### 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.

### 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
### 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% |
340240 - SIPI-K7P07 - Integrated Production Systems

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:
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:
# 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:

\[
NF = 0.6 \times Ex + 0.2 \times PractiQuum + 0.2 \times Team\: Group
\]

## 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)
- PractiQuum: guided lessons in the laboratory
- Ex individual PractiQuum

## Bibliography

### Basic:

- Smith, Graham T. CNC machining technology. London [etc.]: Springer-Verlag, 1993. ISBN 0387198288 (V.1) ; 0387198296 (V.2) ; 038719830X (V.3).