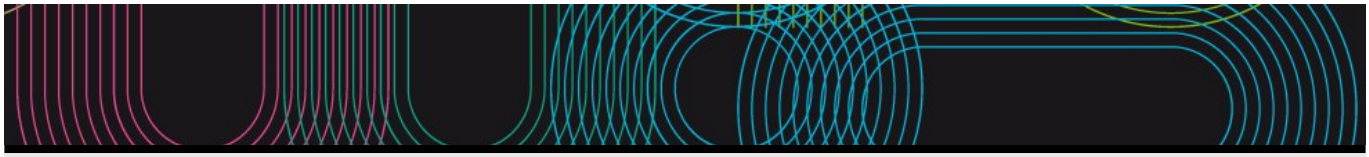

IDENTIFYING DATA				
Means, Machines and Tools for Manufacturing				
Subject	Means, Machines and Tools for Manufacturing			
Code	V04M141V01333			
Study programme	(*)Máster Universitario en Enxeñaría Industrial			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	4.5	Optional	2nd	1st
Teaching language	#EnglishFriendly Spanish Galician			
Department				
Coordinator	Pérez García, José Antonio			
Lecturers	Pérez García, José Antonio			
E-mail	japerez@uvigo.es			
Web	http://campusremotouvigo.gal/			
General description	(*)Los utillajes y equipos de fabricación son fundamentales en la industria ya que permiten optimizar los procesos de fabricación y reducir los tiempos y costes de producción.			

Training and Learning Results	
Code	
A1	Knowledge and understanding that provide a basis or opportunity for originality in developing and / or applying ideas, often in a research context.
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.
A5	Students must possess the learning skills that enable them to continue studying in a way that will be largely self-directed or autonomous.
C1	CET1. Project, calculate and design products, processes, facilities and plants.
C3	CET3. Conduct research, development and innovation in products, processes and methods.
C5	CET5. Technically and economically manage projects, installations, plants, companies and technology centers.
C8	CET8. Being 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.
C10	CET10. Possess learning skills that will allow further study of a self-directed or autonomous mode.
C11	CET11. Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Industrial Engineer.
C13	CTI2. Knowledge and ability to design, calculate and design integrated manufacturing systems.
D5	ABET-e. An ability to identify, formulate, and solve engineering problems.

Expected results from this subject	
Expected results from this subject	Training and Learning Results

(*)	A1 A3 A5 C1 C3 C5 C8 C10 C11 C13 D5

Contents	
Topic	
Module 1.- Introduction to Advanced Manufacturing	
Module 2.- CAD/CAM/CAE	CAM applied to machining processes CAE applied to metal casting processes CAE applied to polymer injection processes
Module 3.- Design for Manufacturing and Assembly	Conceptual design Design for assembly Material selection Design for manufacturing
Module 4.- Calculation and advanced design of tools for metal casting processes	Part analysis Mold design Mold making Cost calculation
Module 5.- Calculation and advanced design of tools for polymer injection processes	Part analysis Mold design Mold making Cost calculation
Module 6.- Advanced machining	5 axis machining High speed machining

Planning			
	Class hours	Hours outside the classroom	Total hours
Introductory activities	3	1	4
Lecturing	6	6	12
Project based learning	25	43.5	68.5
Project	2	20	22
Presentation	1	5	6
*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	1 sesión de 1 hora, e 1 sesión de dúas horas na que, tras explicarlle ao alumnado en que consiste a metodoloxía de aprendizaxe por proxectos, se lles informará da folla de ruta a seguir durante o curso.
Lecturing	2 sessions of 1 hour and 2 sessions of two hours, to be held in the IPF Area Workshop of the EEI (Campus Lagoas Marcosende) focused on learning both the CAM software and the manufacturing equipment that the student must handle during the course. course
Project based learning	9 sessions of 1 hour and 9 sessions of two hours, to be held in the Workshop of the IPF Area of the EEI (Campus Lagoas Marcosende) focused on the development of real projects for the design and manufacture of tools and components.

Personalized assistance	
Methodologies	**Description**
Project based learning	A tutorial schedule will be established, both face-to-face and online through Remote Campus
Lecturing	A tutorial schedule will be established, both face-to-face and online through Remote Campus
Tests	**Description**
Project	A tutorial schedule will be established, both face-to-face and online through Remote Campus

Assessment

	Description	Qualification	Training and Learning Results		
Project	(*)El alumno realizará un proyecto práctico de diseño y fabricación de un molde o utillaje. En su elaboración utilizará el software CAD/CAM/CAE Autodesk Inventor Professional y los equipos de fabricación disponibles en el taller de fabricación del Área IPF en la Sede Campus de la EEI	70	A1 A5	C1 C3 C10 C13	D5
Presentation	(*)El alumno documentará, y presentará, el proyecto desarrollado durante el curso	30			

Other comments on the Evaluation

FIRST CHANCE (January)

a) Continuous Assessment Modality

The continuous evaluation will be carried out during the teaching period of the subject.In this modality, all tests are compulsory.The contribution of each test to the total grade is as follows:

1. First Work Report.At the beginning of the project, the student will present a first report in which he will detail both the objectives of the work and the resources and the execution planning, having to demonstrate both the suitability of the chosen topic and the feasibility of its manufacture with the resources available in the workshop.Mechanic of the IPF Area at the EEI Campus Headquarters (10% of the qualification).
2. Second Work Report.Halfway through the project, the student will present a second report that reflects the status of the project's evolution, analyzes the degree of compliance with the initially planned plan and, if necessary, proposes possible corrective measures necessary to achieve final compliance with the planned objectives (20% of the grade)
3. Final Work Report.This report, which will constitute the memory of the work, will constitute the final documentation of the work, that is, calculations, plans, process sheets, costs, .(40% of the grade).
4. Presentation of the Work.After the delivery of the Final Work Report, the student will make a public presentation of it (30% of the grade).

To pass the subject in the first edition of the certificate by continuous evaluation, a minimum of 40% must be reached in each of the previously written tests. In the event that the student does not reach this minimum in any of the Continuous Assessment tests or, having reached it, does not achieve a minimum of 5 (scale 0 to 10) in the overall subject, it will be considered that they have not passed the subject and must be submitted to the Second Chance (June/July).

In the case of not reaching the minimum in any continuous assessment test, and the sum of the qualifications is greater than 5 (scale 0 to 10), the record will include 4.9.

b) Overall Assessment Modality.

Those students who renounce the continuous evaluation methodology and therefore use the global evaluation methodology, will be evaluated solely on the basis of:

1. Final Work Report.This report, which will constitute the memory of the work, will constitute the final documentation of the work, that is, calculations, plans, process sheets, costs, .(70% of the grade).

2. Presentation of the Work.After the delivery of the Final Work Report, the student will make a public presentation of it (30% of the grade).Maintaining the minimum grade requirements set forth in the previous case

SECOND CHANCE (June/July)

In the Second Opportunity all students will be evaluated following the guidelines established in the modality "b) Global evaluation" of the First Opportunity

Ethical Commitment: The student is expected to present adequate ethical behavior, as stated in Articles 39, 40, 41 and 42 of the Regulation on the evaluation, qualification and quality of teaching and the learning process of thestudent body, approved in the Senate on April 18, 2023. In the case of detecting unethical behavior (copying, plagiarism, use of unauthorized electrical devices, and others) it will be considered that the student does not meet the necessary requirements to pass thesubject.In this case, the overall grade for this academic year will be fail (0.0).

NOTICE: In the event of discrepancies between the different language versions of the guide, what is included in the Spanish version will prevail.

Sources of information

Basic Bibliography

John G. Nee, **Fundamentals of Tool Design**, 978-087263-867-9, 6ª, SME, 2010

Camarero de la Torre, Julián, **Matrices, Moldes y Utillajes**, 1ª, CIE Dossat 2000, 2003

Complementary Bibliography

Tickoo, Sham, **CATIA V5-6R2014 for designers**, 12ª, Schererville, IN : Cadcim Technologies, 2015

Tickoo, Sham, **Autodesk Inventor Professional 2020 for Engineers and Designers**, 97-93-89423-10-5, 1ª, BPB Publications, 2019

Campbell, John, **Complete Casting Handbook: Metal Casting Processes, Metallurgy, Techniques and Design**, 2ª, Elsevier, 2015

Dangel, R., **Injection Molds for Beginners**, 1ª, HANSER PUBLICATIONS, 2020

Lerma Valero. J.R., **Plastic Injection Molding**, 978-1-56990-689-7, 1ª, Hanser, 2019

Shoemaker, J., **Moldflow Design Guide A Resource for Plastics Engineers**, 1ª, Hanser, 2006

Recommendations