



IDENTIFYING DATA

Design of Assisted Machinery

Subject	Design of Assisted Machinery			
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			
E-mail	e.casarejos@uvigo.es			
Web	http://faitic.uvigo.es			
General description	Machine Design by using CAE techniques			

Competencies

Code	
A2	CB7. 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	CB8. 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 *modelado 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	
Presentation	# Introduction to the syllabus. # Planning
CAE tools	# CAD: Design and modeling. Parameterization. # Analytical calculation (normative) and FEM.
Engineering of detail	# Engineering of detail I : Power. Electronics. Sensors. Actuators. # Engineering of detail II : Maintenance. Documentation. Quality. Security.
Rigidity of structures of machines	# General requirements # Requirements of rigidity. # Requirements for dumping. # Structural configurations. # Matrix calculation of deformation. # Calculation with FEM of deformation.

Precision machines.	# Basic concepts of design. Errors. # Thermal effects. # Linear transmission. Measure. # Actuators. Sensors.
Advanced topics.	# Machines with extreme requirements. # Restrictions. Kinematic coupling. # Flexures. # MEMS.
Project	Exhibition of selection and developments posed.

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	1	0	1
Master Session	10	0	10
Case studies / analysis of situations	10	0	10
Troubleshooting and / or exercises	10	0	10
Practice in computer rooms	10	0	10
Group tutoring	4	0	4
Troubleshooting and / or exercises	0	30	30
Practical tests, real task execution and / or simulated.	3	0	3
Jobs and projects	0	72	72

*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	Previous contents of design and calculation of machines. Real applications.
Master Session	Presentation of subjects
Case studies / analysis of situations	Presentation and analysis of particular cases.
Troubleshooting and / or exercises	Resolution of cases applied to distinct solutions of machines.
Practice in computer rooms	Presentation of the tools of calculation and design of machines. Examples of basic use.
Group tutoring	Exhibition and resolution of doubts of development of works and projects.

Personalized attention	
Methodologies	Description
Practice in computer rooms	Personalised attention to solve the doubts arisen in the practices in classrooms of computing.
Tests	Description
Troubleshooting and / or exercises	Personalised attention for the resolution of problems and/or exercises proposed.
Jobs and projects	Personalised attention to solve the doubts arisen developing of the works and projects

Assessment				
	Description	Qualification	Training and Learning Results	
Troubleshooting and / or exercises	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
Practical tests, real task execution and / or simulated.	Resolution and presentation of problems (exam)	25	A2 A3	C1 C14
Jobs and projects	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 to be given back and the project. The quota of the exam will pass to the project.
In anyone refuses (officially) to 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.

Sources of information

Shigley, J.E., Diseño en Ingeniería Mecánica, McGraw-Hill, 2008

Lombard, M., Solid Works 2009 bible, Wiley, 2009

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

O. C. Zienkiewicz, T.L. Taylor, El método de Elementos Finitos, McGraw-Hill.

Ertas, A., Jones, J. C., The Engineering Design Process, John Wiley and Sons, New York, 1996.

Lumsdaine, E., Lumsdaine, M., Shelnutt, J. W., Creative Problem Solving and Engineering Design, McGraw Hill, Inc., New York, 1999.

Sanders, M. S., McCormick, E. J., Human Factors in Engineering and Design, McGraw-Hill, Inc., New York, 1993.

Dym, C. L., Little, P., Engineering Design: A Project-Based Introduction, John Wiley, New York, 1999.

Hyman, B., Fundamental of Engineering Design, Prentice Hall, New Jersey, 1998.

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

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

Blanding, D. L., Exact Constraint: Machine Design using Kinematic Principles, ASME Press, NY, 1999.

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

S. T. Smith, D. G. Chetwynd, Foundations of Ultra Precision Mechanism Design, Vol 2, Taylor & Francis, 2005.

Recommendations
