLs carried out individually or in teams

EVALUATION SYSTEM

w

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

Comments: Part of the evaluation of the PBL consists of an individual defense of the project that students will have to pass with a minimum of a 5, so that they can make a mean with the rest of the marks.

CH - Class hours: 4 h.
NCH - Non-class hours: 17 h.
TH - Total hours: 21 h.

MAKE-UP MECHANISMS

Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence

CONTENTS

1. Thermodynamics basics. Properties of fluids, behaviour of perfect gases, transformations, Laws of Thermodynamics.
2. Combustion basics.
3. Internal Combustion Reciprocating Engine cycles.
4. Turbomachines and their components. Nozzels.
5. Steam power cycles, refrigeration cycles and heat pump.

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

<http://es.libros.redsauce.net/index.php?folderID=1>
 Subject notes
 Labs
 Lab practical training
 Presentations by external Lecturers
 Moodle Platform

Bibliography

Çengel, Y. A., Boles, M. A. and Cázares, G. N. Termodinámica. McGraw-Hill. 2006.
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 Muñoz, M. and Payri, F. Motores de combustión interna alternativos. Editorial Universitat Politècnica de València, 2011.
 Vivier, . Turbinas de vapor y de gas. Urmo, 1968.
 Cumpsty, N. and Heyes, A. Jet propulsion. Cambridge University Press, 2015.
 Incropera, F. P., DeWitt F. P. and Bergman T. L. Fundamentos de Transferência de Calor E de Massa . Grupo Gen-LTC, 2000.