



## 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	Casarejos Ruiz, Enrique			
Lecturers	Casarejos Ruiz, Enrique			
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General description	Machine Design by using CAE techniques			

## Competencies

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	C1
- Know and apply the computational technicians of *modelado 2D and 3D to the mechanical design.	A3	C14
- Complement the classical calculation of elements of machines, and the cinematic and dynamic calculations of mechanisms with computational technicians.		

## Contents

Topic	
Presentation	# Syllabus, planning, and assignments.
CAE tools	# CAD. Design. Modeling. Parameterization. # Analytical calculation (normative) # Numerical calculation (FEM).
Power, Sensors & Actuators	General introduction to: # Power # Sensors # Actuators
Rigidity of structures of machines	# General requirements # Requirements of rigidity # Requirements for vibration dumping # Structural configurations # Calculation of deformation and vibration

Precision machines.	# Basic concepts of design. Errors. # Thermal effects. # Linear transmission. Measure.
Advanced topics.	# Machines with extreme requirements. # Restrictions. Kinematic coupling. # Flexures. # MEMS.
Project	Presentation of personal works

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Lecturing	10	0	10
Case studies	15	0	15
Problem solving	15	0	15
Seminars	4	0	4
Problem and/or exercise solving	0	15	15
Laboratory practice	3	0	3
Project	0	87	87

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

Methodologies	
	Description
Introductory activities	Review of design & calculation of elements concepts.
Lecturing	Lectures about topics
Case studies	Discussion of practical cases
Problem solving	Discussion of exercises
Seminars	Follow-up & discussion of projects

Personalized assistance	
Tests	Description
Problem and/or exercise solving	Individual discussion about the resolution of problems and/or exercises proposed.
Project	Individual discussion to solve the doubts about the works and projects

Assessment				
	Description	Qualification	Training and Learning Results	
Problem and/or exercise solving	Resolution of exercises and problems, by means of analytical calculation and/or by means of the use of software of calculation	25	A2 A3	C1 C14
Laboratory practice	Resolution and presentation of problems (exam)	25	A2 A3	C1 C14
Project	Resolution of a realistic case proposed by means of the use of technicians of design, analysis and simulation.	50	A2 A3	C1 C14

#### Other comments on the Evaluation

The continuous evaluation will be done considering both the regular exercises and the project to be hand in. The quota of the exam will pass to the project.

In students give up (officially) the continuous evaluation, the examination for the evaluation will be done together with the project proposed, and the distribution of the evaluation will be of 50% for the examination.

Ethical commitment: It is expected an adequate ethical behaviour of the student. In case of detecting unethical behaviour (copying, plagiarism, unauthorized use of electronic devices, etc.) shall be deemed that the student does not meet the requirements for passing the subject. In this case, the overall rating in the current academic year will be Fail (0.0).

The use of any electronic device for the assessment tests is not allowed unless explicitly authorized. The fact of introducing unauthorized electronic device in the examination room will be considered reason for not passing the subject in the current academic year and will hold overall rating (0.0).

#### Sources of information

### Basic Bibliography

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Slocum, A.H., **Precision Machine Design**, SME Press, 1992

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Lopez de Lacalle N., Lamikiz Mentxaka A. (Eds.), **Machine Tools for High Performance Machining**, Springer-Verlag London, 2009

### Complementary Bibliography

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various authors, **Shigley's mechanical engineering design**, McGraw-Hill,

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Lombard, M., **Solid Works Bible**, Wiley,

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Kuang-Hua, Ch., **Product Design Modeling using CAD/CAE**, Elsevier, 2014

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Dornfeld, D., Lee D. E., **Precision Manufacturing**, Springer, NY, 2008

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### Recommendations

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