[GFC004] THERMODYNAMICS

GENERAL INFORMATION

Studies	DEGREE IN ENGINEERING PHYSICS APPLIED TO INDUSTRY			**Subject**	Physics
Semester	2	**Course**	2	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	ENGLISH
Credits	3	**Hours/week**	0	**Total hours**	45 class hours + 30 non-class hours = **75 total hours**

2030 AGENDA GOALS

PROFESSORS

IGLESIAS SANCHEZ, ASIER

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
GENERAL PHYSICS I GENERAL PHYSICS II CHEMISTRY	*(No previous knowledge required)*

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GFR107 - Understanding the principles of thermodynamics and applying them to modelling and solving basic problems through the use of mathematics	x			2,6
G-RTR1 - To develop interdisciplinary projects specific to their specialty and of gradual complexity, - becoming aware of respect for human rights and fundamental rights, and analyzing and assessing the impact of the proposed solutions on the SDGs - to acquire and/or apply basic, advanced and/or avant-garde, demonstrating the ability to work in multidisciplinary teams and/or undertake further studies with a high degree of autonomy		x		0,16
G-RTR2 - To express information, ideas and the arguments that support them in an orderly, clear and coherent manner, orally and in writing, based on quality information, self-made or obtained from different sources, using inclusive and non-discriminatory language		x		0,24
			Total:	3

KC: Knowledge or Content / SK: Skills / AB: Abilities

SECONDARY LEARNING RESULTS

RGF218 **[!]** ***Comprende los principios de la Termodinámica y lo aplica a la modelización y resolución de los problemas básicos mediante el uso de las matemáticas.***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	10 h.	25 h.	35 h.
Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	30 h.		30 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	40%
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	20%
Individual written and/or oral tests or individual coding/programming tests	40%

MAKE-UP MECHANISMS

Individual written and/or oral tests or individual coding/programming tests

CH - Class hours: 40 h.
NCH - Non-class hours: 25 h.
TH - Total hours: 65 h.

2RGF293 **(2 sem)**

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

2RGF294 **[!]** ***(2 sem)Realiza una presentación oral del proyecto con argumentos elaborados por sí mismos y haciendo un uso correcto, inclusivo y no discriminatorio del lenguaje.***

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

2RGF291 **(2 sem)**

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W
Self-assessment	25%
Co-assessment	25%
Observation (technical capacity, attitude and participation)	50%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

2RGF290 **(2 sem)**

LEARNING ACTIVITIES	CH	NCH	TH
Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	85%
Presentation and defence of exercises, case studies, computer practical work, simulation practical work, laboratory practical work, term projects, end of degree project, master's thesis, challenges and problems	15%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

2RGF292 (2 sem)

LEARNING ACTIVITIES	CH	NCH	TH
Development and writing of records, reports, presentations, audiovisual material, etc. on projects/work experience/challenges/case studies/experimental investigations carried out individually and/or in teams	1 h.	1 h.	2 h.

EVALUATION SYSTEM	W
Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems	100%

MAKE-UP MECHANISMS

(No mechanisms)

Comments: Continuous assessment. Retake is not foreseen.

CH - Class hours: 1 h.
NCH - Non-class hours: 1 h.
TH - Total hours: 2 h.

CONTENTS

0. Preliminary Concepts

0.1 Thermal and thermodynamic equilibrium

0.2 Ideal gases and thermodynamic potentials

0.3 First and second laws of thermodynamics: Work, heat, and entropy

1. Thermophysical Properties of Materials and Pure Substances

1.1 Phase change processes and P-v-T diagrams in pure substances

1.2 Thermodynamic tables

1.3 Compressibility factor and real gas modeling

2. Engineering Applications

2.1 Thermodynamic analysis of open systems

i) Principle of conservation of mass

ii) First law of thermodynamics for open systems

iii) Second law of thermodynamics and entropy in open systems

iv) Application to engineering systems: Turbines, compressors and pumps, nozzles and diffusers, heat exchangers, valves, combustion chambers and boilers, condensers

2.2 Thermo-fluid power and refrigeration cycles

i) Gas Power Cycles: Brayton Cycle

ii) Vapor Power Cycles: Rankine Cycle, Combined Cycles, Cogeneration

iii) Refrigeration Cycles and Heat Pumps

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources	Bibliography
[!] *Apuntes de la asignatura* [!] *Plataforma Moodle* [!] *Programas*	https://labur.eus/COra9