[GMF302] MECHANICAL DESIGN

GENERAL INFORMATION

Studies	DEGREE IN MECHANICAL ENGINEERING			**Subject**	?
Semester	1	**Course**	3	**Mention / Field of specialisation**	
Character	COMPULSORY				
Plan	2022	**Modality**	Face-to-face	**Language**	CASTELLANO/EUSKARA
Credits	6	**Hours/week**	3.56	**Total hours**	64 class hours + 86 non-class hours = **150 total hours**

PROFESSORS

EZKURRA MAYOR, MIKEL
ARETXABALETA RAMOS, LAURENTZI
AZPI-ZURIARRAIN BERASATEGUI, AITOR (GOIERRI)
LARRAÑAGA AMILIBIA, JON
LARRAÑAGA SERNA, MIREN
TENA MERINO, IOSU
IÑURRITEGUI MARROQUIN, AUREA
INSAUSTI GARMENDIA, OLATZ
VIDAL EZQUERRA, IKER

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
GRAPHIC EXPRESSION I	Mechanical Design
GRAPHIC EXPRESSION II	2D/3D design software (SolidWorks)
INTRODUCTION TO MECHANICAL DESIGN	

LEARNING RESULTS

LEARNING RESULTS	KC	SK	AB	ECTS
GMR306 - To demonstrate ability to calculate, design and test machines		*x*		5,08
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*		0,44
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*		0,48
			Total:	6

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

ENAEE LEARNING RESULTS

ENA102 - Knowledge and comprehension: Knowledge and comprehension of the engineering disciplines of their speciality, at the level necessary to acquire the rest of the competencies of the degree, including notions of the latest advances.

ENA103 - Knowledge and comprehension: Awareness of the multidisciplinary context of engineering.

ENA104 - Analysis in engineering: The ability to analyse complex products, processes and systems in their field of study; choose and apply relevant analytical, calculation and experimental methods in a suitable way; and correctly interpret the results of such analyses.

ENA105 - Analysis in engineering: The ability to identify, formulate and solve engineering problems in their speciality; choose and apply adequately established analytical, calculation and experimental methods; and acknowledge the importance of social, health and safety, environmental, economic, and industrial restrictions.

ENA106 - Engineering projects: Ability to project, design and develop complex products (parts, components, finished products, etc.), processes and systems of their speciality, which meet the established requirements, including awareness of the social, health and safety, environmental, economic and industrial aspects, as well as selecting and applying appropriate project methods.

ENA107 - Engineering projects: Project capacity some state-of-the-art knowledge of their engineering speciality.

ENA108 - Research and innovation: Ability to carry out bibliographic searches and consult and use databases and other information sources with discretion, in order to carry out simulation and analysis with the aim of conducting research on technical topics of their speciality.

ENA109 - Research and innovation: Ability to consult and apply codes of good practice and security in their speciality.

ENA110 - Research and innovation: Capacity and ability to project and carry out experimental investigations, interpret results, and reach conclusions in their field of study.

ENA111 - Practical application of engineering: Understanding of the applicable techniques and methods fr analysis, design and research and their limitations in the field of their speciality.

ENA112 - Practical application of engineering: Practical competency to solve complex problems, carry out complex engineering projects, and conduct investigations specific to their speciality.

ENA113 - Practical application of engineering: Knowledge of application of materials, equipment and tools, engineering technology and processes, and their limitations in the field of their speciality.

ENA114 - Practical application of engineering: Ability to apply standards of engineering practice in their speciality.

ENA115 - Practical application of engineering: Knowledge of the social, health and safety, environmental, economic and industrial implications of engineering practice.

ENA118 - Preparation of judgements: Ability to manage complex technical or professional activities or projects of their speciality, taking responsibility for decision making.

ENA119 - Communication and Teamwork: Ability to effectively communicate information, ideas, problems and solutions in the field of engineering and with society in general.

ENA120 - Communication and Teamwork: Ability to operate effectively in domestic and international contexts, individually and as a team, and to cooperate with both engineers and people from other disciplines.

ENA121 - Continued training: Ability to acknowledge the need for their own continued training and to undertake this activity throughout their professional life independently.

ENA122 - Continued training: Ability to stay up to date on science and technology innovations.

CONTENTS

1. Kinematic chain modelling:

- Modelling principles

- Mechanical transmissions

- Steady-state vs. transient conditions

2. Dimensioning of machine elements:

- Rolling elements:

Rolling bearings

Ball screws

Guiding systems

- Belt transmission

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Subject notes
Technical articles
Class presentations
Video projections
Student book
Slides of the subject

Bibliography

MOTT, Robert L. Diseño de elementos de máquinas. Pearson Prentice Hall (2006)

DECKER, Karl-Heinz. Elementos de máquinas (Manual del Ingeniero Técnico, Volumen XIII) URMO

BUDYNAS, Richard. Diseño en ingeniería mecánica de Shigley. McGraw-Hill Interamericana de España S.L.; Edición: 8 (26 de febrero de 2008)

NORTON, Robert L. Diseño de Máquinas. Norton, Robert L. (2010)

HARNOY Avraham. Bearing Design in Machinery. Engineering Tribology and Lubrication Marcel Dekker, Inc (2003)

BRANDLEIN, J. Ball and Roller Bearings Theory, Design, and Application. John Wiley Sons, Ltd. (1999)

HARRIS, KOTZALAS. Advanced Concepts of bearing Technology. Taylor & Francis (2007)

HUNG NGUYEN-SCHÄFER. Computational Design of Rolling Bearings. Springer (2016)

ERWIN V. ZARETSKY. Rolling Bearing Life Prediction, Theory and Application. Glenn Research Center, Cleveland, Ohio (2013) https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20130011515.pdf

HUGH SPIKES. Basic of EHL for practical application. Lubrication science 2015; 27:45-67

CHILDS, Peter RN. Mechanical Design Engineering Handbook (2nd edition). Butterworth-Heinemann (2014)

BUDYNAS, Richard G. eta all. Shigley's Mechanical Engineering Design (9th edition). Mc Graw Hill (2011)

An Introduction to Stress Analysis and Transducer Design using Strain Gauges; 1987; Karl Hoffmann; Pfungstadt; ASIN: B001ALAP1WHBM; www.hbm.com

Strain Gage Installations with M-Bond 200 Adhesive; Instruction Bulletin B-127-14; Micro-Measurements; www.micro-measurements.com

Strain Gage Selection: Criteria, Procedures, Recommendations; Tech Note TN-505-4; Vishay Micro-measurements; www.vishaymg.com

Vibration Transducers and Signal Conditioning; Brüel & Kjaer Sound and Vibration Measurement A/S; 1998; BA 7675-12; www.bksv.com

Introduction to Shock and Vibration; Brüel & Kjaer Sound and Vibration Measurement A/S; 1998; BA 7674-12; www.bksv.com