

Academic Year/course: 2022/23

28952 - Utilities and process control

Syllabus Information

Academic Year: 2022/23

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

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

THEORY LESSONS

The theoretical academic sessions will be used to allow students to learn through exposure professor concepts and methodologies of work needed to start developing your self-employment. These sessions will be conducted mostly with the support of computer presentations and projected; previously will be provided to the student.

PROBLEM-SOLVING SESSIONS:

The student will be given a series of problem sets that will solve or try to solve, then the interactive sessions will address the doubts and resolutions thereof.

WORKS:

In the classroom will be proposed during the course 3 or 4 works, which the students have to solve. subsequent to the delivery, they made the defence of the same.

LABORATORY PRACTICE:

The professor made an explanation of the theoretical framework necessary for understanding the theory of practice to develop.

Explanation of equipment and instruments

Students operate the equipment, take data order that they can develop the practice report.

The completion of the practices is obligatory.

Throughout the course, learning activities related to SDGs 7 (targets 7.2 and 7.3) and 9 (target 9.4) will be developed.

4.2. Learning tasks

The achievement of a student's basic training is based on theoretical type classes (30 hours) and problems type classes (20 hours), but the active participation of students will be encouraged.

Group work/activities (20 hours) are required; they allow the acquisition of general and specific competence.

Advanced training in information skills: training activity to work on information skills at an advanced level (specialized databases, bibliographic managers, etc.). Classroom mode, theoretical-practical, 2 hours long. It is part of the Information Skills Training Plan developed by the EPS library in the center's degrees (basic (1st), intermediate (2nd and 3rd) and advanced (4th) levels).

Individual tutoring by virtual platform moodle2.unizar.es and by video conference via Google Meet, will be conducted to clarify the particular problems of each student and mandatory tutoring to work with reduced groups specific topics.

Also, the practice program (10 hours) allows transposing theoretical knowledge to practical application and development of scientific and technical documents. Tools will be used to support teaching and problem-solving (software Control Station).

Independent study. Before the final exam.

The Virtual Campus of UniZar will also be used as support.

4.3. Syllabus

The course will address the following learning tasks:

Theory programme

- Topic 1: Introduction

Thematic block 1:

AUXILIARY EQUIPMENT IN THE FOOD PROCESSING INDUSTRY

- Topic 2: Use of steam in food processing industries. Steam distribution network. Steam boilers.
- Topic 3: Drive compressed air and gases. pneumatic equipment. Distribution networks of compressed air.
- Topic 4: Drive liquids. Equipment and distribution networks
- Topic 5: Transport and solids handling

Thematic block 2:

PROCESS CONTROL IN THE FOOD PROCESSING INDUSTRY

- Topic 6: Introduction to automatic control.
- Topic 7: The Process.
- Topic 8: Process characteristics
- Topic 9: Control actions.
- Topic 10: Tuning controllers.
- Topic 11: Industrial Instrumentation (I)
- Topic 12: Industrial Instrumentation (II)
- Topic 13: Characteristics of typical process control loops
- Topic 14: Advanced Control
- Topic 15: Control Valves.
- Topic 16: Applications in the industry. typical control schemes.

Practical Programme

- Practical 1: Control Station. User Guide
- Practical 2: Control Station. Dynamics of the Gravity Drained Tanks
- Practical 3: Control Station. P-Only Control of Tank Level. PI Control of Heat Exchanger Temperature
- Practical 4: Control Station. PID Control of Heat Exchanger Temperature. Cascade Control of the Jacketed Reactor
- Practical 5: Visit a food processing industry to discover its auxiliary installations ?in situ? and to control its processes.

4.4. Course planning and calendar

Study time and individual work

Assistance to the on-site sessions is mandatory in works/activities and laboratory practice.

The students must take up the subject (4-5 hours per week) to understand and carry out further issues and problems that arise in class.

Overall it is estimated that students must use a total of 90 hours of personal work to complete a total of 150 hours devoted to the subject.

Type of activity / week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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<i>On-site activity</i>															
Theory	4	4	2	2	2	2	2	1	1	1	2	2	2	1	2
Problems			2	2	2	2	2	3	3	1			2	1	
Laboratory Problems										2	2	2		2	2
Evaluation								1	1						
<i>Off-site activity</i>															
Autonomous work						3	3	6	5	5	5	5	5	5	5
Group work		4	4	4	4	3	3	2							
TOTAL	4	8	8	8	8	10	10	12	10	10	9	9	9	9	9

4.5. Bibliography and recommended resources

- BB** Acedo Sánchez, José. Instrumentación y control básico de procesos / José Acedo Sánchez. [Madrid] : Díaz de Santos, D.L. 2006
- BB** ÁVALOS ARZATE, G. Teoría de control, ajuste de controladores industriales. Mexico: Instituto Politécnico Nacional, 2002. ISBN 978-1-4492-2636-7.
- BB** Muñoz Hernández, J. A. Dinámica y control de procesos químicos. Sello Editorial Universidad del Tolima, 2014
- BB** Piedrafita Moreno, Ramón. Ingeniería de la automatización industrial / Ramón Piedrafita Moreno. 2a ed. amp. y act. Madrid : Ra-Ma, D.L. 2003 [cop. 2004]
- BB** Rojano Ramos, Santiago. Instrumentación y control en instalaciones de procesos, energía y servicios auxiliares. Málaga : IC Editorial, 2012
- BC** Arbones, E., Corral, I., Gómez, J. (2005). Fundamentos termodinámicos y diseño de las instalaciones de vapor en las industrias agroalimentarias. Editorial Trymar
- BC** Arbones, E., Gómez, J. Vázquez, E. (2001). Las instalaciones de aire comprimido en la industria agroalimentaria. Editorial Trymar
- BC** Balcells Sendra, Josep. Autómatas programables / Josep Balcells, José Luis Romeral. Barcelona : Marcombo Boixareu, D.L. 1997
- BC** Díaz Murillo, Rodolfo. Laboratorio de instrumentación y control. México : Instituto Politécnico Nacional, 2008
- BC** García Gutiérrez, Luis. Instrumentación básica de medida y control. Madrid : Aenor, 2014
- BC** Ogata, Katsuhiko. Sistemas de control en tiempo discreto / Katsuhiko Ogata ; traducción, José Guillermo Aranda Pérez... [et al.]. [1a. ed. en español]. México [etc.] : Prentice Hall Hispanoamericana, cop. 1996
- BC** VILLALOBOS ORDAZ, G. Medición y control de procesos industriales. [s. l.]: Instituto Politécnico Nacional, 2006.

The updated recommended bibliography can be consulted in:
<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28952>