Digital manufacturing and design technology

Academic Year: (2020 / 2021) **Review date: 16-10-2020**

Department assigned to the subject: Department of Mechanical Engineering

Coordinating teacher: CASTEJON SISAMON, CRISTINA

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Basic training in industrial engineering: knowledge of technical drawing, and basic concepts of mechanical engineering

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

BASIC COMPETENCES

CB7 That students know how to apply the knowledge acquired and their ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their area of study

CB8 That students are able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of their knowledge and judgments

CB9 That students know how to communicate their conclusions and the knowledge and ultimate reasons that sustain them to specialized and non-specialized audiences in a clear and unambiguous way

GENERAL COMPETENCES

CG1 Knowledge and understanding of the theoretical foundations of both industrial processes and services, and communications.

CG2 Ability to model, identify basic requirements and analyze various processes.

CG4 Knowledge and understanding of the management principles applicable to productive and service environments.

CG6 Capacity to adapt to changes in requirements associated with new products, new specifications and environments.

SPECIFIC COMPETENCES

CE1 Ability to design automatic process systems (production machinery, transport and storage systems and quality control) and the interconnection between their different modules (industrial protocols)

CE7 Ability to apply the communication of devices, both among them and globally, in the environment of Connected Industry 4.0

CE9 Ability to identify computer security requirements in connected industry environments

CE10 Programmatic data processing capabilities in solving particular problems of the connected industry

CE11 Ability to design customizable and adaptable mechanical parts and objects

LEARNING RESULT

After completing this subject matter, the student will be able to:

- Analyze the new digital production systems under the model of IC4.0 and the study of demand. Know the new technologies of digital product production: additive production, rapid prototyping, total quality control, etc.
- Design new flexible production systems of low and medium complexity that are capable of producing on demand
- Manage the production of a medium-sized system and manage the supply

DESCRIPTION OF CONTENTS: PROGRAMME

1. Concepts & Fundamentals of design technology for Digital manufacturing
2. Digitization in the complete life cycle of a product
3. Modeling and mechanical design oriented to the digitization of production
3. Real-time 3D modeling and simulation
4. design technologies applied to additive production and rapid prototyping
5. Design and customization of new components and mechanical systems
6. Product quality control systems
7. Industrial Maintenance 4.0

LEARNING ACTIVITIES AND METHODOLOGY

TEACHING ACTIVITIES REGARDING TO THE SUBJECT:
AF1 Theoretical class
AF2 Practical class
AF4 Laboratory class
AF5 Tutorials
AF6 Group work
AF7 Student individual work
AF8 Exams

Activity Code	Nº Total Hours	Nº Classroom Hours	% Clasroom /Student
F1	16,5	16,5	100
AF2	4,5	4,5	100
AF4	1,5	1,5	100
AF5	2	2	100
AF6	25	0	0
AF7	25	0	0
AF8	1,5	1,5	100
total	76	26	33%

ASSESSMENT SYSTEM

The assessment system is:
- Individual or group work (SE2): 80%
- Final exam (SE3): 20%

% end-of-term-examination:	20
% of continuous assessment (assigments, laboratory, practicals…):	80

BASIC BIBLIOGRAPHY

- K. Sipsas, K. Alexopoulos, V. Xanthakis, G. Chryssolouris, Collaborative maintenance in flow-line manufacturing environments: An Industry 4.0 approach, 5th CIRP Global Web Conference Research and Innovation for Future Production, Procedia CIRP 55 (2016) 236 ¿ 241, 2016
- K.D. Thoben, S. Wiesner, T. Wuest Industrie 4.0 and Smart Manufacturing- A Review of Research Issues and Application Examples, International Journal of Automation and Technology Vol.11 No.1, 2017 4-16., 2017

- M. Brettel, N. Friederichsen, M. Keller, How Virtualization, Decentralization and Network Building Change the Manufacturing Landscape: An Industry 4.0 Perspective, International Journal of Mechanical, Aerospace, Industrial, Mechatronic and Manufacturing Engineering Vol:8, No:1, 2014, 37-36., 2014
- S. Wang, J. Wan, D. Li, C. Zhang Implementing Smart Factory of Industrie 4.0: An Outlook, International Journal of Distributed Sensor Networks Volume 2016, Article ID 3159805, 1-10., 2016

ADDITIONAL BIBLIOGRAPHY

- F. Almada-Lobo The Industry 4.0 revolution and the future of Manufacturing Execution Systems (MES), Journal of Innovation Management JIM 3, 4 (2015) 16-21., 2015
- G. Schuh, T. Potente, C. Wesch-Potente, A.R. Weber Collaboration Mechanisms to increase Productivity in the Context of Industrie 4.0,, Robust Manufacturing Conference (RoMaC 2014), Procedia CIRP 19 (2014) 51 ¿ 56., 2014

- S. Erol, A. Jäger, P. Hold, K. Ott, W. Sihn Tangible Industry 4.0: a scenario-based approach to learning for the future of production, th CLF - 6th CIRP Conference on Learning Factories, Procedia CIRP 54 (2016) 13 ¿ 18., 2016

- S. Simons, P. Abé, S. Neser, Learning in the AutFab ¿ the fully automated Industrie 4.0 learning factory of the University of Applied Sciences Darmstadt, 7th Conference on Learning Factories, CLF 2017, Procedia Manufacturing 9 (2017) 81 ¿ 88., 2017