220555 - Process Automation

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control
Academic year: 2018
Degree: MASTER'S DEGREE IN MANAGEMENT ENGINEERING (Syllabus 2012). (Teaching unit Compulsory)
ECTS credits: 5
Teaching languages: Catalan, English

Teaching staff
Coordinator: JAUME FIGUERAS JOVE
Others: ANTONIO GUASCH PETIT

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.

General:
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.
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

<table>
<thead>
<tr>
<th>Total learning time: 125h</th>
<th>Hours large group:</th>
<th>8h</th>
<th>6.40%</th>
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<tr>
<td></td>
<td>Hours medium group:</td>
<td>15h</td>
<td>12.00%</td>
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<td></td>
<td>Guided activities:</td>
<td>22h</td>
<td>17.60%</td>
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<td>Self study:</td>
<td>80h</td>
<td>64.00%</td>
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## Content

<table>
<thead>
<tr>
<th>Module 1: Introduction</th>
<th>Learning time: 10h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 4h</td>
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<td>Self study : 6h</td>
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**Description:**
1. Devices and components for industrial automation
2. Industrial Process Management
3. Models for industrial automation
4. Simulation. Advantages, disadvantages and application fields

<table>
<thead>
<tr>
<th>Module 2: Discrete-event systems modeling</th>
<th>Learning time: 47h</th>
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<tbody>
<tr>
<td></td>
<td>Theory classes: 11h</td>
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<tr>
<td></td>
<td>Practical classes: 6h</td>
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<td>Self study : 30h</td>
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**Description:**
1. Conceptual modeling
2. Petri Nets
3. Colored Petri Nets

<table>
<thead>
<tr>
<th>Module 3: Statistics models for simulation</th>
<th>Learning time: 42h</th>
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<tr>
<td></td>
<td>Theory classes: 10h</td>
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<td>Practical classes: 4h</td>
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<td>Self study : 28h</td>
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**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
6. Most commonly used distribution functions.
7. Breakdowns
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 the exams, or failing them, will have the option of repeating them with the Final exam.

**Bibliography**

**Basic:**


**Others resources:**

**Module 4: Design of experiments and analysis of results**

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<th>Learning time: 26h</th>
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<tbody>
<tr>
<td>Theory classes: 6h</td>
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<tr>
<td>Practical classes: 4h</td>
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<tr>
<td>Self study : 16h</td>
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</tbody>
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**Description:**

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