Universitat de Lleida

DEGREE CURRICULUM

ADVANCED MANUFACTURE SYSTEMS

Coordination: NOGUES AYMAMI, MIQUEL

Academic year 2019-20

Subject's general information

Subject name	ADVANCED MANUFACTURE SYSTEMS
Code	14521
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION
Typology	<table><tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr><tr><td>Master's Degree in Industrial Engineering</td><td>1</td><td>COMPULSORY</td><td>Attendance-based</td></tr></table>
Course number of credits (ECTS)	6
Type of activity, credits, and groups	<table><tr><th>Activity type</th><th>PRAULA</th><th>TEORIA</th></tr><tr><th>Number of credits</th><td>3</td><td>3</td></tr><tr><th>Number of groups</th><td>1</td><td>1</td></tr></table>
Coordination	NOGUES AYMAMI, MIQUEL
Department	COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING
Teaching load distribution between lectures and independent student work	1 ECTS = 10h attendance lessons + 15h of autonomous work Attendance: 40% Autonomus work: 60%
Important information on data processing	Consult this link for more information.
Language	Catalan (part of the material in Spanish and English)
Distribution of credits	3 Theory 3 Practice

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
ADELL POCH, FRANCESC	francesc@intech3d.es	1,6	
CAMPILLO BETBESÉ, MANEL	manelcampillo81@hotmail.com	,8	
COMELLAS ANDRÉS, MARTÍ	marti.comellas@udl.cat	0	Thursday, 11:00 to 12:00 Thursday, 17:00 to 18:00 CREA Building, Office 0.19
CUCURULL BONCOMPTE, GERARD	gerardcb07@hotmail.com	,8	
NOGUES AYMAMI, MIQUEL	miquel.nogues@udl.cat	1,2	
SALAT DUCH, RAMON	ramon.salat@udl.cat	1,6	

Subject's extra information

There are no previous requirements to do the subject.

Regarding the safety rules that apply to the laboratory practices:

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

- Laboratory gown from UdL (unisex) (blue or white colour)
- 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 laboratory 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 lenses 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

During the realization of visits to companies, the use of personal protective equipment (PPE) set by the centre is mandatory.

Learning objectives

General objectives:

Understand the different actors that are involved in an advanced productive process. The subject will be focused on the management and quality issues, and special attention will be given to the additive manufacturing.

Particular objectives:

- Know the additive manufacturing technologies
- Design a part in order to be built with 3D printing.
- Set up 3D printing parameters
- Print 3D parts
- Know quality certifications and enterprise structure
- Know what quality implies in a productive process
- To implement quality systems
- Verify the quality of a product
- Know the different managing tools of production systems
- Apply product managing using an specific software

Competences

Basic competences:

- **CB2.** To be able to apply the knowledge gained and to solve problems in new environments in wider contexts (or multidisciplinary) related with the area of study.
- **CB5.** To possess the skills to continue learning self-directed and freelance.

General competences EPS:

- **CG4.** Capacity to conceive, design and implement projects and/or provide new solutions, using the tools that the engineering offers.

Specific competences:

- **CE2.** Knowledge and capacity to project, calculate and design integrated manufacturing systems.
- **CE8.** Capacity to design and project automated production and advanced process control systems.
- **CE13.** Knowledge on methods and techniques of transportation and industrial maintenance services.

Subject contents

1 Additive manufacturing

1.1 Introduction to additive manufacturing systems

1.2 FDM technology

1.3 Polymeric materials

1.4 CAD/CAE/CAM design oriented to additive manufacturing

1.5 Software: Layers and printing parameters

2 Quality management

2.1 Introduction to Quality

2.2 ISO certification at enterprises

2.3 Enterprise structure

2.4 Quality at productive processes

2.5 Verification and validation of a product

2.6 Audit (Internal / External).

2.7 Corrective actions and Non-conformity products

3 Productive systems management

3.1 Introduction to the different management tools

3.2 Product data management (PDM)

3.3 Product life cycle management (PLM)

3.4 Enterprise resources plan (ERP)

Methodology

Lectures: In the lectures, the contents of the subject is exposed orally by a teacher without the active participation of students.

Problems solving: In the activities of problems solving, the professors present a complex issue that students

must solve, whether working individually or in teams.

Practices: Practices allow to apply and set up, in a practice level, the theory of a knowledge scope in a particular context.

Visits: Activity of a group of students, guided by the teachers, which consists of going to a certain place to get direct information that favours the learning process.

Work in group: Learning activity that has to be done through collaboration between members of a group.

Development plan

Week	Methodology	Unit	Attendance hours	Autonomous work hours	Professor
1-4	Lectures, Problems solving, Practices	Unit 1: Additive manufacturing	16	27	F. Adell
5-13	Lectures, Problems solving, Practices	Unit 2: Quality management	16	27	M. Campillo G. Cucurull
5-13	Lectures, Problems solving, Practices	Unit 3: Productive systems management	16	27	R. Salat
14	Visit	Units 1-3	6	5	M. Nogués
15	Work in group	Units 1-3	4	4	M. Nogués

Evaluation

Objectives	Evaluation activities	Criteria	%	Dates	M/V (1)	I/G (2)	Observations
Unit 1	Exam 1	(*)	15	Week 4	M	I	Unit 1 will be evaluated in written form
Unit 1	Practices Report Unit 1		15	Week 4	M	G	Practices reports will be evaluated
Unit 2	Exam 2	(*)	15	Week 13	M	I	Unit 2 will be evaluated in written form
Unit 2	Work Report Unit 2		15	Week 13	M	G	Work report will be evaluated
Unit 3	Exam 3	(*)	15	Week 13	M	I	Unit 3 will be evaluated in written form
Unit 3	Work Report Unit 3		15	Week 13	M	G	Work report will be evaluated
Units 1-3	Visits Report		10	Week 16-17	M	G	Visits report will be evaluated

(1) Mandatory / Voluntary

(2) Individual / in Groups

(*) A minimum score of 3 out of 10 is required

Note: At the beginning of the course it will be informed of the days/schedules of the evaluation activities as well as the visit. Teachers may require and evaluate classroom attendance. In the case that the student does not attend any of the practices/visits or any of the reports is evaluated as Not Correct, the mark of the subject will be No

Presented.

Bibliography

Basic Bibliography

Antonio Domínguez Machuca y otros. Dirección de operaciones: Aspectos tácticos y operativos en la producción y los servicios. Ed. Mc Graw-Hill.

Jay Heizer y Barry Render. Dirección de la producción, decisiones estratégicas.Ed. Prentice Hall.

Luis Cuatrescasas. Diseño avanzado de procesos y plantas de producción flexible. Ed Profit.

Aguayo Gonzalez F. Metodología del diseño industrial: un efoque desde la ingeniería concurrente. Ed. Rama.

Complementary Bibliography

UNE-EN ISO 9001:2015. Sistemas de gestión de la calidad.

Other resources

Eliyahu M.Golddratt Jeff Cox. La Meta, Un proceso de mejora continua. Ed. Diaz de Santos.

Xavier Sala i Martín. Economía liberal, para no economistas y no liberales. Ed. DeBolsillo.

Adaptations to the contents due to COVID-19

No content changes are expected

Adaptations to the methodology due to COVID-19

Due to classes cannot be face-to-face, theory and problem classes will be conducted by videoconference.

Adaptations to the development plan due to COVID-19

Due to the need for a period of adaptation by both students and teachers to the new tools, a certain delay in the development plan has arisen, and also the possible accumulation of work that students have to deal with. For these reasons the deadlines have been extended and the classes have been rescheduled in order to recover the missing classes.

On the other hand, due to the pandemic situation, trips to visit factories had been canceled (visit to SEAT and Draxton), as well as activities related to virtual reality experimentation.

Adaptations to the evaluation due to COVID-19

There are no changes in the grading process, except that the exams will be conducted through the SAKAI exam tool.

There are no grades on the visit reports, as they could not be done.