Universida_de_Vigo

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
- 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	# Syllabus, planning, and assignments.
CAE tools	# CAD. Design. Modeling. Parameterization.
	# Analytical calculation (normative)
	# Numerical calculation (FEM).
Engineering of detail	# 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.
	# Actuators. Sensors.
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
Master Session	10	0	10
Case studies / analysis of situations	15	0	15
Troubleshooting and / or exercises	15	0	15
Group tutoring	4	0	4
Troubleshooting and / or exercises	0	15	15
Practical tests, real task execution and / or simulated.	3	0	3
Jobs and projects	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	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.
Group tutoring	Discussion and resolution of doubts about the development of works and projects

Personalized attention

Tests	Description
Troubleshooting and / or exercises	Individual discussion about the resolution of problems and/or exercises proposed.
Jobs and projects	Individual discussion to solve the doubts about 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 and the project to be hand in. The quota of the exam will pass to the project.

In anyone gives 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.

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

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

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

Complementary Bibliography

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

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

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

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

Recommendations