Advanced machine design

Academic Year: (2023 / 2024) **Review date: 06/07/2023 13:20:17**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: RUBIO HERRERO, PATRICIA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Engineering Graphics
Machine Mechanics
Production systems and manufacturing technologies
Elasticity and strength of materials
Machines Technology

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB3. Students have the ability to gather and interpret relevant data (usually within their field of study) in order to make judgements which include reflection on relevant social, scientific or ethical issues.
CB5. Students will have developed the learning skills necessary to undertake further study with a high degree of autonomy.
CG1. Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.
CG3. Ability to design a system, component or process in the field of Industrial Technologies to meet the required specifications
CG4. Knowledge and ability to apply current legislation as well as the specifications, regulations and mandatory standards in the field of Industrial Engineering.
CG5. Adequate knowledge of the concept of company, institutional and legal framework of the company. Organisation and management of companies.
CG6. Applied knowledge of company organisation.
CG8. Knowledge and ability to apply quality principles and methods.
CG9. Knowledge and ability to apply computational and experimental tools for the analysis and quantification of Industrial Engineering problems.
RA1. Knowledge and understanding: Have basic knowledge and understanding of science, mathematics and engineering within the industrial field, as well as knowledge and understanding of Mechanics, Solid and Structural Mechanics, Thermal Engineering, Fluid Mechanics, Production Systems, Electronics and Automation, Industrial Organisation and Electrical Engineering.
RA2. Engineering Analysis: To be able to identify engineering problems within the industrial field, recognise specifications, establish different resolution methods and select the most appropriate one for their solution
RA3. Engineering Design: To be able to design industrial products that comply with the required specifications, collaborating with professionals in related technologies within multidisciplinary teams.
RA5. Engineering Applications: To be able to apply their knowledge and understanding to solve problems and design devices or processes in the field of industrial engineering in accordance with criteria of cost, quality, safety, efficiency and respect for the environment.

OBJECTIVES

To know the concepts of Mechanical Engineering using advanced computer-aided design methods.
To be able to apply computer-aided design techniques to solve problems in the field of Industrial Engineering.
To be able to apply computational analysis methods to the design and calculation of machines.
To be able to select suitable computer aided design methods for machine design.
To be able to apply theory and practice in computer-aided mechanical design.

DESCRIPTION OF CONTENTS: PROGRAMME

1. INTRODUCTION TO MECHANICAL DESIGN
2. COMPUTER AIDED DESIGN
3. SOLIDS MODELING
4. ASSEMBLY MODELING
5. FINITE ELEMENT METHOD
6. OPTIMAL DESIGN OF MECHANICAL COMPONENTS
7. CAD DESIGN

LEARNING ACTIVITIES AND METHODOLOGY

Theoretical-practical classes.
Student work.
Tutoring.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	0
% of continuous assessment (assigments, laboratory, practicals…):	100

The evaluation system consists of exercises, elaboration and presentation of a team report and a partial exam.

ORDINARY EXAM:

Continuous evaluation 100% of the mark. The percentage of each of the parts in the final grade is:

Exercises: 20 %.

Elaboration and presentation of the report: 30 %.

Partial exam: 50 %.

In order to pass the course a minimum of 4/10 is required in each part of the partial exam.

EXTRAORDINARY EXAM:

The grade will be the maximum of the following 2 marks:

- Final exam grade (60%) and continuous assessment grade (40%).

- Final exam grade (100%).

BASIC BIBLIOGRAPHY

- Jeús Meneses, CArolina Álvarez, Santiago Rodríguez Introducción al Solid Edge, Thomson, 2006

- Nam H. Kim et al. Introduction to finite element analysis and design, John Wiley & Sons, 2018

- Rafael Gutiérrez, Lidia Esteban, Esther Pascual Solid Edge ST . Tradicional y si¿ncrono, RA-MA, 2010

BASIC ELECTRONIC RESOURCES

- . Recursos gratuitos de Solid Edge para estudiantes.: https://solidedge.siemens.com/es/solutions/users/students/

- . Abaqus Student edition: https://academy.3ds.com/en/software/abaqus-student-edition

- . Abaqus documentation: https://abaqus-docs.mit.edu/2017/English/SIMACAEEXCRefMap/simaexc-c-docproc.htm