

29930 - Monitoring Chemical Processes

Información del Plan Docente

Academic Year	2016/17
Academic center	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Course	4
Period	Half-yearly
Subject Type	Compulsory
Module	---

1. Basic info

1.1. Recommendations to take this course

1.2. Activities and key dates for the course

2. Initiation

2.1. Learning outcomes that define the subject

2.2. Introduction

3. Context and competences

3.1. Goals

3.2. Context and meaning of the subject in the degree

3.3. Competences

3.4. Importance of learning outcomes

4. Evaluation

5. Activities and resources

5.1. General methodological presentation

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.

5.2. Learning activities

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.

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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.Program

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.Planning and scheduling

	Theoretical lectures + problems	Practical cases in groups.	Individual study

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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	3h + 0 h		3h

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and observability. Multivariable control.			
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
[web.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_Intro]
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