Course guide
220555 - 220555 - Process Automation

Last modified: 19/04/2023

Unit in charge:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit:	707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Compulsory subject).

Academic year: 2023   **ECTS Credits:** 5.0   **Languages:** Catalan

LECTURER

Coordinating lecturer: JAUME FIGUERAS JOVE

Others: ANTONIO GUASCH PETIT
          FERRAN SANABRIA ORTEGA

PRIOR SKILLS

It is advisable to have a statistical base (means, deviations, confidence intervals, etc.) and computer programming skills.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
2. Apply quantitative and experimental methods for making decisions in situations where intangibles appear
3. Apply theories and inherent principles in the production and logistics area in order to analyze uncertainty complex situations and make decisions using engineering tools.
1. Acquire concepts and techniques relating to quantitative and experimental methods for analysis and decision making.

Generical:
4. Ability to apply knowledge to solve problems in new environments or unfamiliar environments within broader contexts (or multidisciplinary) related to engineering.
5. Self-learning capacity to independent continuous training.
6. Ability to effectively communicate their findings, knowledge and concluding reasons to skilled and unskilled audiences, clearly and unambiguously.
7. Ability to integrate knowledge and formulate judgments with the aim of making decisions based on information that, with incomplete or limited include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
8. Ability to understand the impact of engineering solutions in a global and social context .
9. Ability to operate and lead multidisciplinary and multicultural groups, with negotiation skills, group work, relationships in an international setting, and conflict resolution.

TEACHING METHODOLOGY

The teaching methodology combines the following activities:

The lectures presented by teachers.
Practise in the laboratory.
The proposed voluntary exercises. These are divided into theoretical and practical exercises.
The simulation project.

LEARNING OBJECTIVES OF THE SUBJECT

The Process Automation course introduces students to the knowledge of tools to aid in the decision making process in production environments. The modeling of production environments in a simulator allows the analysis, the study, the improvement, and the evaluation of different solutions without interfering with the production or logistics.

STUDY LOAD

Type	Hours	Percentage
Self study	80,0	64.00
Hours medium group	15,0	12.00
Guided activities	22,0	17.60
Hours large group	8,0	6.40

Total learning time: 125 h

CONTENTS

Module 1: Introduction

Description:
1. Devices and components for industrial automation
2. Industrial Process Management
3. Models for industrial automation
4. Simulation. Advantages, disadvantages and application fields

Full-or-part-time: 10h
Theory classes: 4h
Self study : 6h

Module 2: Discrete-event systems modeling

Description:
1. Conceptual modeling
2. Petri Nets
3. Colored Petri Nets

Full-or-part-time: 47h
Theory classes: 11h
Practical classes: 6h
Self study : 30h

Module 3: Statistics models for simulation

Description:
1. Definitions, description of a system with random characteristics
2. Data collection and analysis
3. Statistical Concepts
4. Analysis of the fit of a distribution
5. Random number generation. Manual simulation.
6. Most commonly used distribution functions.
7. Breakdowns

Full-or-part-time: 42h
Theory classes: 10h
Practical classes: 4h
Self study : 28h

Module 4: Design of experiments and analysis of results

Description:
1. Measures of system performance
2. Comparison of alternatives, confidence intervals
3. Factorial design

Full-or-part-time: 26h
Theory classes: 6h
Practical classes: 4h
Self study : 16h

GRADING SYSTEM

The final grade depends on the following assessment criteria:

- Examen 1, weight: 35%
- Examen 2, weight: 35%
- Project, weight: 30%

All students unable to attend theexams, or failing them, will have the option of repeating them with the Final exam.

BIBLIOGRAPHY

Basic:
- Guasch, A. [et al.]. Modelado y simulación: aplicación a procesos logísticos de fabricación y servicios [on line]. 2a ed. Barcelona: Edicions UPC, 2003 [Consultation: 22/06/2020]. Available on: http://hdl.handle.net/2099.3/36767. ISBN 8483017040.
- Banks J.; Carson J. S.; B.L. Nelson; D.M. Nicol. Discrete-event system simulation. 5a ed. Upper Saddle River: Prentice Hall, 20010. ISBN 9780138150372.