

[GDI302] MATERIALS I

GENERAL INFORMATION

Studies	DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING		Subject	MATERIALS AND PROCESS	
Semester	1	Course	2	Mention / Field of specialisation	
Character	COMPULSORY				
Plan	2022	Modality	Face-to-face	Language	EUSKARA/CASTELLANO
Credits	4,5	Hours/week	3.11	Total hours	56 class hours + 56.5 non-class hours = 112.5 total hours

2030 AGENDA GOALS



PROFESSORS

TATO VEGA, GUILSON

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
CHEMISTRY	(No previous knowledge required)

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GDR206 - To analyze, select and implement different metallic (ferrous and non-ferrous alloys) and non-metallic materials from the point of view of their properties for design		x		4,02
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		0,32
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		0,16
Total:				4,5

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

ENAE LEARNING RESULTS

ENAE LEARNING RESULTS	ECTS
ENAE02 - Knowledge and understanding: A systematic understanding of the key aspects and concepts of their branch of engineering.	1,2
ENAE04 - Knowledge and understanding: To be aware of the multidisciplinary context of engineering.	0,3
ENAE06 - Analysis in engineering: Ability to apply their knowledge and understanding in analysing product, process and method engineering.	0,9
ENAE08 - Engineering projects: Ability to apply their knowledge in the development and completion of projects which meet specific requirements.	0,66
ENAE09 - Engineering projects: Understanding of the different methods and ability to use them.	0,24
ENAE10 - Research & innovation: Ability to perform bibliographic searches, to use databases and other sources of information.	0,12
ENAE11 - Research & innovation: Ability to design and carry out experiments, to interpret data and draw conclusions.	0,12
ENAE12 - Research & innovation: Technical and lab competences.	0,12
ENAE13 - Practical application of engineering: Ability to select and use suitable equipment, tools and methods.	0,12
ENAE14 - Practical application of engineering: Ability to combine theory and practice in order to solve engineering problems.	0,12
ENAE15 - Practical application of engineering: Understanding of applicable methods and techniques and their limitations.	0,12
ENAE16 - Practical application of engineering: To be aware of the implications of the practical application of engineering.	0,12
ENAE17 - Transversal competences: To work effectively, both individually and in a team.	0,12
ENAE18 - Transversal competences: To use different methods to communicate effectively with the engineering community and society in general.	0,12
ENAE19 - Transversal competences: Demonstrate that they are aware of the responsibility implied in the practical application of engineering, the social and environmental impact, and show commitment with professional ethics, responsibility and regulations of the practical application of engineering.	0,12
Total:	4,5

SECONDARY LEARNING RESULTS

1RGD290 (1 sem)

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

NCH

TH

3 h.

3 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Co-assessment

50%

(No mechanisms)

Observation (technical capacity, attitude and participation)

50%

CH - Class hours: 0 h.

NCH - Non-class hours: 3 h.

TH - Total hours: 3 h.

RGD208 [!] *Relacionar las propiedades mecánicas, físicas y el comportamiento en servicio de los polímeros con su composición y microestructura*

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

4 h.

10,5 h.

14,5 h.

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

2 h.

7 h.

9 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

8 h.

8 h.

Practical work in workshops and/or laboratories, individually and/or in teams

2 h.

2 h.

4 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

10%

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

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

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

70%

CH - Class hours: 16 h.

NCH - Non-class hours: 19,5 h.

TH - Total hours: 35,5 h.

RGD207 [!] *Relacionar las propiedades mecánicas de los metales con su composición y tratamiento térmicos*

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

4 h.

8 h.

12 h.

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

2 h.

6 h.

8 h.

Presentation by the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects

28 h.

2 h.

30 h.

Carrying out exercises and solving problems individually and/or in teams

2 h.

9 h.

11 h.

Practical work in workshops and/or laboratories, individually and/or in teams

2 h.

2 h.

4 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

10%

Reports on the completion of exercises, case studies, computer exercises, simulation exercises, laboratory exercises, term projects, challenges and problems

Presentation and defence of exercises, case studies,

20%

Individual written and/or oral tests or individual

computer practical work, simulation practical work,
laboratory practical work, term projects, end of degree
project, master's thesis, challenges and problems
Individual written and/or oral tests or individual
coding/programming tests

70%

CH - Class hours: 38 h.
NCH - Non-class hours: 27 h.
TH - Total hours: 65 h.

1RGD291 (1 sem)

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in
interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

NCH

TH

3 h.

3 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies,
computer exercises, simulation exercises, laboratory
exercises, term projects, challenges and problems

100%

(No mechanisms)

CH - Class hours: 0 h.
NCH - Non-class hours: 3 h.
TH - Total hours: 3 h.

1RGD293 (1 sem)

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in
interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

NCH

TH

2 h.

2 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies,
computer exercises, simulation exercises, laboratory
exercises, term projects, challenges and problems

100%

(No mechanisms)

CH - Class hours: 0 h.
NCH - Non-class hours: 2 h.
TH - Total hours: 2 h.

1RGD292 (1 sem)

LEARNING ACTIVITIES

Carrying out/resolving projects/challenges/cases, etc. to provide solutions to problems in
interdisciplinary contexts, real and/or simulated, individually and/or in teams

CH

NCH

TH

1 h.

1 h.

2 h.

EVALUATION SYSTEM

W

MAKE-UP MECHANISMS

Reports on the completion of exercises, case studies,
computer exercises, simulation exercises, laboratory
exercises, term projects, challenges and problems

100%

(No mechanisms)

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

1RGD294 (1 sem)

LEARNING ACTIVITIES

Conducting tests, giving presentations, presenting defences, taking examinations and/or doing checkpoints

CH

1 h.

NCH

1 h.

TH

2 h.

EVALUATION SYSTEM

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

W

100%

MAKE-UP MECHANISMS

(No mechanisms)

CH - Class hours: 1 h.

NCH - Non-class hours: 1 h.

TH - Total hours: 2 h.

CONTENTS

1. STATIC/TRACTION: Stiffness, Resistance, deformation,... - 1.1.1. Description of the test - 1.2.1.2. Scale effecto 1.2.1. Crystallography (seen in first year chemistry) - 1.2.2. Microstructure: phases, polycrystallinity, equilibrium diagrams (solid solution hardening) - 1.3.1.3. Fe-C alloys. Steels and castings - 1.4.1.4. Plastic deformation, hardeningHardening by plastic deformation (acritude) - 1.4.2.o 1.4.2. Morphology: Grain size, (hardening by grain joints).2. STATICS/HARDNESS - 2.1.2.1. Description of the test - 2.2. Hardening mechanisms (martensitic and precipitation hardening) - 2.2.1.o 2.2.1. Steels: Heat treatments (quenching and tempering, normalizing, annealing)Aluminum Alloys: Plastic deformation, precipitation, annealing.3. STATICS/FLUENCE - 3.1.3.1. Polymerso 3.1.1. Descriptiono 3.1.2. Classificationo 3.1.3. Physical properties, mechanical properties / creep (effect of time and temperature)4. CES - O 3.1.2.4.1. Introduction to CES as a tool for property queries

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

- [!] *Plataforma Moodle*
- [!] *Apuntes de la asignatura*
- [!] *Presentaciones en clase*
- [!] *Proyección de videos*
- [!] *Realización de prácticas en laboratorio*
- [!] *Transparencias de la asignatura*

Bibliography

- Asbhy, M. Unit 1. The materials of engineering. Presentación. Granta Design and M. F. Ashby, 2018.
- Asbhy, M. Unit 2. Materials property charts: mapping materials. Presentación. Granta Design and M. F. Ashby, 2018
- Asbhy, M. Unit 3. The Elements database: properties, relationships and resources. Presentación. Granta Design and M. F. Ashby, 2018.
- "Materials: engineering, science, processing and design". Ashby, Michael; Shercliff, Hugh; Cebon, David. Elsevier, Amsterdam. 2007. 1st edition. ISBN-13: 978-0-7506-8391-3. ISBN-10: 0-7506-8391-0 <https://katalogoa.mondragon.edu/janium-bin/sumario.pl?Id=20210923145641>
- "Ciencia e Ingeniería de los Materiales"; vol. I y II; Callister, W.D./ Ed. Reverté; Barcelona, 1995, 3ª edición
- Programa de selección de materiales CES de Michael Ashby
- "Ciencia e Ingeniería de los Materiales"; W.D. Callister, Jr., D. G. Rethwisch, 2ª edición (correspondiente a la 9ª Edición original), Ed. Reverté; Barcelona, 2016.