

Basic Experimentation in Chemical Engineering

Code: 106054
ECTS Credits: 6

Degree	Type	Year	Semester
2500897 Chemical Engineering	OB	1	2

Contact

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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

José Luis Montesinos Seguí

Francisco Valero Barranco

Kirian Bonet Ragel

Sady Roberto Rodriguez Avila

Eric Valdes Martin

Marina Guillen Montalban

Fco. J Guerrero Camacho

Prerequisites

Having studied the subject of Chemical Engineering Fundamentals. Understanding Catalan, since the lab-guides are written in Catalan.

Objectives and Contextualisation

The objectives of the course are:

- Reach a minimum level of knowledge of basic concepts in the field of TIC that will include the writing of reports, bibliographic search and the use of MS Word, PowerPoint and Excel.
- Experimental verification of different basic aspects of chemical engineering. These aspects include: the heat energy and matter balance and the experimental determination of the transport properties of diffusivity of a component and viscosity.

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 basic knowledge of the use and programming of computers, and apply the applicable IT resources to chemical engineering.
- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Observe ethics and professionalism.
- Students must be capable of applying their knowledge to their work or vocation in a professional way and they should have building arguments and problem resolution skills within their area of study.
- Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
- Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
- 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. Apply matter and energy balances to continuous and discontinuous systems.
2. Apply scientific method to perform macroscopic balances of matter, energy and momentum.
3. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
4. Design experiments.
5. Develop critical thinking and reasoning
6. Develop independent learning strategies.
7. Develop scientific thinking.
8. Maintain a proactive and dynamic attitude with regard to one's own professional career, personal growth and continuing education. Have the will to overcome difficulties.
9. Manage available time and resources. Work in an organised manner.
10. Perform a critical analysis of experimental results and of the overall work done.
11. Prevent and solve problems.
12. Respect diversity in ideas, people and situations.
13. Students must be capable of collecting and interpreting relevant data (usually within their area of study) in order to make statements that reflect social, scientific or ethical relevant issues.
14. Students must have and understand knowledge of an area of study built on the basis of general secondary education, and while it relies on some advanced textbooks it also includes some aspects coming from the forefront of its field of study.
15. Use spreadsheets and numerical programming environments to solve chemical engineering problems.
16. Work autonomously.
17. Work cooperatively.

Content

The contents of the subject are divided into two different parts, each corresponding to 3 ECTS: Basic Practices in Computer Science and Laboratory Practices in Bases in Chemical Engineering

Basic practices in computer science

- Microsoft Word: Application to the writing of technical reports:
 - Formatting a technical document.
 - Automatic generation of Tables of contents.
 - Tools for bibliographic searches.
 - Bibliographic citations in documents.
- Microsoft Excel Application to Engineering problems:

- Work environment. Basic operation and formulas.
- Functions preprogrammed to Excel.
- Graphical representations and regressions.
- Programming logic statements.
- Vectors and matrices.
- Integration and numerical derivation.
- MS Excel tools and add-ins. The "Solver".
- Microsoft PowerPoint

Laboratory practices of Bases in Chemical Engineering

They will take place within the last 7 weeks of the second semester. It consists of 5 practices that will be carried out in the laboratory.

- Basic chemical laboratory techniques.
- Heat energy balance.
- Material balance of a component.
- Determination of the diffusivity of a component.
- Determination of viscosity.

Methodology

The methodology of the subject is based on the development in the computer room or in the laboratory of the practices mentioned above. The basic practices in computer science will be preceded by a brief session of uterus-To carry out the laboratory practices the student will have a script for each practice that must be read and prepared before the start of each practice.

Being an eminently practical learning, attendance at practical sessions (computer science and laboratory) is mandatory. Non-attendance will be penalized according to what is explained in the evaluation section.

Depending on the number of students, the academic calendar, the capacity of the computer room and the number of experimental facilities, the students will be divided into different shifts and into groups of 2 students (if possible). In the case of the Informatics practices they will be carried out in the morning, in the case of the laboratory practices there will be morning shifts and afternoon shifts. Student groups do not have to be the same for computer lab and lab.

Safety lab-rules

The first day of practical work in the laboratory, not that of subject presentation, students must give to teachers the document, signed, which is generated when the basic test of "Safety in laboratories" is passed. The test is on the Virtual Campus. It is mandatory to wear a lab coat, material for taking notes and the the practice previously studied, in addition to following the safety rules mentioned in the Virtual Campus.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Presentación y funcionamiento de la asignatura	2	0.08	11
Type: Supervised			
Realización de las prácticas	75	3	1, 5, 10, 9, 8, 12, 17

Assessment

The evaluation of the two parts of the subject is independent and there is a minimum grade of 5 for each of the parts to be able to average between them.

Basic practices in computer science

The evaluation will be done on different exercises that will be delivered at the end of the session. To pass this part of the course it will be necessary to obtain an average grade equal to or greater than 5.0 out of 10 from the different continuous assessment activities.

Laboratory practices of Bases in Chemical Engineering

Attendance at laboratory sessions is mandatory to pass the course. In addition, evaluation activities include:

- Presentation of reports for each practice: you must present all the reports and have an average of 5.0 out of 10 of the report mark to pass the course. The report delivery schedule will be notified before the start of the practices.
- Attitude in the laboratory: The laboratory grade, in addition to the attendance, also considers the attitude towards the subject (responsability and behavior in the laboratory, punctuality, having read the practice previously, ...).
- Exam, a minimum mark of 4 will be necessary to pass the course.

The final grade for this part of the course will be calculated as 15% attitude in the laboratory, 15% exam and 50% reports.

Final grading

A student will be considered Non-Evaluable when one or both of the following situations occur:

- The percentage of completion of the evaluation activities of Computer Basics Practices has a value of less than 67% of completion.
- The attitude grade in the Chemical Engineering Basics laboratory does not reach 6.0 out of 10 due to attendance reasons.

The qualification of Matriculation of Honor (MH) may be awarded from an average grade equal to or greater than 9.0 out of 10. The total number of MH will never exceed 5% of the total number of enrolled students.

If the average grade of the two parts of the course is equal to or greater than 5 out of 10, but one of the parts has a grade lower than 5, the final grade for the course will correspond to the lowest grade.

Recovery process

The recovery process is independent for each of the parts of the subject.

Basic practices in computer science

If the mark resulting from the average of the exercises is less than 5.0 out of 10, this part of the course may be recovered in an exam that includes all the contents worked on and that will replace the marks of the exercises. To participate in the recovery, the weight of which equates to a minimum of two-thirds of the total grade for this part of the subject must have been previously evaluated in a set of activities.

The recovery exam will be done according to the calendar set by the coordination.

Laboratory practices of Bases in Chemical Engineering

Only the recovery of the exam is contemplated and a minimum grade of 4 will be required to pass the subject. To take the make-up exam, it will be necessary to have a report grade equal to or greater than 5. The recovery exam will be done according to the schedule set by the coordination.

Procedure for qualification reviewing

The student will have the opportunity to request a review of the different activities and reports delivered within 24 hours after the note is published, contacting the professor who made the correction in order to schedule a review.

Repeating students

For repeating students, if the previous year they passed one of the two parts of the subject, this mark will be maintained and they will only have to recover the failed part.

- Computer basics: it will not be necessary for them to go to the computer practice classes, but they must take the partial tests of this part. The same minimum grade criteria will be applied as for the rest of the students
- Laboratory Bases in Chemical Engineering: They must submit again the reports that they had failed the previous course and it will be necessary to take the exam and meet the same minimum grade criteria as the rest of the students.

A repeating student can always choose to repeat the entire course. To prepare the practice group, it is necessary for the repeating students to contact the professor who coordinates the subject before its beginning.

Plagiarism and other irregularities

Without prejudice to other disciplinary measures, and in accordance with current academic regulations, any irregularities committed by the student that could lead to a variation of the score of an evaluation act will be scored with a zero. Therefore, copying or allowing to copy a practice or any other evaluation activity will imply a zero (0) in the attitude note and, therefore, suspend the course having a mark of 3 over 10. In addition, the student will not be able to continue with the practices in the current course.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Actitud	variable	0	0	3, 8, 11, 17
Corrección informes	variable	0	0	1, 2, 3, 7, 6, 5, 4, 10, 9, 8, 14, 13, 12, 16, 15
Exam	optatiu	2	0.08	14, 13

Bibliography

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- CRC Handbook of Chemistry and Physics John R. Rumble, ed, 100th Edition CRC Press/Taylor & Francis, Boca Raton, FL.
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- R.B. Bird, W.E. Stewart, E.N. Lightfoot "Transport Phenomena", 2nd ed. John Wiley & Sons, 2002.

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- M.L. Sheely "Glycerol viscosity table" Industrial and Engineering Chemistry, 24(9), 1932, 1060-1064.

Software

MS Word and MS Excel