

**1. General information****Course:** STRENGTH OF MATERIALS**Type:** CORE COURSE**Degree:** 419 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING**Center:** 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING**Year:** 2**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 56310**ECTS credits:** 6**Academic year:** 2023-24**Group(s):** 56**Duration:** First semester**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** XIAOXIN ZHANG --- - Group(s): 56

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**2. Pre-Requisites**

The student must have acquired the knowledge imparted in the subjects of mathematics and physics.

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

This subject provides the student with skills to carry out the professional activity of Industrial Technical Engineer related to the fundamental concepts of structural calculation.

**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.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEC08	Knowledge and use of the principles of the resistance of materials.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	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.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

**5. Objectives or Learning Outcomes****Course learning outcomes****Description**

Ability to dimension simple structural elements

Ability to calculate the stress distribution in a cross-section.

Knowledge of when a real solid can be studied by means of two simplifications, geometric and material

Acquisition of manual techniques for calculating displacements and forces in structural elements.

Study of one-dimensional solids (bars and beams) made of a material that behaves in the elastic range.

**6. Units / Contents**

**Unit 1: Calculation of structures formed by one-dimensional elements. Structures of articulated nodes and rigid nodes.**

**Unit 2: Calculation of reactions and forces in isostatic systems.**

**Unit 3: Methods for obtaining turns and displacements. Elasticity of the beam and deformations.**

**Unit 4: Calculation of reactions and forces in hyperstatic systems.**

**Unit 5: Normal and tangential stresses in bending. Combination of forces.**

**Unit 6: Torsion**

**Unit 7: Buckling, theory of Euler**

**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]	Combination of methods	CB02 CB03 CB04 CB05 CEC08 CG03 CG04 CT02 CT03	1.36	34	N		The teacher will focus on the topic and the fundamental contents of the subject, using a blackboard, audiovisual media and academic experiences.
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB02 CB03 CB04 CB05 CEC08 CG03 CG04 CT02 CT03	0.28	7	N		The teacher will carry out exercises and practical problems related to the corresponding topic.
Formative Assessment [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 CEC08 CG03 CG04 CT02 CT03	0.16	4	Y	Y	They will consist of two tests related to aspects of the theoretical-practical application.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB02 CB03 CB04 CB05 CEC08 CG03 CG04 CT02 CT03	0.6	15	Y	Y	Resolution of individual or small group laboratory practices with computers.
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 CB04 CB05 CEC08 CG03 CG04 CT02 CT03	3.6	90	N		Study and preparation of exams by the student autonomously.
<b>Total:</b>			<b>6</b>	<b>150</b>			
<b>Total credits of in-class work: 2.4</b>			<b>Total class time hours: 60</b>				
<b>Total credits of out of class work: 3.6</b>			<b>Total hours of out of class work: 90</b>				

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
Mid-term tests	70.00%	0.00%	Two tests related with the application of theoretical-practical aspects. Each test must be passed at least 4 out of 10.
Final test	0.00%	70.00%	It will consist of a test that encompasses all the topics of the subject (final exam).
Projects	15.00%	15.00%	The reports of seminars, problems and / or papers presented as well as the attitude shown by the student will be evaluated.
Assessment of activities done in the computer labs	15.00%	15.00%	Use software (MDSolids) to check the analytical results of the problems. The results obtained and the cleaning and presentation of the document will be taken into account. The content is on flexure.
<b>Total:</b>	<b>100.00%</b>	<b>100.00%</b>	

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:

CONSIDERATIONS IN CASE OF COPYING: Those students who submit the practice and problem assignments (that is, whose percentage of resemblance to other student(s), from their course or from previous ones, is greater than 80%), will be evaluated with a zero in this activity.

The subject will be passed with a score equal to or greater than 5.

Those students who have not passed any of the partial exams, will maintain the score of the exams passed for the final ordinary and extraordinary exams, having to be examined only for the partial tests not passed.

##### Non-continuous evaluation:

The subject will be passed with a score equal to or greater than 5.

#### Specifications for the resit/retake exam:

The subject will be passed with a score equal to or greater than 5.

#### Specifications for the second resit / retake exam:

The subject will be passed with a score equal to or greater than 5.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	34
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	7
Formative Assessment [PRESENCIAL][Assessment tests]	4
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Combination of methods]	34
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	7
Formative Assessment [PRESENCIAL][Assessment tests]	4
Study and Exam Preparation [AUTÓNOMA][Self-study]	90

**10. Bibliography and Sources**

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Russell Charles Hibbeler	Mechanics of materials	Pearson		9780134319650	2015	
Vázquez Fernández, Manuel	Resistencia de materiales	Noela		84-88012-05-5	1999	
Beer, Ferdinand P.	Mecánica de materiales	McGraw-Hill Interamericana		970-10-6101-2	2007	
Beer, Ferdinand P.	Mecánica vectorial para ingenieros : Estática	McGraw-Hill Interamericana		978-607-15-0277-3	2010	
Ortiz Berrocal, Luis	Resistencia de materiales	McGraw-Hill		978-84-481-5633-6	2007	
Rodríguez-Avial Azcunaga, Fernando	Resistencia de materiales	Librería Bellisco		84-85198-58-1 (T. II	1990	
Timoshenko, S.P., Gere, J.M.	Resistencia de Materiales	Thomson		8497320654	2002	