

Academic Year/course: 2022/23

29749 - Manufacturing Systems

Syllabus Information

Academic Year: 2022/23

Subject: 29749 - Manufacturing Systems

Faculty / School: 110 - Escuela de Ingeniería y Arquitectura

Degree: 434 - Bachelor's Degree in Mechanical Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject Type: Optional

Module:

1. General information

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

4.2. Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1.04 ECTS): 26 hours.
- Laboratory sessions (0.72 ECTS): 18 hours.
- Guided assignments (0.48 ECTS): 12 hours.
- Visits to companies: (0.16 ECTS): 4 hours.
- Autonomous work (3.6 ECTS): 90 hours.
- Tutorials.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (6 sessions in total) and the last 3 hours each. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory session to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 90 hours to study theory, solve problems, prepare lab sessions, and take exams.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

4.3. Syllabus

The course will address the following topics:

1) Cellular manufacturing systems

- Basic Components
- Manufacturing systems characterization
- Group technology and cellular manufacturing
- Flexible and transfer manufacturing systems.

2) Material handling:

- Workpiece carrier.
- Warehouse.
- Transport system.
- Part feeders.
- Handling equipment, positioning units and robots.
- Transfer systems.
- Process units. Package, packaging and palletizing.

3) Assembly workstations and cells

- Manual workstations.
- Automatic workstation components.
- Grippers and fixture design.
- Calculation and selection of components.
- Analytical techniques. Functional, geometric, resistant and economic analysis.
- Planning, configuration and evaluation of automatic assembly systems.

4) Monitoring and control systems:

- Data record automatic system.
- Fixed sequence automatic mechanism.
- PLC/PC control; surveillance; HMI.
- Robot and automation programming.
- DNC and industrial nets.

5) Design for assembly

Computer lab sessions:

- 1) Computer-aided design of manufacturing systems.
- 2) CAE validation of manufacturing systems.
- 3) Control and programming electro-pneumatically devices with PLC/PC.
- 4) Control and programming Robots.

4.4. Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course, please refer to the "Escuela de Ingeniería y Arquitectura " website (<https://eina.unizar.es/>)

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29749>