Universidad Zaragoza

Academic Year/course: 2023/24

29930 - Chemical Process Control

Syllabus Information

Academic year: 2023/24
Subject: 29930 - Chemical Process Control
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 330 - Complementos de formación Máster/Doctorado
        435 - Bachelor's Degree in Chemical Engineering
ECTS: 6.0
Year: 435 - Bachelor's Degree in Chemical Engineering: 4
330 - Complementos de formación Máster/Doctorado: XX

Semester: First semester
Subject type: 435 - Compulsory
330 - ENG/Complementos de Formación
Module:

1. General information

It is intended that the student understands the fundamental concepts of instrumentation and control of chemical processes, which guarantee the correct monitoring and stability of the same throughout the operation time. Therefore, provides you with key knowledge for the development of your future professional activity.

These approaches and goals are aligned with some of the Sustainable Development Goals, SDGs, of the Agenda 2030 (https://www.un.org/sustainabledevelopment/es/) and certain specific goals, so that the acquisition of the learning results of the subject provides training and competence to the student to contribute to some extent to their achievement:

Decent work and economic growth. Objective 8.2

Goal 9. Industry, Innovation and Infrastructure. Objective 9.4

2. Learning results

Model a process including the elements corresponding to the process control. Predict the behavior of equipment and processes in non-steady state.

Analyze the process identifying the variables to be controlled with the most appropriate instrumentation.

Know the basic principles of control applied to the safety of a chemical process.

Design advanced control systems taking into account multivariable process interaction. Apply appropriate control techniquesin these processes.

Design control strategies applied to the main variables and equipment of industrial processes.

Design complete control strategies for an industrial chemical process and modify the process to increase controllability.

3. Syllabus

Unit 1. Introduction. Types of control.

Unit 2. The control loop.

Unit 3. Feedback control.

Unit 4. Industrial instrumentation.

Unit 5. Variable selection.

Unit 6. Strategies for the control of the main process variables (temperature, pressure, level, flow and composition).

Unit 7. Dynamic process modeling. Controlled processes.

Unit 8. Control for safety.

Unit 9. Strategies for reactor control.

Unit 10. Heat exchanger control and energy management.

Unit 11. Control of distillation columns.

Unit 12. Control of other process units. Snowball effect.

4. Academic activities

Participative master classes (45 h). The theory of the different topics that have been proposed will be taught and model problems will be solved.

Problem solving classes (15 h). In these classes, problems related to the theoretical part explained in the master classes will be solved.

Case studies (20 h). There will be 2 cases of application of the explained contents that will be assessable.

Individual study (67 hours).

Final assessment(3 h).

5. Assessment system

Option 1:

Completion of two individual case studies. They may include: selection of variables in a process, instrumentation, control strategy, control for safety... (30% of the final grade).

Final test (70% of the final grade): Written test divided into two parts. Each one will account for 50% of the grade. A minimum score of 4 out of 10 is required for each partto be averaged for.

In order to average the test with the grades of the practical cases it is necessary to obtain a minimum score in the final test of 5 out of 10 , being the grade of each of the two parts higher than 4.0.

In addition, points will be awarded and added directly to the final grade for class participation.

Option 2:

A single written test with three different parts. The first two parts will be the same as for option 1. The third part of the test will correspond to the contents of the case studies. In order to be eligible for averaging, it is necessary that the three parts of the test each have a minimum score of 4.0 out of 10, and that the average of the three parts be at least 5.0