

340240 - SIPI-K7P07 - Integrated Production Systems

Coordinating unit:	340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit:	707 - ESAII - Department of Automatic Control
Academic year:	2019
Degree:	BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits:	6
Teaching languages:	Catalan, Spanish

Teaching staff

Coordinator:	LUIS MIGUEL MUÑOZ MORGADO
Others:	LUIS MIGUEL MUÑOZ MORGADO - ABEL TORRES CEBRIAN

Prior skills

Previous knowledge on programming, control theory and automation

Requirements

- Q5: Automatització Industrial; Informàtica Industrial
- Q6: Sistemes Robotitzats

Degree competences to which the subject contributes

Specific:

1. CE15. Basic knowledge of production and fabrication systems.
2. CE29. Ability to design automation control systems.

Teaching methodology

This subject is an example of learning by doing methodology. A relation between theoretic concepts and applied knowledge. We will use the project based learning and the model role playing approaches. The aim is use learnings tools in order to achieve the autonomy of the engineering students.

Learning objectives of the subject

- 1 General characteristics of the integrated production systems (form plant level to supervisory control level)
- 2 Skill acquisition in modelling and simulation systems
- 3 Identify essential elements on robotic production systems
- 4 Skill acquisition in developing robotic and computer vision applications over production systems

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Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	30h	20.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

(ENG) Introduction to Computer Integrated Manufacturing

Degree competences to which the content contributes:

Description:

(ENG) Definitions

The flexible manufacturing

Components of a manufacturing system

Specific objectives:

(ENG) Modeling

Degree competences to which the content contributes:

Description:

(ENG) Modeling and simulation of production processes and logistics

Modeling with Petri Nets

Random effects model

Related activities:

(ENG) PR1 Modeling

Specific objectives:

(ENG) Simulation

Degree competences to which the content contributes:

Description:

(ENG) Introduction

Simulation of discrete event systems

Verification and validation of models Analysis of results

Related activities:

(ENG) PR2 Simulation

Specific objectives:

(ENG) Computer Vision

Degree competences to which the content contributes:

Description:

(ENG) Introduction to Computer Vision

Acquisition and image processing

Segmentation and recognition

Industrial vision systems

Specific objectives:

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Related activities:

(ENG) PR3 Vision

Specific objectives:

(ENG) Robotics

Degree competences to which the content contributes:

Description:

(ENG) Application of robots in production lines
Special robots: robotic warehouses, parallel robots, mobile robots, machine tools.

Related activities:

(ENG) PR4 Robotics

Specific objectives:

(ENG) PR1 Modeling

Degree competences to which the content contributes:

Description:

(ENG) Introduction to simulation software ARENA
Representation of Petri Nets arena on environment
Petri Nets applied to case studies of production systems
Modeling machines

Specific objectives:

(ENG) PR2 Simulation

Degree competences to which the content contributes:

Description:

(ENG) ARENA applied to case studies of production systems
Case studies. Comparison of alternatives

Specific objectives:

(ENG) PR3 Vision

Degree competences to which the content contributes:

Description:

(ENG) Introduction to the toolbox "Image Processing" toolbox of Matlab and National Instruments tools.

Specific objectives:

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(ENG) PR4 Robotics

Degree competences to which the content contributes:

Description:

(ENG)Introduction to Programming in Rapid (ABB)

Introduction to RobotStudio

Introduction to the programming of CNC machines

Specific objectives:

Qualification system

The final qualification is:

NF = 0,6XEx + 0,2Practiquim + 0,2XTeam Group

Regulations for carrying out activities

The evaluation is a set of proofs (individual and/or in group), in class or virtual approach:

- Ex individual proof about the theoretical parts of the subject (in class)
- Practiquim: guided lessons in the laboratory
- Ex individual Practiquim

Bibliography

Basic:

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Computer vision : theory and industrial applications. Berlin [etc.]: Springer-Verlag, 1992. ISBN 3540510368.

Banks, Jerry [et al.]. Discrete-event system simulation. 5th ed. Upper Saddle River, NJ: Prentice Hall, 2010. ISBN 9780138150372.

Davies, E. R. Machine vision [Recurso electrònic] : theory, algorithms, practicalities [on line]. 4th ed. Saint Louis: Academic Press, 2012 [Consultation: 14/10/2019]. Available on: <https://discovery.upc.edu/iii/encore/record/C__Rb1412110?lang=cat>. ISBN 9780123869913.

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Fu, K. S. Rob3tica : Control, detecci3n, visi3n e inteligencia. Madrid: McGraw-Hill, 1988. ISBN 8476152140.

Carrie, Allan. Simulation of manufacturing systems. Chichester: John Wiley & Sons, 1988. ISBN 0471915742.

Kelton, W. David. Simulation with Arena. 5th ed. Boston [etc.]: McGraw-Hill, 2010. ISBN 9780071267717.

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