

**1. General information****Course:** INDUSTRIAL AUTOMATION**Code:** 56508**Type:** CORE COURSE**ECTS credits:** 6**Degree:** 359 - UNDERGRAD. IN INDUSTRIAL ELECTRONICS AND AUTOMAT. ENGINEERING (CR)**Academic year:** 2020-21**Center:** 602 - E.T.S. INDUSTRIAL ENGINEERING OF C. REAL**Group(s):** 20**Year:** 3**Duration:** C2**Main language:** Spanish**Second language:****Use of additional languages:****English Friendly:** Y**Web site:****Bilingual:** N**Lecturer:** ANDRES SAN MILLAN RODRIGUEZ - Group(s): 20

| Building/Office   | Department                                                     | Phone number | Email                    | Office hours |
|-------------------|----------------------------------------------------------------|--------------|--------------------------|--------------|
| Politécnico/2C-01 | INGENIERÍA ELÉCTRICA, ELECTRÓNICA, AUTOMÁTICA Y COMUNICACIONES | Vía Teams    | Andres.SanMillan@uclm.es |              |

**2. Pre-Requisites**

Not established

**3. Justification in the curriculum, relation to other subjects and to the profession**

Not established

**4. Degree competences achieved in this course****Course competences**

| Code | Description                                                                                                                                                                                                                             |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A02  | To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study. |
| A03  | To have the capability to gather and interpret relevant data (normally within the area of study) to make judgements that include a reflection on themes of a social, scientific or ethical nature.                                      |
| A04  | To be able to transmit information, ideas, problems and solutions to a specialized audience.                                                                                                                                            |
| A05  | To have developed the learning skills necessary to undertake subsequent studies with a greater degree of autonomy.                                                                                                                      |
| A07  | Knowledge of Information Technology and Communication (ITC).                                                                                                                                                                            |
| A08  | Appropriate level of oral and written communication.                                                                                                                                                                                    |
| A12  | Knowledge of basic materials and technologies that assist the learning of new methods and theories and enable versatility to adapt to new situations.                                                                                   |
| A13  | Ability to take the initiative to solve problems, take decisions, creativity, critical reasoning and ability to communicate and transmit knowledge, skills and abilities in Industrial Electronic Engineering and Automation.           |
| A15  | Ability to work to specifications and comply with obligatory rules and regulations.                                                                                                                                                     |
| D11  | Ability to design control and industrial automatization systems.                                                                                                                                                                        |

**5. Objectives or Learning Outcomes****Course learning outcomes**

Description

Know the characteristics of industrial peripherals

Use the main information support tools

Ability to design communication systems in the industrial environment

Ability to design systems of control and industrial automatization

Ability to plan an application based on real-time systems

Know the basic structure of an information system in the work environment

**6. Units / Contents****Unit 1:****Unit 2:****Unit 3:****Unit 4:****Unit 5:****Unit 6:****Unit 7:****Unit 8:****Unit 9:****Unit 10:****Unit 11:**

**Unit 12:**

| 7. Activities, Units/Modules and Methodology                                |                                  |                                                       |          |                                             |    |     |             |
|-----------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------|----------|---------------------------------------------|----|-----|-------------|
| Training Activity                                                           | Methodology                      | Related Competences (only degrees before RD 822/2021) | ECTS     | Hours                                       | As | Com | Description |
| Class Attendance (theory) [ON-SITE]                                         | Lectures                         | A07 A12                                               | 0.84     | 21                                          | N  | -   |             |
| Problem solving and/or case studies [ON-SITE]                               | Problem solving and exercises    | A02 A03 A15 D11                                       | 0.8      | 20                                          | Y  | N   |             |
| Study and Exam Preparation [OFF-SITE]                                       | Self-study                       | A07 A12                                               | 2.72     | 68                                          | N  | -   |             |
| Laboratory practice or sessions [ON-SITE]                                   | Practical or hands-on activities | A13 A15 D11                                           | 0.64     | 16                                          | Y  | N   |             |
| Practicum and practical activities report writing or preparation [OFF-SITE] | Combination of methods           | A02 A03 A04 A05 A07 A08 A12 A13 A15 D11               | 0.88     | 22                                          | Y  | Y   |             |
| Final test [ON-SITE]                                                        | Combination of methods           | A02 A03 A04 A07 A08 A12 A13 D11                       | 0.12     | 3                                           | Y  | Y   |             |
| <b>Total:</b>                                                               |                                  |                                                       | <b>6</b> | <b>150</b>                                  |    |     |             |
| <b>Total credits of in-class work: 2.4</b>                                  |                                  |                                                       |          | <b>Total class time hours: 60</b>           |    |     |             |
| <b>Total credits of out of class work: 3.6</b>                              |                                  |                                                       |          | <b>Total hours of out of class work: 90</b> |    |     |             |

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

| 8. Evaluation criteria and Grading System         |                       |                            |             |
|---------------------------------------------------|-----------------------|----------------------------|-------------|
| Evaluation System                                 | Continuous assessment | Non-continuous evaluation* | Description |
| Laboratory sessions                               | 20.00%                | 20.00%                     |             |
| Final test                                        | 70.00%                | 70.00%                     |             |
| Assessment of problem solving and/or case studies | 10.00%                | 10.00%                     |             |
| <b>Total:</b>                                     | <b>100.00%</b>        | <b>100.00%</b>             |             |

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

| 9. Assignments, course calendar and important dates                                                 |              |
|-----------------------------------------------------------------------------------------------------|--------------|
| Not related to the syllabus/contents                                                                |              |
| <b>Hours</b>                                                                                        | <b>hours</b> |
| Final test [PRESENCIAL][Combination of methods]                                                     | 3            |
| <b>Unit 1 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 2            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| <b>Unit 2 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 6            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 2            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 1            |
| <b>Unit 3 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 6            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 2            |
| <b>Unit 4 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 4            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 2            |
| <b>Unit 5 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |

|                                                                                                     |              |
|-----------------------------------------------------------------------------------------------------|--------------|
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 8            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 4            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 4            |
| <b>Unit 6 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 4            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 10           |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 4            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 6            |
| <b>Unit 7 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 6            |
| <b>Unit 8 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 6            |
| <b>Unit 9 (de 12):</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 2            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 8            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 2            |
| <b>Unit 10 (de 12):</b>                                                                             |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 1            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 2            |
| <b>Unit 11 (de 12):</b>                                                                             |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 1            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 3            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 4            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 2            |
| <b>Unit 12 (de 12):</b>                                                                             |              |
| <b>Activities</b>                                                                                   | <b>Hours</b> |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 1            |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 4            |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 6            |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 1            |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 3            |
| <b>Global activity</b>                                                                              |              |
| <b>Activities</b>                                                                                   | <b>hours</b> |
| Laboratory practice or sessions [PRESENCIAL][Practical or hands-on activities]                      | 16           |
| Practicum and practical activities report writing or preparation [AUTÓNOMA][Combination of methods] | 22           |
| Class Attendance (theory) [PRESENCIAL][Lectures]                                                    | 21           |
| Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]                     | 20           |
| Study and Exam Preparation [AUTÓNOMA][Self-study]                                                   | 68           |
| Final test [PRESENCIAL][Combination of methods]                                                     | 3            |
| <b>Total horas: 150</b>                                                                             |              |

| 10. Bibliography and Sources                 |                                                        |                                                   |      |                |      |             |
|----------------------------------------------|--------------------------------------------------------|---------------------------------------------------|------|----------------|------|-------------|
| Author(s)                                    | Title/Link                                             | Publishing house                                  | Citv | ISBN           | Year | Description |
| Andrés García                                | El Control Automático en la Industria                  | Ediciones de la Universidad de Castilla-La Mancha |      | 84-8427-405-5  | 2005 |             |
| Andrés García, Pedro José Muñoz, Carlos Ruiz | Prácticas de Tecnología de la Automatización           | Ediciones ETSII-UCLM                              |      | 84-689-0419-4  | 2006 |             |
| Antonio Rodríguez Mata, Julián Cócera Rueda  | Desarrollo de sistemas secuenciales                    | Paraninfo                                         |      | 84-283-2731-9  | 2000 |             |
| Christopher T. Kilian                        | Modern Control Technology: Components and Systems      | Delmar Thomson Learning                           |      | 978-0766823587 | 2000 | 2nd edition |
| G.K. McMillan, D.M. Considine et al.         | Process / Industrial Instruments and Controls Handbook | McGraw-Hill                                       |      | 0-07-012582-1  | 1999 | 5th. ed.    |
| Richard L. Shell & Ernest I. Hall            | Handbook of Industrial Automation                      | Marcel Dekker,                                    |      | 0-8247-0373-1  | 2000 |             |

