Production and manufacturing systems

Academic Year: (2023 / 2024) **Review date: 17/04/2023 13:06:35**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: RODRIGUEZ URBANO, FRANCISCO JOSE

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 2

LEARNING OUTCOMES

CB1. Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
CB2. Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
CB4. Students should be able to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences.
COCIN1. Ability to draft, sign and develop projects in the area of industrial engineering for construction, renovation, repair, preservation, demolition, manufacture, installation, assembly or operation of: structures, mechanical equipment, energy installations, electrical and electronic installations, industrial plants and installations and automation and manufacturing processes.
COCIN3. Knowledge of basic and technological subject areas that will capacitate them to acquire new methods and theories and endow them with the versatility to adapt to new situations.
COCIN4. Ability to resolve problems with initiative, decision-making, creativity, and critical reasoning skills and to communicate and transmit knowledge, skills and abilities in the Industrial Engineering field.
COCIN5. Knowledge to perform measurements, calculations, assessments, appraisals, surveys, studies, reports, work plans and other similar jobs.
COCIN7. Ability to analyze and assess the social and environmental impact of technical solutions.
CEP1. Capacity to design a system, component or process in the area of electrical engineering in compliance with required specifications.
CER10. Basic and applied knowledge in environmental and sustainability technologies.
CEP2. Knowledge and ability to apply computational and experimental tools for analysis and quantification of electrical engineering problems.
CER9. Basic knowledge of production and manufacturing systems.
CT1. Ability to communicate knowledge orally as well as in writing to a specialized and non-specialized public.

By the end of this content area, students will be able to have:
RA1.1. Knowledge and understanding of production and manufacturing systems, metrology and control of quality.
RA1.2. A systematic understanding of the key aspects and concepts of production and manufacturing systems.
RA1.4. Awareness of the wider multidisciplinary context of engineering.
RA2.1. The ability to apply their knowledge and understanding to analyse engineering products, processes and methods.
RA4.3. Workshop skills on production and manufacturing systems.
RA5.1. The ability to select and use appropriate equipment, tools and methods.
RA5.3. An understanding of applicable techniques and methods in production and manufacturing systems and of their limitations.

OBJECTIVES

By the end of this subject, students will be able to :
1. Have a knowledge and understanding of the key aspect related to automated manufacturing systems.
2. Be aware of the multidisciplinary context of automated production systems.
3. Have the ability to model and analyze manufacturing systems in a computer program whith discrete event simulation programs.
4. Have the ability to search for literature related to a real visit to a production system.
5. Have the ability to combine theory and practice in the programing of the simulation of a manufacturing systems example.
6. Have the ability of working in group to visit a real production system and to relate that visit to the theoretical sessions.
7. Have and understanding about the aspects related to environmental impact and sustainable production, and to relate these aspects with the group work.

DESCRIPTION OF CONTENTS: PROGRAMME

1.- Introduction.
1.1.- Introduction.
1.2.- Automated machinery.
1.3.- Sensors.
1.4.- Robotized systems.
1.5.- Flexible manufacturing systems.
2.- Materials management.
2.1.- Kanban and JIT.
2.2.- Computer based material planning systems (ERP).
2.3.- Identification systems.
2.4.- Transport elements.
2.5.- Traceability and warehouse management.
3.- Information management.
3.1.- Arquitectures of CIM systems.
3.2.- Industrial communications.
3.3.- SCADA software and flexible manufacturing systems simulation products.
4.- Introduction to manufacturing processes.
4.1.- Forming processes.
4.2.- Machining processes.
4.3.- Surface finishing processes.
4.4.- Element joining processes.
4.5.- Thermal processes.
4.6.- Finishing processes.
5.- Sustainable production.
5.1.- Sustainable development.
5.2.- Environmental impact.
5.3.- Sustainable design.
6.- Manufacturing trends.
6.1.- Product or service.
6.2.- Market scenarios.
6.3.- Knowledge based enterprise.
6.4.- New enterprise logistics and organization.
6.5.- Logistics: direct and inverse logistics.
7.- Production systems case studies.
7.1.- Process plans.
7.2.- Food industry.
7.3.- Automobile industry.
7.4.- Stainless steel production.
8.- Manufacturing systems simulation.
8.1.- Introduction to discrete events software simulation packages.
8.2.- Implementation of a manufacturing systems model on a simulation package.

LEARNING ACTIVITIES AND METHODOLOGY

- Theoretical lectures oriented for the acquisition of theoretical knowledge.
- Classes of problems in small groups for case studies.

- Individual tutorials and students' personal work, aimed at the acquisition of skills related to the subject program.
- Laboratory practices: 4 sessions of 1'5 hours. During the lab sessions students will learn to analyze a production process by means of a simulator. Students submit an assignment that will be marked.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

The breakdown of the course final grade is as follows:
- Assignment Work: Work and practice exercise: 40%
- Final Exam: 60%.

BASIC BIBLIOGRAPHY

- James A. Regh Computer Integrated Manufacturing (third edition), Prentice Hall, 204

- SINGH, N. Systems Approach to Computer-Integrated Design and Manufacturing., Ed. John Wiley & Sons., 1996.

- Serope Kalpakjian. Manufacturing Engineering And Technology. , Addison-Wesley Pub., 2001.

ADDITIONAL BIBLIOGRAPHY

- REMBOLD, U. Computer-Integrated Manufacturing Technology and Systems. , Marker Dekker., 1985.

- REMBOLD, U., NNAJI, B.O., STORR, A. Computer Integrated Manufacturing and Engineering., Addison-Wesley., 1993.

- SCHEER, A.W. CIM-Toward the Factory of the Future. , Springer Verlag., 1991.