Universitat Autònoma de Barcelona

2019/2020

Experimentation in Chemical Engineering II

Code: 102395
ECTS Credits: 5

Degree	Type	Year	Semester
2500897 Chemical Engineering	OB	3	1

Contact

Name: Adriana Artola Casacuberta
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Use of Languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Eduard Puente Massaguer
Alejandra Cerda Llanos
Mario Benito Peinado
Cintia Romina Avila
Ana Vázquez Fernández
Antonio Javier Moral Vico

Prerequisites

- To have passed the following subjects: Balances in Chemical Engineering, Applied Thermodynamics, Chemical Kinetics, Fluid Dynamics and Computer Applications.

- Currently attending Heat Transfer.

Objectives and Contextualisation

- Writing reports on experimental works.

- Experimental verification of mass, heat and mechanical energy balances.

- Practical application of concepts introduced in subjects such as Balances in Chemical Engineering, Applied Thermodynamics, Chemical Kinetics, Fluid Dynamics, Heat Transfer and Computer Applications.

- In addition to the conceptual aspects, the organization of work in the lab and the quality in the analysis and communication of the experimental results obtained is also very important.

Competences

- Apply scientific method to systems in which chemical, physical or biological transformations are produced both on a microscopic and macroscopic scale.
- Assume the values of professional responsibility and ethics required in chemical engineering.
- Communication
- Demonstrate knowledge of the different reaction, separation and processing operations for materials, and transport and circulation of fluids involved in the industrial processes of chemical engineering.
- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Observe ethics and professionalism.
- Understand and apply the basic principles on which chemical engineering is founded, and more precisely: balances of matter, energy and thermodynamic momentum, phase equilibrium and kinetic chemical equilibrium of the physical processes of matter, energy and momentum transfer, and kinetics of chemical reactions
- Work in a team.

Learning Outcomes

1. Adapt to multidisciplinary and international surroundings.
2. Assume social, ethical, professional and legal responsibility, if applicable, derived from professional exercise.
3. Calculate losses by friction in conduction.
4. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
5. Contribute to societys welfare and to sustainable development.
6. Critically evaluate the work done.
7. Design experiments.
8. Develop a capacity for analysis, synthesis and prospection.
9. Develop curiosity and creativity.
10. Maintain a proactive and dynamic attitude with regard to ones own professional career, personal growth and continuing education. Have the will to overcome difficulties.
11. Monitor the progress of a chemical reaction
12. Perform a critical analysis of experimental results and of the overall work done.
13. Perform experiments.
14. Practice the fundamental laws of thermodynamics.
15. Prevent and solve problems.

Content

1. Lab sessions (supervised activity):

- The total number of sessions per student will be 22, in morning hours (check the timetables of the degree in the web site of the School of Engineering).

- Lab sessions are not consecutive. The organization of these sessions will be explained at the beginning of the course taking into account the different groups.

- There is a first session of compulsory attendance (data that will be announced via Moodle) where the schedule of the lab sessions, the distribution of the students in turns and groups will be presented.

- 21 lab sessions for the realization of the following practices:

Centrifugal compressor

Centrifugal pump

Circulation by fixed bed / fluidization

Pressure drop in accidents

Heat Exchangers

Heat transfer by convection

Homogeneous kinetics

Determination of reaction heat

Heterogeneous kinetics

Determination of the effective diffusion within a particle

2. Practical reports

Preparation of reports based on the data obtained in the lab. The analysis of observations carried out in the laboratory and of the results obtained is even more important than the experimental part of the subject. It is necessary to demonstrate that each practice has been understood trough the comments and analysis of the results obtained.

Methodology

Being an eminently practical subject, attendance at the laboratory sessions is COMPULSORY.

Depending on the number of students, the academic calendar and the number of experimental facilities, the students will be divided into shifts, up to a maximum of 3, and each shift in work groups, up to a maximum of 14.

The presentation session is common to every shift and is mandatory. In this session the different shifts and working groups will be established.

The different shifts and groups will attend to the lab alternately: In case, for example, of the existence of 3 shifts, shift 1 will attend lab sessions for 6 days, followed by 6 days by shift 2 and 6 days by shift 3; then again shift 1 for 9 days, shift 2, 9 days also and shift 3, another 9 days. Finally, al shifts will attend again 6 more days.

Scheduling of presentation session and lab session will be published in Aula Moodle.

Students must wear their own lab coat, a note-book and the practice script previously studied. Contact lenses are not allowed.

The general rules of security in the lab can be found in Aula Moodle. The first day of practical work in the laboratory, not the one of presentation of the subject, the document that is generated when the base test of "Security in the laboratories" is passed, must be given to the professors previously signed by the student. The test can be found Aula Moodle, in the space called "Security in laboratories."

The practical reports will be delivered, on the corresponding day, in the same laboratory, in practice hours, in paper format and through the work delivery of the Aula Moodle in digital format as a pdf file.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Lab sessions	63	2.52	1, 2, 3, 4, 5, 8, 9, 7, 13, 12, 10, 11, 14, 15

Presentation of the subject	3	0.12	1, 2, 8, 10, 15
Type: Supervised			
Global exam	4	0.16	3, 11, 14
Type: Autonomous			
Preparation of the global exam	10	0.4	6, 4, 12, 15
Preparation of the reports on lab practices	45	1.8	2, 6, 3, 4, 5, 8, 9, 12, 10, 11, 14

Assessment

Attitude towards lab work: 15%

Global exam: 15%

Practical reports: 70%

a) Evaluation activities

Attendance at the lab sessions is obligatory. Every day of non-attendance discount 0.15 points out of 1.5 from the attitude in the lab mark. In addition, the mark of the practical report corresponding to the lab session to which the student has not attended will be reduced by 30%. The laboratory mark, apart from the attendance, also takes into account the attitude towards the subject (behaviour in the lab, reading the scripts and preparing the practice prior to the lab session, copy in laboratory reports or exam, etc.).

To pass the subject, in addition to attending to lab sessions and presenting the report of all the practices on the corresponding day, students must reach a minimum average mark of 60% of the reports, 60% of the grade "Attitude in the lab" and 35% in the global exam. The weighted average of these marks must be above 5 out of 10. If the minimum mark is not reached in any of these three concepts, but the weighted average of the notes obtained is above 5 out of 10, the final mark of the subject will be 4 out of 10. In the rest of the cases, it will be the average mark that has been obtained. When the mark on Attitude in the lab does not reach 60% for reasons of attendance, the final grade of the subject will be Non-Evaluable.

In order to be able to attend to the global exam, 60% of the report mark and 60% of the attitude mark must be previously reached.

b) Schedule of evaluation activities

The date of the global exam will be given on the presentation session and will be published in Aula Moodle and on the School of Engineering website. The schedule of the different lab sessions will also be given in the presentation session and published in Aula Moodle.

c) Resit process

In accordance with the School of Engineering rules regarding the eminently practical subjects, no resit exams will be scheduled.

d) Review of practical reports and global exam

For the review of the results of the practical reports and global exam, data and place will be determined within the 10 working days following the publication of the marks.

e) Qualifications

Students not attending 30% of the lab sessions or more will be deemed not eligible.

To award a student with an Honors Qualification, apart from the threshold mark stablished in UAB Regulations, different aspects of the student work and attitude will be considered: proactivity towards the subject, the manual ability in the laboratory, the understanding of the basics of the practices and its relationship with other subjects and the fluidity, reliability and reasoning capacity in situations such as those posed by practices.

f) Irregularities by the student, copy and plagiarism

Without prejudice to other disciplinary measures that are deemed appropriate, and in accordance with the current academic regulations, the irregularities committed by the student that can lead to a variation of the qualification of an act of self- evaluation will be penalised. Therefore, copying, plagiarizing, cheating, etc. a report on lab practices or any other activity of evaluation will imply a zero (0) in the Attitude towards work in the lab and, consequently, to fail the subject.

g) Evaluation of repeating students

Repeating students have two possibilities:

• Pursue the entire subject again as if they were enrolled for the first time.

• Repeat only the reports of those practices that, in the previous year, were rated with a score of less than 6. They will not have to go to the laboratory but to prepare the practical reports using lab data obtained during the previous year (18-19). To pass the subject, students must obtain at least 6 out of 10from each of the reports and a minimum of 5 out of 10 from the global exam. The calculation of the mark will be based on: 70% average of the mark of all the reports and 30% the mark of the exam. In any case, by this means, students will be candidate for an Honors Qualification.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Attitude towards lab work	15%	0	0	1, 2, 6, 5, 8, 9, 7, 13, 10, 15
Global exam	15 %	0	0	3, 8, 12, 11, 14, 15
Reports on the lab practices	70%	0	0	6, 3, 4, 8, 7, 13, 12, 11, 14

Bibliography

References can be found in the instructions for each lab practice.