# Universida<sub>de</sub>Vigo

## Subject Guide 2016 / 2017

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IDENTIFYIN	G DATA						
Design of A	ssisted Machinery						
Subject	Design of Assisted						
Codo	Machinery						
Code							
programme	(*)Master Universitario en						
programme	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						
General description	Machine Design by using CA	E techniques					
<u></u>							
Competenc	ies						
Code							
A2 CB7. Th within b	at the students can apply thei proader (or multidisciplinary) c	ir knowledge and their ontexts related to thei	ability to solve pro r field of study.	blems in new or un	familiar environments		
A3 CB8. Th informa applicat	at students are able to integra tion that was incomplete or lir ion of their knowledge and juc	ate knowledge and har nited, include reflectin dgments.	ndle complexity and g on social and eth	l formulate judgme ical responsibilities	nts based on linked to the		
C1 CET1. P	roject, calculate and design pr	roducts, processes, fac	ilities and plants.				
C14_CTI3. At	pility to design and test maching	nes.					
Learning ou	itcomes						
Expected res	ults from this subject				Training and		
	· Commence and a line the standard sector	<b>6</b>			Learning Results		
- Integration - Know and a - Complement	of components in the design of pply the computational techni of the classical calculation of e	of machines. icians of *modelado 2[ elements of machines	D and 3D to the me	chanical design.	A2 A3 C1		
calculations	of mechanisms with computat	ional technicians.			C14		
Contents							
Topic							
Presentation		# Introduction # Planning	to the syllabus.				
CAE tools		# CAD: Design # Analytical ca	and modeling. Par Iculation (normativ	ameterization. e) and FEM.			
Engineering	of detail	# Engineering # Engineering	of detail I : Power. of detail II : Mainte	Electronics. Sensors nance. Documentat	s. Actuators. ion. Quality. Security.		
Rigidity of st	ructures of machines	# General requ	uirements				
		# Requirement	ts of rigitity. ts for dumning				
		# Structural co	onfigurations.				
		# Matrix calcu	lation of deformation	on.			
		# Calculation v	with FEM of deformation	ation.			

Precision machines.	<ul> <li># Basic concepts of design. Errors.</li> <li># Thermal effects.</li> <li># Linear transmission. Measure.</li> <li># Actuators. Sensors.</li> </ul>	
Advanced topics.	<ul><li># Machines with extreme requirements.</li><li># Restrictions. Kinematic coupling.</li><li># Flexures.</li><li># MEMS.</li></ul>	
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	3	0	3
simulated.			
Jobs and projects	0	72	72
*The information in the planning table is for guid	dance only and does no	ot take into account the het	erogeneity of the students.

## Methodologies

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	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 / o exercises	r 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	T	raining and
			Lea	rning Results
Troubleshooting and / or	Resolution of exercises and problems, by means of analytical	25	A2	C1
exercises	calculation and/or by means of the use of software of calculation		A3	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