

Degree programme	Type	Course
Chemical Engineering	FB	2

Contact lecturer

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Group languages

You can consult this information at the [end](#) of the document.

Prerequisites

Students are recommended to have acquired the basic knowledge and competences developed in the courses Statistics, Fundamentals of Chemistry, Chemical Kinetics, and Applied Thermodynamics. Familiarity with the use of general-purpose computer tools is also recommended.

Objectives

Knowledge

Acquire the fundamental knowledge of scientific programming and numerical methods required to solve Chemical Engineering problems using computational tools.

Skills

Develop the ability to use the MATLAB programming environment to implement algorithms and apply numerical techniques to solve Chemical Engineering problems.

In particular, students will be able to:

- Use the main features of the MATLAB programming language to develop simple and well-structured programs
- Implement and apply basic numerical methods to solve Chemical Engineering problems
- Analyse, interpret, and represent the results obtained, assessing their accuracy and consistency

Learning outcomes

1. Use spreadsheets and numerical programming environments to solve chemical engineering problems.
2. Apply the most basic numerical methods to solve chemical engineering problems.
3. Work autonomously.
4. Develop independent learning strategies.
5. Manage available time and resources. Work in an organised manner.
6. Prevent and solve problems.
7. 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.
8. 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.

Contents

Students will have access to the course teaching materials through the Virtual Campus.

MATLAB. Programming language

1. Introduction to the MATLAB environment and its main features
2. Variables, vectors, matrices, and matrix operations
3. Scripts, functions, and code organization
4. Basic programming structures: conditional statements (*if, elseif, else, end*) and iterative structures (*for, end, while, end*)
5. Graphical representation and data visualization
6. Polynomial operations
7. Solution of linear and nonlinear systems of equations
8. Data fitting and interpolation
9. Numerical differentiation and integration
10. Solution of ordinary differential equations

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Practical classes with computer	36	1.44	
Autonomous study	23	0.92	
Theoretical classes	12	0.48	
Autonomous computer practise	70	2.8	
Group assignment	0	0	

The course is structured around two complementary types of face-to-face learning activities:

a) Lectures

These sessions introduce the fundamental concepts of scientific programming and the main numerical methods that form the basis of the course. The theoretical concepts are complemented with examples focused on solving typical Chemical Engineering problems. Classes are delivered face-to-face in the assigned classroom.

b) Computer laboratory sessions

The practical sessions are aimed at applying the concepts introduced in the lectures through the development and solution of problems using the MATLAB programming environment. During these sessions, students will implement algorithms, apply numerical methods, and analyse the results obtained from practical Chemical Engineering case studies. Classes are conducted face-to-face in the assigned computer laboratories.

The use of Artificial Intelligence (AI) tools is permitted in this course as support for learning MATLAB and for the development of the group assignment, provided that their use is responsible and complementary to the student's own work. When AI tools are used in the preparation of the group assignment, students must clearly acknowledge their use, specify the tools employed, and briefly describe how they contributed to the development of the activity. The use of AI tools does not exempt students from responsibility for the authorship, quality, accuracy, and originality of the submitted work. Finally, a lack of transparency regarding the use of AI, or its use as a substitute for the student's own intellectual work, will be considered a breach of academic integrity and may result in a partial or total reduction of the grade for the activity, without prejudice to any additional disciplinary measures that may apply.

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.

Assessment

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Group task	20%	0	0	1, 2, 3, 4, 5, 6, 7, 8
Partial test 3	30%	3	0.12	1, 2, 3, 5, 7
Partial test 1	20%	3	0.12	1, 2, 3, 5, 7
Partial test 2	30%	3	0.12	1, 2, 3, 5, 7

Continuous evaluation

Throughout the course, several graded exercises will be completed during the practical sessions. For students enrolled in the course for the first time, each unexcused absence from a practical session will result in a 0.25-point deduction from the final course grade. In addition, students who accumulate unexcused absences in more than 50% of the practical sessions will receive a Not Assessed grade. For students enrolled for the second time or more, attendance at the practical sessions is not mandatory, although it is strongly recommended for the proper follow-up of the course. Nevertheless, these students must complete and submit all activities and exercises corresponding to the practical sessions under the same conditions and deadlines as the rest of the students

During the semester, all students are required to complete a group assignment in teams of three or four students. The characteristics, objectives, and schedule of this assignment will be provided through the Virtual Campus at the beginning of the course.

To pass the course, students must obtain an average grade of at least 4.0/10 across the partial examinations. Only if this requirement is met will the grade obtained in the partial examinations be combined with the grade of the group assignment.

Without prejudice to any additional disciplinary measures that may be adopted, any irregularity involving cheating, plagiarism, impersonation, facilitating cheating, or any other form of academic misconduct will result in a grade of 0 for the affected assessment activity or activities. If any of these irregularities are detected during the resit examination, the course will be automatically failed.

Resit examination

Students who do not pass the course through continuous assessment (final grade below 5.0/10) may take the resit examination. To be eligible for the resit examination, students must have been previously assessed in at least two of the three partial examinations held during the semester. Students who do not meet this requirement will receive a Not Assessed grade.

The resit examination will consist of a comprehensive proficiency examination covering all the contents taught throughout the course. The maximum grade that can be obtained through this examination is 5.0/10.

Honourous distinction

The Honours Distinction (Matrícula d'Honor, MH) may be awarded to students who obtain a final grade of 9.0/10 or higher. The total number of Honours Distinctions awarded may not exceed 5% of the total number of students enrolled in the course.

Bibliography

Basic bibliography

1. Resolución de problemas de Ingeniería Química y Bioquímica con Polymath, Excel y Matlab. M.B. Cutlip y M. Shacham. Pearson Educación S.A. Madrid. 2008. ISBN: 978-84-8322-461-8.
2. Matlab con aplicaciones a la ingeniería, física y finanzas. David Lopez Bàez. (2008) ISBN: 978-970-15-1137-4.
3. Métodos numéricos para ingenieros. Steven C. Chapra & Raymond P. Canale. Ed. (2003) McGrawHill. ISBN: 970-10-3965-3

Complementary bibliography

1. Matlab. An introduction with applications. Amos Gilat (2008) ISBN 978-0-470-10877-2
2. Essential MATLAB for Engineers and Scientists. Brian D. Hahn & Daniel T. Valentine. (2007) Elsevier. ISBN 13: 9-78-0-75-068417-0
3. Numerical Methods. Germund Dahlquist & Ake Bjorck. Prentice-Hall series in automatic computation. ISBN 0-13-627315.7.1974

Links

http://www.mathworks.es/academia/student_center/tutorials/

<http://www.mathworks.es/matlabcentral/>

http://www.mathworks.es/academia/student_center/tutorials/

Software

MATLAB: <https://es.mathworks.com/academia/tah-portal/universitat-autonoma-de-barcelona-40811157.html>

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TE) Theory	21	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	211	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	212	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	213	Catalan	second semester	morning-mixed
(PLAB) Practical laboratories	214	Catalan	second semester	morning-mixed