

Academic Year/course: 2022/23

## 29932 - Experimentation in Chemical Engineering II

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 29932 - Experimentation in Chemical Engineering II

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 435 - Bachelor's Degree in Chemical Engineering

**ECTS:** 6.0

**Year:** 4

**Semester:** First semester

**Subject Type:** Compulsory

**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 learning process that is designed for this course is based on the following:

In each one of the sessions, students will work in groups of two. Students will know in advance the practice to make and must have read the script. For the part of computer simulation, if schedules and availability of computer equipment allow it, practices will be held individually.

In each practice session, students will perform the experimental part. During the practice session, the teacher will pose questions related to the theory of the practice being performed.

#### 4.2. Learning tasks

The following activities are programmed:

Theory: one theory class with a duration of 1 hour, in which the basics and the evaluation of the course will be exposed.

Laboratory classes: about 20 practices distributed as follows:

I) Practices of simulation of chemical processes with computer: 9

II) Practices of control of chemical processes: 9

III) Chemical reactions engineering laboratory: 2

Alternatively, and depending on availability, some practices could be replaced (up to three) for visits to industries.

#### 4.3. Syllabus

One theory class with a duration of 1 hour, in which the foundations of the subject and the evaluation of the subject will be exposed.

About 20 practices distributed as follows:

I) Practices of simulation of chemical processes with a computer: up to 9 sessions of three hours each, using the chemical process simulator Aspen HYSYS®. An example of practices that can be performed is shown below:

- ? Practice 1. Introduction to Hysys. Binary rectification
- ? Practice 2. Extractive Distillation
- ? Practice 3. Synthesis of MTBE
- ? Practice 4. Synthesis of toluene
- ? Practice 5. Production of ethylene glycol
- ? Practice 6. Production of ethylene oxide
- ? Practice 7. Production of ethyl chloride
- ? Practice 8. Gasification and Combined Cycle
- ? Practice 9. Separation of monochlorobenzene

II) Practices of control of chemical processes: up to 9 sessions of three hours each. An example of practices that can be performed is shown below:

- ? Practice 1. Processes of the first order
- ? Practice 2. Tuning PID controllers (I): level in a tank
- ? Practice 3. Control of pressure and flow in a gas stream
- ? Practice 4. Control of temperature in a reactor
- ? Practice 5. Tuning PID controllers (II): cooled reactor
- ? Practice 6. Process second order
- ? Practice 7. Characterization of the behaviour of temperature sensors
- ? Practice 8. Control of pH
- ? Practice 9. Level control in a tank

III) Practices of chemical reactions engineering: 2 sessions of 3-hour each, for instance:

- ? Practice 1. Deactivation of catalysts: dehydrogenation of ethane
- ? Practice 2. Real Flow. Tank-pipe system

Alternatively, and depending on availability, some practices could be replaced (up to three) by visits to industries. In that case, it will be announced in advance the replaced practices. This activity would have a maximum duration of 9 hours in total.

#### **4.4. Course planning and calendar**

The practise sessions are held in the laboratory according to the schedule established by the School of Engineering and Architecture (EINA) and it will be published prior to the start date of the course (timetables available at <https://eina.unizar.es>).

They will be planned depending on the number of students and will be announced previously to the beginning of the course.

Each teacher will inform of his hours of tutoring.

#### **4.5. Bibliography and recommended resources**

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29932>