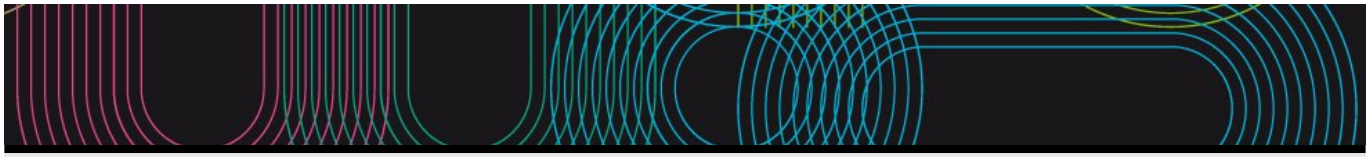

IDENTIFYING DATA				
Fundamentals of manufacturing systems and technologies				
Subject	Fundamentals of manufacturing systems and technologies			
Code	P52G381V01402			
Study programme	Grado en Ingeniería Mecánica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Mandatory	4th	1st
Teaching language	Spanish			
Department				
Coordinator	Álvarez Feijoo, Miguel Ángel			
Lecturers	Álvarez Feijoo, Miguel Ángel Lareo Calviño, Guillermo			
E-mail	alvarezfeijoo@cud.uvigo.es			
Web	http://moovi.uvigo.gal			
General description	The course Fundamentals of Manufacturing Systems and Technologies focuses on the study and the application of scientific and technical knowledge related to the manufacturing processes of components and assemblies whose functional purpose is mechanical, as well as the evaluation of their dimensional accuracy and the one of the products to obtain, with a determinate quality. All this including from the preparation phases to the use of instruments, tools, toolings, equipments, machine tools and systems necessary for its realization, according to the established standards and specifications, and applying optimization criteria.			

Training and Learning Results	
Code	
B3	Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
C15	Basic knowledge of production systems and manufacturing.
D2	Problems resolution.
D8	Decision making.
D9	Apply knowledge.
D10	Self learning and work.
D17	Team working.
D20	Ability to communicate with people not expert in the field.

Expected results from this subject	Training and Learning Results		
To know the technological basis and basic aspects of manufacturing processes.	B3	C15	D2 D9 D10 D20
To understand the basics of manufacturing systems.	B3	C15	D2 D10
To acquire skills for the selection of manufacturing processes and elaboration of manufacturing planning.		C15	D2 D8 D17
To develop skills for the fabrication of assemblies and elements in CAD/CAM environments.	B3	C15	D2 D8 D9 D17 D20

ENAEE learning outcome: KNOWLEDGE and UNDERSTANDING LO1.2.- Knowledge and understanding of the mathematics and other basic sciences underlying their engineering specialisation, at a level necessary to achieve the other programme outcomes. Intermediate (2).	B3	C15	
ENAEE learning outcome: ENGINEERING ANALYSIS LO2.1.- Ability to analyse complex engineering products, processes and systems in their field of study; to select and apply relevant methods from established analytical, computational and experimental methods; to correctly interpret the outcomes of such analyses. Advance (3).		C15	
ENAEE learning outcome: ANALYSIS IN ENGINEERING: LO2.2.- The ability to identify, formulate and solve engineering problems in their specialty; to choose and properly apply established analytical, computational and experimental methods; to recognize the importance of social, health and safety, environmental, economic and industrial constraints. Intermediate (2).			D2 D9
ENAEE learning outcome: PRACTICAL APPLICATION OF ENGINEERING: LO5.1.- Understanding of the applicable techniques and methods of analysis, design and research and their limitations in the field of their specialty. Basic (1).			D2 D9
ENAEE learning outcome: PRACTICAL APPLICATION OF ENGINEERING: LO5.2.- Practical competence to solve complex problems, to carry out complex engineering projects and to carry out research in his/her specialty [level of development. Intermediate (2).			D9 D10
ENAEE learning outcome: COMMUNICATION AND TEAMWORK: LO7.1.- Ability to communicate effectively information, ideas, problems and solutions in the field of engineering and with society in general [level of development. Basic (1).			D8 D10 D17
ENAEE learning outcome: COMMUNICATION AND TEAMWORK: LO7.2.- Ability to function effectively in national and international contexts, individually and in teams and to cooperate both with engineers and with people from other disciplines. Intermediate (2).			D20

Contents

Topic	
UNIT 1. INTRODUCTION	Lesson 1. Introduction to manufacturing technologies.
UNIT 2. METROLOGY	Lesson 2. Principles of Dimensional Metrology. Lesson 3. Instruments and measuring methods. Lesson 4. Coordinate measurement. Lesson 5. Image measurement.
UNIT 3. MASS-REDUCING PROCESSES	Lesson 6. Introduction to mass-reducing processes. Lesson 7. Cutting principles. Lesson 8. Turning: operations, machines and tooling. Lesson 9. Milling: operations, machines and tooling. Lesson 10. Drilling: operations, machines and tooling. Lesson 11. Abrassive machining processes: operations, machines and tooling. Lesson 12. Non-conventional machining processes.
UNIT 4. AUTOMATION AND MANAGEMENT OF MANUFACTURING PROCESSES	Lesson 13. Numerical control.
UNIT 5. CONSOLIDATION PROCESSES OF LIQUID AND GRANULAR WORKPIECE MATERIALS	Lesson 14. General aspects of metal casting forming. Lesson 15. Models, die systems and cores. Lesson 16. Melting, casting and finishing technology. Lesson 17. Equipment and furnaces used in casting. Lesson 18. Compacting processes with granular workpiece materials.
UNIT 6. DEFORMATION PROCESSES	Lesson 19. General aspects. Lesson 20. Rolling and forging processes. Lesson 21. Extrusion and drawing processes. Lesson 22. Sheet metal forming processes.
UNIT 7. JOINING PROCESSES	Lesson 23. Welding processes. Lesson 24. Joining and assembly processes without welding.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	42	70
Problem solving	3	1	4
Seminars	7	0	7
Laboratory practical	14	14	28
Mentored work	4	14	18
Objective questions exam	4	4	8
Essay questions exam	9	6	15

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

Methodologies

	Description
Lecturing	In these sessions, the faculty will explain in detail the basic theoretical contents of the course, exposing clarifying examples that help to better understand the concepts. Computer presentations and the blackboard will be used, especially to transmit information like definitions, charts, algorithms, etc. When it is possible, a copy of the slides will be given to the students in advance, focusing the effort of the lecturers and the students on the exhibition and understanding of the concepts. Anyway, the reproductions in paper of the slides should not be considered like substitutes of the texts, but like complementary material.
Problem solving	Activity in which problems and/or exercises related to the subject are formulated. The student must develop the appropriate or correct solutions through the exercise of routines, the application of formulas or algorithms, the application of transformation procedures of the available information and the interpretation of the results. It is usually used as a complement to the master class.
Seminars	Intensive course of 15 hours for those students who did not pass the subject in the first call, prior to the examination of the second call. Tutorial groups with the lecturer.
Laboratory practical	The didactic method to be followed in the teaching of the practical classes consists in that the lecturer supervises the work and progress done by the different groups. The practices of laboratory are headed to strengthen the theoretical concepts tackled in the sessions in the classroom (with the master sessions as well as with the design of the project).
Mentored work	The student, individually or in groups, prepares a document on one of the topics of the course or prepares seminars, research, reports, essays, summaries of readings, lectures, etc.

Personalized assistance

Methodologies	Description
Lecturing	Regarding tutorials, it is possible to distinguish between academic and personalised tutorials. Students will be offered office hours so that they can ask every question related to contents, organization and planning of the course. They can be one-to-one tutorials although group tutorials will be fostered in order to sort out the problems related to group activities or just in order to inform the instructor of the development of group work. Regarding one-to-one tutorials, each student will be able to talk to the instructor about any problem which is preventing her/him from coping with the subject properly, so that both can find a solution. By merging both kinds of tutorials, it is intended to compensate the different learning paces through measures of attention to diversity.
Mentored work	The lecturers will personally answer the questions and queries of the students, both in person, according to the timetable that will be published on the center's website, and by telematic means (e-mail, videoconference, Moovi forums, etc.) by appointment.

Assessment

	Description	Qualification	Training and Learning Results		
Lecturing	Intermediate tests: theoretical questions and problems. The objective of these tests is to evaluate the learning of all the theoretical contents selected for the course. - Intermediate tests (PI): 15% + 15%.	30	B3	C15	D2 D8 D9 D17 D20
Laboratory practical	The evaluation of the practises will be based on the evaluation of the practises reports (MP) that the student must submit.	10	B3	C15	D2 D8 D9 D10 D17
Mentored work	Evaluation of the mentored work (TT). Percentage of the final grade: - Submission 1. Initial version of the report: 6%. - Submission 2. Intermediate version of the report: 6%. - Submission 3. Final version of the final report: 8%.	20	B3	C15	D2 D8 D9 D10 D17 D20
Essay questions exam	Writing final test (PF) final to evaluate the global knowledge of the subject (official date of evaluation)	40	B3	C15	D2 D8 D9 D10 D17

Other comments on the Evaluation

The overall final mark of the student will represent the sum of the marks awarded to each one of the before commented parts, being the continuous evaluation mark (NEC). To pass the matter by Continuous Evaluation, the final mark (NEC) will have to be greater or the same to 5, and will be calculated in the following way:

NEC = 0.40·PF + 0.15·PI1 + 0.15·PI2 + 0.20·TT + 0.10·MP

The students must attend the ordinary exam, which addresses the whole course contents, if the total grade of continuous evaluation is lower than 5. They also will have to attend the ordinary exam if any of the following cases happens:

- The no realisation or delivery of any of the previous interim assessments.
- A grade lower than 4 points in the final theory exam is obtained.

Those students that do not fulfil any of the previous requirements, will have to attend to the ordinary examination to be ableto pass the course, and their grade of continuous evaluation will be calculated as follows:

NEC FINAL = min (4, NEC)

All those students that wish to improve their mark obtained at the continuous evaluation will be able to attend the ordinary examination.

ACADEMIC INTEGRITY: Students are expected to show adequate ethical behaviour, committing to act honestly. Based on article 42.1 of the Regulation on the evaluation, qualification and quality of teaching and the student learning process of the University of Vigo , as well as point 6 of the fifth rule of Order DEF/711/2022, of July 18th, which establishes the requirements for evaluation, progress, and ongoing enrolment in military educational training centres for incorporation into the ranks of the Armed Forces, **any violation of academic integrity in the assessment process, as well as the cooperation in it will result in the assignment of a failing grade to the student (zero) for the entire course in the corresponding assessment opportunity**, regardless of the percentage of importance that the test in question had in the overall continuous assessment and independently of other disciplinary actions that may be applied.

Sources of information

Basic Bibliography

Kalpakjian, Serope, **Manufactura, ingeniería y tecnología**, Pearson, 2002

Todd, R.H.; Allen, D.K.; Alting, L., **Fundamental principles of manufacturing processes**, Industrial Press Inc., 2011

Alting, L., **Procesos para ingenieria de manufactura**, Alfaomega, 1990

Groover, M. P., **Fundamentos de manufactura moderna: materiales, procesos y sistemas**, Prentice Hall,

Complementary Bibliography

Faura, F., **Prácticas de tecnología mecánica**, Ed. Universidad de Murcia, 1994

Dieguez, J.L.; Pereira, A.; Ares, J.E:, ´**Fundamentos de fabricación mecánica**,

De Garmo; Black; Kohser, **Materiales y procesos de fabricación**, Reverté, 1988

Lasheras, J.M., **Tecnología mecánica y metrotecnia**, Donostiarra, 2000

Recommendations

Other comments

The course FUNDAMENTALS OF MANUFACTURING SYSTEMS AND TECHNOLOGIES has no associated prerequisites. However, in order to successfully complete this course the student must have:
- Capacity of written and oral understanding very developed.
- Ability of abstraction, basic calculation and synthesis of information.
- At least basic notions acquired in the subjects of Materials Engineering, Theory of Machines and Mechanisms and Graphic Engineering.

In addition, they must possess group work and group communication skills.
The most frequent learning difficulties are linked to a lack of this knowledge, but they can be overcome with a little effort and the means available at this centre.