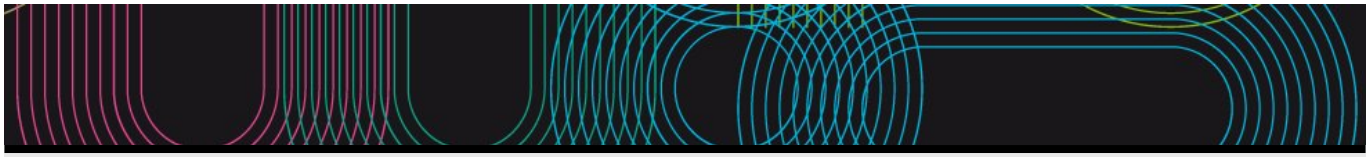

IDENTIFYING DATA				
Computer-Aided Mechanical Design				
Subject	Computer-Aided Mechanical Design			
Code	V04M141V01316			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Optional	2nd	1st
Teaching language	English			
Department				
Coordinator	Segade Robleda, Abraham López Campos, José Ángel			
Lecturers	Casarejos Ruiz, Enrique López Campos, José Ángel Segade Robleda, Abraham			
E-mail	joseangellopezcampos@gmail.com asegade@uvigo.es			
Web	http://moovi.uvigo.gal/			
General description	Machinery design and calculation by the finite element method			

Skills	
Code	
A2	That the students can apply their knowledge and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
A3	That students are able to integrate knowledge and handle complexity and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
C1	CET1. Project, calculate and design products, processes, facilities and plants.
C14	CTI3. Ability to design and test machines.

Learning outcomes	
Expected results from this subject	Training and Learning Results
- Integration of components in the design of machines.	A2
- Know and apply the computational technicians of modelling 2D and 3D to the mechanical design.	A3
- Complement the classical calculation of elements of machines, and the cinematic and dynamic calculations of mechanisms with computational technicians.	C1 C14

Contents	
Topic	
Introduction to the finite element method	Discretisation, meshing, quality of mesh, boundary conditions. Pre and post processing
Preparation of geometry	Generation of geometry by means of direct modelling. Repair and modification of geometry. Dimensional parameterisation
Static analysis. Linear and no linear	Methodologies for solving nonlinear equilibrium equations. Sources of non linearity, theory of large deformations. Non-linearity caused by material and contacts. Failure criteria, yielding and damage laws
Dynamic analysis in the frequency domain	Modal, harmonic load, PSD and spectral analysis.

Dynamic analysis in the time domain	Rigid body dynamics Implicit and explicit dynamics.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	12	20	32
Practices through ICT	24	45	69
Problem solving	12	20	32
Essay questions exam	2	0	2
Report of practices, practicum and external practices	2	13	15

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	Introduction and desripion of the different concepts and techniques related with the subject
Practices through ICT	Resolution of problems of calculation of mechanical components using simulation software
Problem solving	Put the knowledges achieved in the subject into practice applying them to the resolution of common problems in engineering

Personalized assistance

Methodologies	Description
Lecturing	Personalised attention of all the doubts posed by the students
Practices through ICT	Group or individual tutorials will be held during office hours to strengthen the acquired knowledge and to guide and assess the proposed works/papers.
Problem solving	Group or individual tutorials will be held during office hours to strengthen the acquired knowledge and to guide and assess the proposed works/papers.

Assessment

	Description	Qualification	Training and Learning Results	
Essay questions exam	Final and mid-term tests will be focused on the contents taught at classes and laboratory sessions.	30	A2	C1 C14
Report of practices, practicum and external practices	Capacity for resolution of the exercises proposed, quality of the reports presented and solutions to the problems posed	70	A2 A3	C1 C14

Other comments on the Evaluation

Students must achieve 5 points or higher grade to pass the subject, following these rules:

- Laboratory Practical.
  - Students are required to attend. Practices reports, papers, and tests for each practice session as well as proposed works will be evaluated and graded with a maximum of 7 points. To be evaluated, students must attend a minimum of 75% of practice sessions; otherwise, students won't be evaluated and will get 0 points.
  - For those students who have been officially granted the right to waive their continued evaluation, they can skip attendance but will have to complete the same proposed works for his evaluation.
- Exam. It will be graded in a test that have a minimum grade of 3 points.

(*) Grades are calculated using a system of numerical qualification from 0 to 10 points conforming to the Spanish current legislation (RD 1125/2003, 5 September; BOE 18 September).

Ethical commitment: An adequate ethical behaviour of the student is expected at all times. In case an unethical behaviour is detected (copying, plagiarism, unauthorized use of electronic devices, and others); the student will be considered unfit to meet the necessary requirements to pass the subject.

In this case, the overall qualification in the current academic year will be a Fail grade (0.0). The use of any electronic devices during tests is completely forbidden unless is specified and authorized. The fact of introducing unauthorized electronic devices in the examination room will be considered reason enough to fail the subject in the current academic year and the overall qualification will be a Fail grade (0.0).

Sources of information

Basic Bibliography

Olek C. Zienkiewicz, Robert L. Taylor, J. Z. Zhu, **The Finite Element Method: Its Basis and Fundamentals**, 978-1856176330, 7ª, Butterworth-Heinemann, 2013

Javier Bonet, Richard D. Wood, **Nonlinear Continuum Mechanics for Finite Element Analysis**, 9780511755446/10.1017/CBO9780511755446, 2nd, Cambridge, 2008

Roy R. Craig, Andrew J. Kurdila, **Fundamentals of Structural Dynamics**, 978-0-471-43044-5, 2nd, Wiley, 2003

Complementary Bibliography

Garcia de Jalon, Javier; Bayo, Eduardo, **Kinematic and Dynamic Simulation of Multibody Systems**, 978-1-4612-2600-0, Springer, 1994

Singiresu S. Rao, **Mechanical Vibrations**, 978-0132128193, 5th, Prentice Hall, 2010

Recommendations

Subjects that it is recommended to have taken before

Mechanical Engineering Design/V04M141V01114

Contingency plan

Description

=== EXCEPTIONAL PLANNING ===
Given the uncertain and unpredictable evolution of the health alert caused by COVID-19, the University of Vigo establishes an extraordinary planning that will be activated when the administrations and the institution itself determine it, considering safety, health and responsibility criteria both in distance and blended learning. These already planned measures guarantee, at the required time, the development of teaching in a more agile and effective way, as it is known in advance (or well in advance) by the students and teachers through the standardized tool.
In the event that attendance to classes become legally entirely or partially limited, the measures set on place will be:
1. To guarantee the necessary means, namely personal computer or internet access, to every enrolled student so they can follow the distance learning classes, appropriately. Therefore, to apply the appropriate solutions, any student who does not have any of these means should inform the course coordinator.
2. To inform students of the different measures adopted, the department will use the platform, Moovi.
3. On top of that, in the case of cancelation of face-to-face classes, the teaching guide will show the next modifications:
A. Competences. They will not be modified.
B. Learning outcomes. They will not be modified.
C. Contents. They will not be modified.
D. Planning. It will not be modified.
E. Methodology. It will be modified:
Lecturing and Problem solving. They will require the employment of electronic means (virtual classroom of the Remote Campus or others).
Laboratory Practices. The department will provide every student access to FEM software, so that they can carry out the practices remotely. The professor will supervise these practices using electronic means (virtual classroom of the Remote Campus or others).
F. Tutoring Lessons. They will be carried out by previously arranged electronic means (e-mail, faitic forums or virtual classroom at campus remote, ...).
G. Assessment. Assessment methodologies/test will not be modified: Laboratory practical and Essay questions exam. Description, qualification, and competences, they will not be modified. All exams will use electronic means (virtual classroom of the Remote Campus or others); the department will publish in advance the specific rules for each test in the platform, Moovi. According to attendance at the virtual practice sessions, the professor will compute and validate each practice attendance on virtual classroom of the Remote Campus.
Partial tests for the evaluation of specific contests of the subject can be proposed. Once again, the professor will publish in advance the rules concerning each test in the platform, Moovi.
H. Bibliography. Besides the bibliographical references found in this guide, the
documentation provided at Faitic, and the problem bulletins and previous exams, the professor might facilitate additional notes, videos, web-references, and others, so
that students can appropriately follow the course during the non-face-to-face classes.
This guide can be modified following Rectoral rules.