



PERSONA CIÈNCIA EMPRESA  
UNIVERSITAT RAMON LLULL

## **COURSE: CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY IV**

**SUBJECT MATTER:** Fundamentals of Thermal and Fluids Engineering

**MODULE:** Core Topics of Industrial Engineering

**PROGRAM:** Degree in Chemical Engineering

Page 1 of 5

### **GENERAL FEATURES\***

**Type:**  Basic Formation,  Compulsory,  Elective

Final Degree Project,  Internship

**Duration:** Annual

**Semester/s:** 5 and 6

**Number of ECTS credits:** 5

**Language/s:** Spanish, Catalan, English

### **DESCRIPTION**

#### **SHORT DESCRIPTION AND JUSTIFICATION**

The course is highly practical. The students, through practical work individually or in small groups, must acquire the ability to design and conduct experiments in engineering.

Experimentation in Chemical Engineering is dedicated, by conducting experiments, deepening the knowledge in fluid mechanics, mass and heat transfer.

In all cases, students will improve their training to assess and control risks associated with their activity. Students will be able to assess the need to recycle chemicals and biological substances and manage adequately the waste.

#### **COMPETENCES**

- Be able to perform experiments to meet the requirements established in the activity to be performed in the practice of different fields of Chemical Engineering. (CB2, E5)
- That students are able to convey information, ideas, problems and solutions to both specialized and non-specialized audiences. (CB4)
- Be able to design processes and experiments to achieve the requirements established in the activity to be carried out in the practice of the different fields of Chemical Engineering. (E10)
- To be able to assess the risks in the use of chemical and biological substances and the processes in which they are involved. (E11)
- Knowledge of applied thermodynamics and heat transmission. Basic principles and their application to engineering problem solving. (CR11)
- Knowledge of the basic principles of fluid mechanics and their application to problem solving in the field of engineering. Calculation of pipes, channels and fluid systems. (CR12)

## COURSE: CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY IV

**SUBJECT MATTER:** Fundamentals of Thermal and Fluids Engineering

**MODULE:** Core Topics of Industrial Engineering

**PROGRAM:** Degree in Chemical Engineering

Page 2 of 5

### PREREQUISITES

According to the program planning and academic regulations.

### CONTENTS

1. **Fluid mechanics.**
  - 1.1. Pressure drop in fittings.
  - 1.2. Pressure drop in packed columns.
  - 1.3. Agitation and viscosity.
  - 1.4. Pump performance.
2. **Mass transport.**
  - 2.1. Ebulliometry
  - 2.2. Characterization of a plate distillation column.
  - 2.3. Characterization of a packed distillation column.
  - 2.4. Cooling tower.
3. **Heat transport/Thermodynamics**
  - 3.1. Rankine cycle.
  - 3.2. Specific heats
  - 3.3. Heat exchanger.
4. **Fuel cell.**

### METODOLOGY

### LEARNING ACTIVITIES

Learning activities	Hours	ECTS Credits	Competences
Lectures	3	0,1	CB2, E5, CRI1, CRI2
Case and Problem-Solving Sessions		-	-
Seminars		-	-
Practical & Lab Work	116	4,3	CB2, E5, E10, E11, CRI1, CRI2
Presentations	5	0,2	CB4, CRI1, CRI2
Personal study	5	0,2	CB2, E5, E10, E11, CB4, CRI1, CRI2
Assessment Tasks (Exams, Continuous Assessment...)	5	0,2	CB2, E5, E10, E11, CB4, CRI1, CRI2
<b>TOTAL</b>	<b>134</b>	<b>5,0</b>	

## **COURSE: CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY IV**

**SUBJECT MATTER:** Fundamentals of Thermal and Fluids Engineering

**MODULE:** Core Topics of Industrial Engineering

**PROGRAM:** Degree in Chemical Engineering

Page 3 of 5

### **TEACHING METHODOLOGY**

Concept exposition sessions: Exhibition of contents by presentation or explanation (possibly including demonstrations) by a professor.

Practical work / laboratory: Period of realization of activities of laboratory or similar (practical with computer, projects, etc.) on the part of the student, under the direct supervision of a professor.

Presentations: Oral presentation by the student about the work done, accompanied by the relevant graphic material, content and duration to be determined in each case.

Personal study activities: Personal work of the student necessary to acquire the competencies of each Subject and assimilate the concepts involved in carrying out the Laboratory activities, using, where necessary, the recommended reference material.

Assessment activities (exams, follow-up controls): Oral and / or written tests carried out during the lecture period of a subject or once it has been completed.

## **ASSESSMENT**

### **ASSESSMENT METHODS**

<b>Assessment Methods</b>	<b>Weight (%)</b>	<b>Competences</b>
Final exam	10	CB2, E11, CB4, CRI1, CRI2
Follow-up Activities	10	CB2, E10, E11, CB4, CRI1, CRI2
Reports and Presentations	40	CB2, CB4, CRI1, CRI2
Lab or Field Work	40	CB2, E10, E11, CRI1, CRI2

### **LEARNING OUTCOMES**

The students will have acquired:

- The capacity to know how to apply their knowledge to their work or vocation in a professional manner and possess the competences that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.
- The capacity to convey information, ideas, problems and solutions to both specialized and non-specialized audiences.
- The capacity to design processes and experiments to achieve the requirements established in the activity to be carried out in the practice of the different fields of Chemical Engineering.



PERSONA CIÈNCIA EMPRESA  
UNIVERSITAT RAMON LLULL

## **COURSE: CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY IV**

**SUBJECT MATTER:** Fundamentals of Thermal and Fluids Engineering

**MODULE:** Core Topics of Industrial Engineering

**PROGRAM:** Degree in Chemical Engineering

Page 4 of 5

- The capacity to assess the risks in the use of chemical and biological substances and the processes in which they are involved.
- The knowledge of applied thermodynamics and heat transmission. Basic principles and their application to engineering problem solving.
- The knowledge of the basic principles of fluid mechanics and their application to problem solving in the field of engineering. Calculation of pipes, channels and fluid systems.

### **QUALIFICATION**

The rating for the Chemical Engineering Laboratory is obtained by weighted average of the different assessment methods indicated in the table below:

10%	Final exam
10%	Follow-up activities made at class time
40%	Reports and presentations
40%	Experimental work

To be able to average, the final exam of Laboratory must be equal to or greater than 4.0, and the weighted average of the ratings for the Follow-up Activities conducted in class time, Papers, Presentations, and of Experimental Work of each laboratory must be equal to or greater than 5.0, otherwise, the final grade will be directly the worst of partial qualifications.

### **ASSESSMENT OF THE COMPETENCES**

The assessment of the competences will be carried out as indicated in the table of Evaluation Methods.

When two competences are evaluated by two evaluation methods, the rating assigned to each competence is the weighted average of the grade obtained by each evaluation method.

### **BIBLIOGRAPHY**



PERSONA CIÈNCIA EMPRESA  
UNIVERSITAT RAMON LLULL

## **COURSE: CHEMISTRY AND CHEMICAL ENGINEERING LABORATORY IV**

**SUBJECT MATTER:** Fundamentals of Thermal and  
Fluids Engineering

**MODULE:** Core Topics of Industrial Engineering

**PROGRAM:** Degree in Chemical Engineering

Page 5 of 5

### **DOCUMENT HISTORY**

#### **PREVIOUS REVISIONS**

August 2016, Dr. Xavier Batllori and Dr. Eduard Serra

#### **CURRENT REVISION**

September 2018, Dr. Eduard Serra