29930 - Monitoring Chemical Processes

Información del Plan Docente

Academic Year	2017/18
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	XX
Semester	Half-yearly
Subject Type	Compulsory, ENG/Complementos de Formación
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process will take place at several levels: lectures, practical problems (cases) and tutored projects, increasing the level of student participation. In the practical problems and tutored projects, the students will work in small groups of two or three people.

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5.2.Learning tasks

The program proposed to the student in order to achieve the expected results, includes the following activities:
Theoretical lectures (45 h). Dedicated to explain the different topics and solve some model problems.
Work in small groups (15 h). In these classes, problems will be solved by students supervised by the professor. Problems or cases will be related to the theoretical part explained in the lectures.
Practical cases in group (20 h Non-contact). Groups of two and three students will be formed throughout the semester. The groups will work on 3 practical cases supervised by the teacher. Tutoring sessions will be scheduled for the resolution of doubts.
Individual study (67 hours). Students perform individual study continuously throughout the semester.
Final Evaluation (3 h). A global test, where the theoretical and practical knowledge gained by the student will be evaluated.

5.3.Syllabus

The topics covered in this subject are:

1. Introduction. Types of control.

2. The control loop.

3. Feedback control.

4. Industrial Instrumentation.

5. Selection of control variables.

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

7. Dynamic Modeling of processes. Controlled processes.

8. Control for safety. Effect of recycles on control: effect "snowball".

9. Strategies for controlling reactors.

10. Control of heat exchangers, and energy management.

11. Control of distillation columns.

12. Control of other process units

13. Controllability and observability. Multivariable control.

5.4.Course planning and calendar

	Theoretical lectures	Practical cases in	Individual study

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	+ problems	groups.	
1. Introduction. Types of control.	3 h + 0 h		3 h
2. The control loop.	2 h + 0 h		3 h
3. Feedback control.	5 h + 2 h		6 h
4. Industrial Instrumentation.	3 h + 1 h	Case 1 (4 h), T1	5 h
5. Selection of control variables.	2 h + 1 h		6 h
6. Strategies for the control of key process variables (temperature, pressure, level, flow and composition).	4 h + 2 h		5 h
7. Dynamic Modeling of processes. Controlled processes.	5 h + 4 h		7 h
8. Control for safety. Effect of recycles on control: "snowball" effect.	2 h + 1 h		5 h
9. Strategies for controlling reactors.	4 h + 1 h	Case 2 (6 h), T2	3 h
10. Control of heat exchangers, and energy management.	4 h +1 h		9 h
11. Control of distillation columns.	4 h + 1 h		9 h
12. Control of other process units.	4 h + 1 h	Case 3(10 h), T3	3 h

13. Controllability and observability. Multivariable control.	3h + 0 h		3h
Total	45 h + 15 h	20 h	67 h

5.5.Bibliography and recommended resources

BB	Bequette, B. Wayne. Process control : modeling, design, and simulation / Wayne B. Bequette . Upper Saddle River (New Jersey) : Prentice Hall PTR, cop. 2003
BB	Luyben, William L.. Plantwide process control / William L. Luyben, Björn D. Tyréus, Michael L. Luyben . New York [etc.] : McGraw-Hill, cop. 1999
BB	Process dynamics and control / Dale E. Seborg ... [et al.] . - 3rd ed., international student ed. Hoboken, NJ : Wiley, cop. 2011
BC	Creus Solé, Antonio. Instrumentación industrial / Antonio Creus Solé . 8ª ed. Barcelona : Marcombo, 2011
BC	Product and process design principles : synthesis, analysis, and evaluation / Warren D. Seider ... [et al.] . 3rd ed. Hoboken [New Jersey] : John Wiley and Sons, cop. 2010

LISTADO DE URLs:

Curso de control de la Universidad de Edimburgo [eweb.chemeng.ed.ac.uk/courses/control/restricted/course/index.html]
Curso de control de la Universidad de Michigan [https://controls.engin.umich.edu/wiki/index.php/Main_Page#Process_Control_Intr]