

[GDN302] THERMAL AND FLUID ENGINEERING

GENERAL INFORMATION

Studies	DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING		Subject	?	
Semester	1	Course	3	Mention / Field of specialisation	
Character	COMPULSORY				
Plan	2022	Modality	Face-to-face	Language	CASTELLANO/EUSKARA
Credits	4,5	Hours/week	3.33	Total hours	60 class hours + 52.5 non-class hours = 112.5 total hours

PROFESSORS

IGLESIAS SANCHEZ, ASIER
BIZKARRA LANGARA, KEPA

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
MATHEMATICS I	(No previous knowledge required)
MATHEMATICS II	
PHYSICS I	
PHYSICS II	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GDR304 - To know the basic principles of thermodynamics and fluid mechanics to apply them in product design		x		3,78
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		0,4
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		0,32
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.	1,12
ENAE06 - Analysis in engineering: Ability to apply their knowledge and understanding in analysing product, process and method engineering.	0,92
ENAE08 - Engineering projects: Ability to apply their knowledge in the development and completion of projects which meet specific requirements.	0,4
ENAE10 - Research & innovation: Ability to perform bibliographic searches, to use databases and other sources of information.	0,24
ENAE14 - Practical application of engineering: Ability to combine theory and practice in order to solve engineering problems.	0,2
ENAE18 - Transversal competences: To use different methods to communicate effectively with the engineering community and society in general.	1,62
Total:	4,5

CONTENTS

- 1.-FLUID PROPERTIES
 - 1.1.- Basics concepts and definition
 - 1.2.- Properties of the fluid
- 2.- HYDROSTATIC
 - 2.1.- Basics concepts and definition
 - 2.2.- Pressure measurements
 - 2.3.- Pascal ́s law
 - 2.4.- Static forces acting on submerged surface
- 3.- HYDRODYNAMICS
 - 3.1.- Basic concepts
 - 3.2.- Conservation of Mass
 - 3.3.- Conservation of Momentum
 - 3.4.- Conservation of Energy (Bemoulli ́s principle)

- 4.- VISCOUS FLOW
 - 4.1.- Load loss
 - 4.2.- Reynold ́s experiment
 - 4.3.- Poiseuille ́s equation
 - 4.4.- Darcy-Weisbach equation. General concepts
 - 4.5.- Localized load loss
 - 4.6.- Union of pipes
- 5.-HEAT TRANSFER MECHANISMS
 - 5.1.-Conduction
 - 5.2.-Convection
 - 5.3.-Radiation
- 6.-FINS (extended surfaces)
- 7.-HEAT EXCHANGERS DESIGN

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

(No resources)

Bibliography

Jariakin konprimaezinen mekanika eta turbomakina hidraulikoak; J. Agüera Soriano; EHU/UPV-ko argitalpen zerbitzua, Bilbo, 1994.

Fluidoan fluxua eta bero-trukea ingeniarietan, O. Levenspiel; EHU/UPV-ko argitalpen zerbitzua, Bilbo, 2009.

Fisika zientzialari eta ingeniariarentzat, P. M. Fishbane, S. Gasiorowicz, S. T. Thornton, EHU-ko argitalpen zerbitzua, 2008.

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Forma eta fluxua. Arrastearen fluido-dinamika, A. H. Shapiro, Itzul.: J. R. Etxebarria, J. M. Igartua, J. I. Urresti; Udako Euskal Unibertsitatea, Bilbo, 2000.

Ingeniaritza fluidomekanikoa: ariketa-bilduma, X. Almandoz, B. Mongelos, I. Pellejero, F. Santos; Elhuyar; Usurbil; 1998.

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2500 Solved Problems in Fluid Mechanics and Hydraulics, J. B. Evett, Cheng Liu., Mc Graw- Hill.

A heat transfer textbook, John H. Lienhard IV and John H. Lienhard V, third edition, Cambridge MA, Phlogiston Press, 2004.

Heat Transfer A Practical Approach, Cengel, Yunus A and Cengel, Yunus, McGraw Hill Professional, 2003.

Fundamentals of heat and mass transfer, Incropera Frank, Dewitt David, Bergman Theodore, Lavine Adrienne, sixth edition, 2011