Universidad Zaragoza

Academic Year/course: 2024/25

28952 - Utilities and process control

Syllabus Information

Academic year: 2024/25
Subject: 28952 - Utilities and process control
Faculty / School: 201 - Escuela Politécnica Superior
Degree: 583 - Degree in Rural and Agri-Food Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

The subject focuses on the study of instrumentation and control in the agri-food industries, the dynamics and behavior of the processes of the agri-food industry, and their measurement and control systems, . The aim is also to acquire an adequate knowledge of the physical problems and technologies related to the operation of equipment and auxiliary machines applied in the handling and manufacturing processes of the agri-food industry.

These approaches and objectives are aligned with the Sustainable Development Goals (SDGs) of the 2030 Agenda of United Nations (https://www.un.org/sustainabledevelopment/es/), specifically, the learning activities planned in this subject will contribute to the achievement of targets 7.2 and 7.3 of Goal 7, and target 9.4 of Goal 9.

2. Learning results

- Know how to design fluid impulsion equipment and steam generation and transport installations.
- Be able to propose simple control strategies and participate in the management and acquisition of a control system.
- Identify the agricultural tasks in which computers, PLCs and robots can be used as tools.
- Awareness of the need for automation and robotization in their sector (climate control of greenhouses, fertigation systems, harvesting, post-harvesting, etc.).
- Focus their agricultural knowledge from a new technology point of view.
- Use the EES program to solve problems with ease.
- Handle with a certain degree of dexterity, and in a responsible manner, the equipment and instruments used during the practical laboratory sessions.
- Interpret experimental results in the context of the subject and relate them to the theoretical contents.
- Select through on-line catalogs the necessary equipment for steam, compressed air and fluid impulsion installations fluid impulsion.
- Apply the standards and regulations in force in the field of the installations studied.

3. Syllabus

1: Introduction.

AUXILIARY EQUIPMENT IN THE FOOD INDUSTRY

2: Use of steam, distribution networks and boilers.

3: Compressed air and gas impulsion. Pneumatic equipment and distribution networks.

4: Liquid impulsion. Equipment and networks.

5: Transport and handling of solids.

PROCESS CONTROL IN THE FOOD INDUSTRY

6: Introduction to automatic control.

7: The process.

8: Process characteristics.

9: Control actions.

10: Adjustment of controllers.

11: Industrial instrumentation (I).

12: Industrial instrumentation (II).

13: Characteristics of typical process control loops.

14: Advanced control.

15: Control valves.

16: Industrial applications. Typical control schemes.

4. Academic activities

- **Lectures**: 30 hours

Theoretical sessions in which the contents of the subject are explained.

- **Problems and cases**: 20 hours

Problem solving by the teacher and self-assessment

- **Laboratory practices**: 10 hours

Control practices (5) in the laboratory/computer room and preparation of reports.

- **Advanced training in information competencies**: 2 hours

Theoretical and practical training of the EPS Library

- **Group work and homework and independent study and work**: 24 + 62 hours

Individual and group resolution of practical control cases. Personal study.

- **Assessment tests**. 2 hours

5. Assessment system

It will be global, considering:

1 Theory and problems exam (50%)

Written test (2,5-3h), with the help of the material provided during the course. It will consist of:

(a) 4-5 theoretical-practical questions of short development or multiple-choice (on instrumentation, control of installations and the installations and laboratory/simulation practices)

(b) 2 application questions (resolution of the most appropriate instrumentation and control for a given industrial process).

The overall grade will be weighted (40%) a, 60% b), with a minimum grade of 3.5 (out of 10) in each part and an overall grade of 4.0 (out of 10) in order to be compensated for the rest.

2 Homework and assignments (50%)

(c) The individual assignments (between 2 and 4) will be problems and questions related to process control. The grade will be the arithmetic mean of the problems and questions handed in.

(d) The works (groups of 2 students) will consist of the study of some auxiliary installation of the Agroalimentary Industries or in the control system of some agroindustrial process. They will be presented in class.

The overall grade will be the arithmetic mean of c and d with a minimum of 3.5 to be compensated for the rest.

If this part is not passed in the first round, the resolution of a new collection of homework and assignments must be handed in individually before the beginning of the global test of the 2nd call.

The success rates for the subject in the last three years are: 2019/20: 100%; 2020/21: 88,89%; 2021/22: 100%

6. Sustainable Development Goals

4 - Quality Education
7 - Affordable and Clean Energy
9 - Industry, Innovation and Infrastructure