UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: FUNDAMENTALS OF MECHANICAL DESIGN
Type: CORE COURSE
Degree: 344 - CHEMICAL ENGINEERING
Center: 1 - FACULTY OF SCIENCE AND CHEMICAL TECHNOLOGY
Year: 2
Main language: Spanish
Use of additional languages:
Web site:

Code: 57715
ECTS credits: 6
Academic year: 2023-24
Group(s): 21
Duration: C2
Second language:
English Friendly: Y
Bilingual: N

Lecturer: **RICARDO LOPEZ ANTON** - Group(s): **21**

Building/Office	Department	Phone number	Email	Office hours
Fac. CC y Tecnologías Químicas	FÍSICA APLICADA	926052782	ricardo.lopez@uclm.es	arrange by email a date with the lecturer

Lecturer: **ANGEL PEREZ MARTINEZ** - Group(s): **21**

Building/Office	Department	Phone number	Email	Office hours
E. Costa / despacho 13	INGENIERÍA QUÍMICA	3413	angel.perez@uclm.es	Monday, Tuesday and Wednesday from 17:00 to 19:00

Lecturer: **ALBERTO RODRÍGUEZ GÓMEZ** - Group(s): **21**

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	INGENIERÍA QUÍMICA		Alberto.RGomez@uclm.es	arrange by email a date with the lecturer

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

This subject is part of the second module (common to the Industrial branch). It is closely related to the "Materials in Chemical Engineering" and "Design of equipment and instalations" subjects. This subject provides the basic background (Materials resistance and Machine Science) required for the mechanical design of the main equipment used in the Chemical Industry

4. Degree competences achieved in this course

Course competences

Code	Description
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
E13	Knowledge of the principles of machine theory and mechanisms.
E14	Knowledge and use of the principles of the resistance of materials.
G03	Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and give them versatility to adapt to new situations.
G05	Knowledge for the realization of measurements, calculations, valuations, appraisals, surveys, studies, reports, work plans and other analogous works.
G20	Ability to analyze and solve problems

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To be able to perform the kinematic analysis of the mechanisms, understanding the basis of the kinematics of the solid in the plane and being able to extrapolate it to the case of mechanisms.

To recognize the different types of efforts that can act on a team and establish the criteria of resistance (tensions and admissible deformations) that allow designing it with reliability.

To learn the basics of static and material resistance.

To learn the basic concepts about the operation of machines and mechanisms, as well as being able to distinguish their different types.

To understand the dynamics of the mechanisms, either alone or integrated in machines.

6. Units / Contents

Unit 1: Fundamentals of Statics and Material Resistance

Unit 2: Design of Structural elements under direct stress

Unit 3: Unitary deformation and thermical effort
Unit 4: Shear and bending moments
Unit 5: Shear and benfing moment in beams
Unit 6: Introduction to Machines and Mechanisms
Unit 7: Plane Kinematics (I): velocity
Unit 8: Plane Kinematics (II): acceleration
Unit 9: Plane Dynamics

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB02 CB03 E13 E14 G03 G05 G20	1	25	N	-	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB02 CB03 E13 E14 G03 G05 G20	1	25	Y	N	
In-class Debates and forums [ON-SITE]	Problem solving and exercises	CB02 CB03 E13 E14 G03 G05 G20	0.1	2.5	Y	N	
Progress test [ON-SITE]	Problem solving and exercises	CB02 CB03 E13 E14 G03 G05 G20	0.1	2.5	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 E13 E14 G03 G05 G20	3.6	90	N	-	
Mid-term test [ON-SITE]	Assessment tests	CB02 CB03 E13 E14 G03 G05 G20	0.2	5	Y	N	
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of active participation	15.00%	0.00%	Resolution of problems and tasks during the seminars
Assessment of problem solving and/or case studies	15.00%	0.00%	resolution of practical cases and tasks
Mid-term tests	70.00%	0.00%	Resolution of applied theoretical questions and basic problems. The average mark of the partial tests must be equal to five or higher whereas the minimum mark in the mid-term tests must be greater than four.
Final test	0.00%	100.00%	Final exam that includes evaluation of all the content and training activities of the subject
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

To succesfully pass the subject a minimum mark of 4/10 in each part should be obtained by the student and an average mark above 5/10.
The students who have not succesfully passed some of the mid-term exams will be examinated of that part of the subject, keeping the mark of the mid-term that has already succesfully passed (for this call)

Non-continuous evaluation:

The student will examine all the material taught and all the activities carried out in the subject, through an exam in the corresponding call, whose grade must be equal to or greater than five

Specifications for the resit/retake exam:

To succesfully pass the subject a minimum mark of 5/10 should be obtained.
If the student has obtained a mark of 5 or more in some mid-term exam, he/she has the option to take the exam only of the mid-term part not succesfully passed.

Specifications for the second resit / retake exam:

To succesfully pass the subject a minimum mark of 5/10 should be obtained

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	**hours**
In-class Debates and forums [PRESENCIAL][Problem solving and exercises]	2.5
Progress test [PRESENCIAL][Problem solving and exercises]	2.5
Unit 1 (de 9): Fundamentals of Statics and Material Resistance	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	8

Unit 2 (de 9): Design of Structural elements under direct stress	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	3
Unit 3 (de 9): Unitary deformation and thermical effort	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	9
Unit 4 (de 9): Shear and bending moments	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	10
Unit 5 (de 9): Shear and benfing moment in beams	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	14
Unit 6 (de 9): Introduction to Machines and Mechanisms	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	4
Unit 7 (de 9): Plane Kinematics (I): velocity	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	14
Unit 8 (de 9): Plane Kinematics (II): acceleration	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	13
Unit 9 (de 9): Plane Dynamics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	25
In-class Debates and forums [PRESENCIAL][Problem solving and exercises]	2.5
Progress test [PRESENCIAL][Problem solving and exercises]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Beer, Ferdinand P.	Mecánica vectorial para ingenieros : dinámica	McGraw-Hill Interamericana		978-607-15-0923-9	2013	
Beer, Ferdinand P.	Mecánica vectorial para ingenieros : estática	McGraw-Hill Interamericana		978-607-15-0277-3	2013	
García Prada, Juan Carlos	Problemas resueltos de teoría de máquinas y mecanismos	Thomson		978-84-9732-495-3	2007	
Hibbeler, R. C.	Mecánica vectorial para ingenieros : dinámica	Pearson Educación		970-26-0500-8	2004	
Hibbeler, R. C.	Mecánica vectorial para ingenieros. Estática	Pearson Educación		970-26-0501-6	2004	
Mott, Robert L.	Resistencia de materiales aplicada	Prentice Hall Hispanoamericana	Mexico	968-880-801-6	1996	
Popov, Egor P.	Mechanics of materials	Prentice-Hall	New Yersey	0-13-571158-4	1978	
Riley, W.F.	Mecánica de materiales	Limusa Wiley	México	968-18-5912-X	2001	
Simón, A.	Fundamentos de teoría de máquinas	Bellisco		84-95279-96-7	2004	
Beer, F.P y colaboradores	Mecánica de materiales	McGraw Hill	México	970-10-3950-5	2006	