UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: MECHANICS OF CONTINUOUS MEDIA AND MATERIALS SCIENCE
Code: 310801
Type: CORE COURSE
ECTS credits: 9
Degree: 2343 - MASTERS DEGREE PROGRAMME IN ENGINEERING OF ROADS, CANALS AND PORTS
Academic year: 2020-21
Center: 603 - E.T.S. CIVIL ENGINEERS OF CR
Group(s): 20
Year: 1
Duration: First semester
Main language: English
Second language: Spanish
Use of additional languages:
English Friendly: N
Web site:
Bilingual: N

Lecturer: **GONZALO FRANCISCO RUIZ LOPEZ** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
Politécnico/2-A61	MECÁNICA ADA. E ING. PROYECTOS	3257	gonzalo.ruiz@uclm.es	

Lecturer: **EDUARDO WALTER VIEIRA CHAVES** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
D55	MECÁNICA ADA. E ING. PROYECTOS	6312	eduardo.vieira@uclm.es	

Lecturer: **CHENGXIANG YU ---** - Group(s): **20**

Building/Office	Department	Phone number	Email	Office hours
A55	MECÁNICA ADA. E ING. PROYECTOS	6313	chengxiang.yu@uclm.es	Every day with appointments.

2. Pre-Requisites

Rigid Body Mechanics, Solid Mechanics, Science and Technology of Civil Engineering Materials, Strength of Materials

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

Not established

4. Degree competences achieved in this course

Course competences

Code	Description
AFC2	Understanding and mastering the laws of thermomechanics of continuous media and the ability to apply them in engineering fields such as fluid mechanics, mechanics of materials, structural theory, etc.
CB06	Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context.
CB07	Apply the achieved knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the area of study
CB09	Know how to communicate the conclusions and their supported knowledge and ultimate reasons to specialized and non-specialized audiences in a clear and unambiguous way
CB10	Have the learning skills which allow to continue studying in a self-directed or autonomous way
G05	Knowledge of the Civil Engineering profession and the activities that can be carried out in the field of civil engineering.
G07	Knowledge to apply technical and managerial skills in R&D&I activities in the field of civil engineering.
G25	Ability to identify, measure, enunciate, analyse, diagnose and scientifically and technically describe a civil engineering problem
G27	Ability to communicate in a second language.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Students use computer programs that simulate the mechanical behavior of materials and structures in static and dynamic regimes.

Students understand the behavior of materials, structural elements and structures through constitutive models. They apply these models to specific cases and use them to predict mechanical phenomena.

Additional outcomes

Measure the mechanical properties of construction materials in Civil engineering

6. Units / Contents

Unit 1: Termoelasticity, elasticity and linear viscoelasticity

Unit 1.1 termoelastic and linear elastic behavior

Unit 1.2 Viscoelastic behavior

Unit 2: Plasticity and viscoplasticity

Unit 2.1 Plastic behavior

Unit 2.2 Viscoplastic behavior

Unit 3: Fracture Mechanics

Unit 3.1 Failure criterion: the global perspective

Unit 3.2 Failure criterion: the local perspective

Unit 3.3 Subcritic fracture

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	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	1.9	47.5	Y	N	
Class Attendance (practical) [ON-SITE]	Project/Problem Based Learning (PBL)	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	0.3	7.5	Y	N	
Practicum and practical activities report writing or preparation [OFF-SITE]	Cooperative / Collaborative Learning	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	0.5	12.5	Y	Y	
Laboratory practice or sessions [ON-SITE]	Combination of methods	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	0.3	7.5	Y	Y	
Study and Exam Preparation [OFF-SITE]	Combination of methods	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	5.8	145	Y	N	
Progress test [ON-SITE]	Assessment tests	AFC2 CB06 CB07 CB09 CB10 G05 G07 G25 G27	0.2	5	Y	N	
		Total:	**9**	**225**			
		Total credits of in-class work: 2.7					**Total class time hours: 67.5**
		Total credits of out of class work: 6.3					**Total hours of out of class work: 157.5**

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
Practicum and practical activities reports assessment	16.80%	16.80%	
Theoretical exam	50.00%	83.20%	
Assessment of active participation	16.60%	0.00%	
Assessment of problem solving and/or case studies	16.60%	0.00%	
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:

The continuous assessment is based on the evaluation system described above with the corresponding weights.
In particular, there will be three written tests evaluated from 0 to 10 (a minimum of 5 is needed to pass), two practice reports and weekly assignments.

Non-continuous evaluation:

The non-continuous evaluation is based on the evaluation system described above with the corresponding weights. In particular, the written exam will be evaluated from 0 to 10, a minimum of 5 is necessary to pass the subject.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours **hours**

Unit 1 (de 3): Termoelasticity, elasticity and linear viscoelasticity

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	15
Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)]	2.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	4
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	2.5
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	47.5
Progress test [PRESENCIAL][Assessment tests]	1.5

Group 20:

Initial date: 28-09-2020 **End date:** 18-12-2020

Unit 2 (de 3): Plasticity and viscoplasticity

Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	15
Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)]	2.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	4.5
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	2.5

Study and Exam Preparation [AUTÓNOMA][Combination of methods]	47.5
Progress test [PRESENCIAL][Assessment tests]	2
Group 20:	
Initial date: 29/10/2018	**End date:** 23/11/2018
Unit 3 (de 3): Fracture Mechanics	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	17.5
Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)]	2.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	4
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	2.5
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	50
Progress test [PRESENCIAL][Assessment tests]	1.5
Group 20:	
Initial date: 27/11/2018	**End date:** 21/12/2018
Global activity	
Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	47.5
Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)]	7.5
Practicum and practical activities report writing or preparation [AUTÓNOMA][Cooperative / Collaborative Learning]	12.5
Laboratory practice or sessions [PRESENCIAL][Combination of methods]	7.5
Study and Exam Preparation [AUTÓNOMA][Combination of methods]	145
Progress test [PRESENCIAL][Assessment tests]	5
Total horas:	225

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house Citv	ISBN	Year	Description
Chadwick, Peter	Continuum mechanics: concise theory and problems	Dover	0-486-40180-4	1999	
Chandrasekharaiah, D. S.	Continuum mechanics	Academic Press	0-12-167880-6	0	
Chaves, E.W.V.	Mecánica del medio continuo: (conceptos básicos)	CIMNE	978-84-96736-38-2	2007	
Chaves, E.W.V.	Mécanica del medio continuo: modelos constitutivos / Eduardo	CIMNE	978-84-96736-68-9	2009	
Chaves, E.W.V.	Notes on Continuum Mechanics	Springer/CIMNE	978-94-007-5985-5	2013	
Chaves, E.W.V.	Solving Problems by means of Continuum Mechanics https://previa.uclm.es/profesorado/evieira/ftp/apuntes/mmc_problems.pdf				
Christensen, R.M.	Theory of Viscoelasticity	Dover	0-486-42880-X	1982	
Chung, T. J.	General continuum mechanics	Cambridge University Press	978-0-521-87406-9	2007	
Gurtin, Morton E.	An introduction to continuum mechanics	Academic Press	0-12-309750-9	1981	
Haupt, Peter	Continuum mechanics and theory of materials	Springer	3-540-66114-X	2000	
Holzapfel, Gerhard A.	Nonlinear solid mechanics: a continuum approach for engineer	John Wiley & Sons	0-471-82319-8	2000	
J. Chakrabarty	Theory of Plasticity	Elsevier	978-0-7506-6638-2	2006	
Malvern, Lawrence E.	Introduction to the mechanics of a continuous medium	Prentice-Hall	0-13-487603-2	1969	
Mauel Elices	Mecanica de la fractura	ETSI de Caminos, UPM	9788474931976	1993	
Norman E. Dowling	Mechanical behavior of materials. Engineering Methods for deformation, fracture and fatigue	Prentice Hall	0-13-905720-X	1999	
Ogden, R.W.	non-linear elastic deformation	Dover		1984	
Oliver, X; Agelet de Saracíbar, C.	Mecánica de medios continuos para ingenieros	CIMNE	84-8301-412-2	2000	
Sanchez Galvez, Vicente	Curso de comportamiento plástico de materiales	Universidad Politécnica de Madrid, Departamento de	84-7493-261-0	1999	
Basar, Yavuz	Nonlinear continuum mechanics of solids: fundamental mathema	Springer	3-540-66601-X	2000	