DEGREE CURRICULUM

MANUFACTURING TECHNOLOGIES

Coordination: NOGUES AYMAMI, MIQUEL

Academic year 2017-18

MANUFACTURING TECHNOLOGIES 2017-18

Subject's general information

Subject name	MANUFACTURING TECHNOLOGIES
Code	102309
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION
Typology	<table><tr><th>Degree</th><th>Course</th><th>Typology</th><th>Modality</th></tr><tr><td>Bachelor's Degree in Mechanical Engineering</td><td>3</td><td>COMPULSORY</td><td>Attendance-based</td></tr></table>
ECTS credits	6
Groups	1GG,2GM,5GP
Theoretical credits	3
Practical credits	3
Coordination	NOGUES AYMAMI, MIQUEL
Department	INFORMATICA I ENGINYERIA INDUSTRIAL
Teaching load distribution between lectures and independent student work	40% lectures in class 60% independent student work
Important information on data processing	Consult this link for more information.
Language	Catalan Also some material could be in Spanish or in English
Distribution of credits	Miquel Nogués Aymamí 3 Juan Jose Gonzalez Fabra 7,2
Office and hour of attention	Miquel Nogués, Tuesday from 19:00 to 20:30 and Thursday from 10 to 11:30 Juan José González, Thursday from 18:00 to 20:00

MANUFACTURING TECHNOLOGIES 2017-18

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
GONZALEZ FABRA, JUAN JOSE	jgonza@diei.udl.cat	7,2	Thursday 18:00 to 20:00
NOGUES AYMAMI, MIQUEL	mnogues@diei.udl.cat	3	Monday 18:00 to 20:00 Tuesday 9:30 to 11:00

Subject's extra information

It is essential to have studied previously, and its advisable to have passed the following subjects:
- GRAPHICS EXPRESSION I.
- MATERIAL SCIENCE.
- THEORY OF MECHANISMS.
- ELASTICITY AND STRENGH OF MATERIALS I.
- MATERIALS FOR MECHANICAL MANUFACTURING.

In relation to the safety rules established in laboratories, it is required to state

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Blue laboratory gown from UdL (unisex)
- Protection glasses
- Mechanical protection gloves

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos
Centre the Cultures i Cooperació Transfronterera

http://www.publicacions.udl.cat/

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratoy gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.

- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: http://www.sprl.udl.cat/alumnes/index.html

Learning objectives

Provide students with the basic knowledge and techniques, tools, skills and abilities to effectively develop professionals activities involved in manufacturing of metal parts, due to its relevance in the industrial world. For this reason, the topics considered to be developed are: metrology, sheet metal work, machining processes and material removal, numerical control programming and welding and brazing systems.

Competences

Cross-disciplinary competences

- **EPS1**. Capacity to solve problems and prepare and defence arguments inside the area of studies.
- **EPS6**. Capacity of analysis and synthesis.

Specific competences

- **GEM25**. Knowledge and capacity for the application of materials engineering.
- **GEM26**. Applied knowledge of manufacturing systems and processes, metrology and quality control.

Subject contents

Unit 1 - METROLOGY

Unit 2 - METAL FORMING PROCESSES.

Unit 3 - MACHINING PROCESSES AND MATERIAL REMOVAL.

Unit 4 - NUMERICAL CONTROL.

Unit 5 - WELDING TECNOLOGIES

Unit 6 - RAPID PROTOTYPING

Unit 7 - UNCONVENCIONAL MACHINING PROCESSES.

Methodology

Lectures: theoretical contents and proposal and/or resolution of some practical examples.

Problems: Presentation and discussion of problems that will eventually solve by the students in an individual way or in groups.

Group work: Development of a study in groups on a set of different parts to be manufactured.

Practices: 9 laboratory sessions: metrology, sheet metal workshop, sheet metal design using CAD, lathe and mill machines, CN simulation using CIMCO (3 sessions), CAD/CAM, and welding and brazing.

Development plan

Week	Methodology	Unit	Attendance hours	Autonomous work hours
1	Lectures	Unit1: Theory Unit 1: Problems	2 0	0 0
2	Lectures Problems	Unit1: Theory Unit 1: Problems	2 2	3 3
3	Lectures Practice	Unit2: Theory Practice Metrology	2 2	3 3
4	Lectures Practice	Unit 2: Theory Practice sheet metal workshop	2 2	3 3
5	Lectures Problems	Unit 3: Theory Unit 2: Problems	2 2	3 3
6	Lectures Problems / Practice	Unit 3: Theory Unit 2: Problems Practice: design sheet metal parts using CAD	2 2	3 3
7	Lectures Practice	Unit 3: Theory Practice: lathe & mill machines	2 2	3 3
8	Lectures Problems	Unit 3: Theory Unit 3: Problems	2 2	3 3
9	Evaluation	Exam 1	2	4
10	Lectures Problems	Unit 4: Theory Unit 3: Problems	2 2	3 3
11	Lectures Practice	Unit 4: Theory Practice: CIMCO (I)	2 2	3 3
12	Lectures Practice	Unit 5: Theory Practice: CIMCO (I)	2 2	3 3
13	Lectures Practice	Unit 5: Theory Practice: CIMCO (I)	2 2	3 3
14	Lectures Practice	Unit 6: Theory Practice CAD/CAM	2 1	3 3
15	Lectures Practice	Unit 7: Theory Practice welding & brazing	2 2	3 3
16-17	Evaluation	Exam 2	2	4
18	Tutoring	Tutoring	1	2
19	Evaluation	Recovery exam	2	2

Evaluation

Several evaluation activities will be carried out:

• 1st Individual written exam focused on theory developed along of the midterm. The test will be done on the date scheduled in the academic calendar (approx. week 9th).

• 2nd individual written exam will assess the part related with the problems and experimental part carried out until the midterm. The exam will be done just after the 1st exam.

• Attendance at laboratory and experimental parts is mandatory. The student could only get in the laboratory if he/she is wearing the corresponding PPE indicated in the laboratory exercise guidance.

• Several works in groups will be proposed, which must be delivered in the period scheduled for evaluation.

• 3rd individual written exam which will be focused on the theory developed in the second quarter. The exam will be done on the scheduled date in the academic calendar (approx. week 17th or 18th).

• 4th individual written exam will assess the part related with the problems and experimental part carried out in the second part of the term. The exam will be done just after the 3rd exam.

• In case that the weighted grade of the written exams, based on the relative weight of each of them, is less than 3, the student will not pass the subject, and its grade will be the minimum of the average percentage based on the relative weight of each of exam (which are shown in the table) or 3.

• Recovery exam (week 20th), In order to attend to these exam, it will be required that the weighted note based on the 4 written exams must be equal to or greater than 4. This exam will assess all the theory and work developed throughout the term. The exam will have both theoretical and problems resolution. If a student attends to this exam, the grade achieved replaces the previous grades from written exams, whether is higher or lower. In case the grade of recovery exam is less than 3, the student will not be pass the subject, and the grade will be the minimum between the recovery exam grade and 3.

The weight stablished to each evaluation activity, out of a total of 100, is as follows:

Activity	**Weight**
1a written exam	20
2a written exam	20
3a written exam	20
4a written exam	20
Work in groups	20
Recovery exam	80

Note: Grades achieved in work developed in groups are not recoverable.

Note: in case of a student does not attend or do in a unsatisfactorily way, the grade of the subject will be Not Presented.

Bibliography

GROOVER, M.P. "Fundamentos de manufacturamoderna". Ed. Mc GrawHill 2007

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SCHEY, J."Introduction to manufacturing processes".Ed. Mc GrawHill 2000

Singh, R."Applied Welding Engineering". Ed. Elsevier Inc. 2012

SALUEÑA X. i NÁPOLES A. " Tecnología Mecánica". Ed.CPDA-ETSEIB. 2000

VIVANCOS, J."Procesos mecanizado". Tomo I. Ed.CPDA-ETSEIB. 1999.

VIVANCOS, J."Control Numèric". Ed. UPCBarcelona 1996.

COMPLEMENTARY BIBLIOGRAPHY

COCA, P. i ROSIQUE, J. "Tecnología Mecánica i Metrotécnia". Ed. Pirámide1984.

LASHERAS ESTEBAN,J.M. "Tecnologia mecánica i Metrotécnia". Ed.Donostiarra. 1987.

Falk, D. i Gockel, H."Metrotècnia Fundamental". Ed. Reverté, 1986.