

Degree programme	Type	Course
Nanoscience and Nanotechnology	FB	1

Contact lecturer

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Prerequisites

Veure guia en català.

Group languages

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

Objectives

Veure guia en català.

Learning outcomes

- CM06 (Identify the mathematical nature of certain physical and chemical phenomena, in order to abstract the essential variables that describe them.) Identify the mathematical nature of certain physical and chemical phenomena, in order to abstract the essential variables that describe them.
- CM07 (Solve real-world problems that occur in the field of science and technology using mathematical tools and methods.) Solve real-world problems that occur in the field of science and technology using mathematical tools and methods.
- KM09 (Understand the idea behind numerical methods: precision, discretisation, numerical error, conditioning, standardisation.) Understand the idea behind numerical methods: precision, discretisation, numerical error, conditioning, standardisation.
- SM09 (Express oneself clearly using basic mathematical language.) Express oneself clearly using basic mathematical language.
- SM10 (Solve simple problems related to matrix calculus, linear equations and first order differential equations.) Solve simple problems related to matrix calculus, linear equations and first order differential equations.
- SM12 (Use graphical and numerical methods to explore, describe and interpret data.) Use graphical and numerical methods to explore, describe and interpret data.

Contents

Traducció des de Google.

1. Review of basic concepts of differential and integral calculus in one variable.
2. Notion of ordinary differential equation, separate variables.
3. Taylor's formula in one variable.

4. Numerical series, power series and improper integrals.
5. Differential calculation in several variables.
6. Integral calculation in several variables.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes
Practice classes	6	0.24	CM06, CM07, KM09, SM09, SM10, SM12
Exercises classes	10	0.4	CM06, CM07, KM09, SM09, SM10, SM12
Theory classes	36	1.44	CM06, CM07, KM09, SM09, SM10, SM12
Theory study and problem solving	84	3.36	CM06, CM07, KM09, SM09, SM10, SM12
Delivery of practices	6	0.24	CM06, CM07, KM09, SM09, SM10, SM12

The course will be structured around the following activities:

Theory classes. The scientific and technical knowledge specific to the subject and necessary for problem-solving will be presented in lectures. These lectures will introduce students to the basic concepts outlined in the syllabus and provide clear guidance on how to expand upon and deepen their understanding of this content.

Problem-solving classes. To assimilate the various mathematical concepts and effective calculation methods introduced in the theory classes, it is crucial that students dedicate a significant portion of their study time to repeatedly practicing the examples and exercises presented in the problem-solving classes. Therefore, we encourage students to attend these classes regularly. It should also be noted that students benefit greatly from these classes when they have formulated and/or solved the problems before they are reviewed in class.

Practical classes. These classes will introduce the use of an algebraic manipulative to perform routine calculations and to create graphical representations that help students visualize more geometric concepts.

Note: 15 minutes of one class, within the schedule established by the center/degree program, will be reserved for students to complete the teacher evaluation surveys and the course/module evaluation surveys.

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
Mid term exam	40%	2	0.08	CM06, CM07, KM09, SM09, SM10, SM12
Delivery of practices	20%	1	0.04	CM06, CM07, KM09, SM09, SM10, SM12

Mid term exam	40%	2	0.08	CM06, CM07, KM09, SM09, SM10
Final exam	80%	3	0.12	CM06, CM07, KM09, SM09, SM10, SM12

Continuous assessment will be conducted through:

- a) A midterm exam (First Partial Exam = EP1) will be administered to assess the work completed up to that point. The grade on this exam will account for 40% of the final grade. Students who take this exam will no longer be marked as NOT EVALUABLE. Students who do not take this exam will be marked as NOT EVALUABLE for academic purposes and will not be entitled to a makeup exam (except for duly justified reasons, in which case a makeup exam will be permitted).
- b) At the end of the semester, there will be a second partial exam (EP2) to assess knowledge of topics not covered in the first partial exam. The grade on this exam will account for another 40% of the final grade. Students who do not take this exam will not be entitled to a makeup exam (except for duly justified reasons, in which case a makeup exam will be permitted).
- c) There will be an assessment corresponding to the practical sessions, with a PR grade, which will account for 20% of the final grade. This portion of the grade cannot be retaken. If the average $(EP1+EP2)/2$ is less than 3.5, the student must take the resit exam, which is a comprehensive exam covering the entire course. If the average is 3.5 or higher, a grade C1 is generated $= (0.4)EP1 + (0.4)EP2 + (0.2)PR$. If C1 is 5 or higher, the final grade is C1. Otherwise, the student must take the resit exam, and in this case, the final grade will be at least $(0.8 R + 0.2 PR, 8)$, where R is the grade of the resit exam.

5% of the students may obtain the highest possible grade (Matrícula de Honor). They must have a grade of 9 or higher. The final decision regarding the Honors grade will be made by the teaching staff.

Calculators are not permitted in midterm and resit exams.

The use of Artificial Intelligence (AI) technologies is prohibited in all assessments. Any work that includes AI-generated components will be considered academic dishonesty and may result in a partial or full penalty on the activity grade, or more severe sanctions in serious cases.

For each assessment activity, a review session will be scheduled, including a date, time, and location, where students can review their work with the instructor. Students may also submit appeals regarding their grade, which will be reviewed by the instructor responsible for the course. If a student does not attend this review session, the activity will not be reviewed at a later date. The dates for midterm and resit exams will be determined by the Degree Coordination Office and may be subject to scheduling changes to accommodate unforeseen circumstances. These changes will always be announced on the Virtual Campus (VC), as the VC is considered the primary means of communication between instructors and students.

Without prejudice to any other disciplinary measures deemed appropriate and in accordance with current academic regulations, any irregularities committed by a student that could lead to a change in their grade will result in a grade of zero (0). For example, plagiarism, copying, allowing others to copy, or using communication devices (such as mobile phones, smartwatches, etc.) during an assessment activity will result in failing that assessment activity with a grade of zero (0). Assessment activities graded in this way and by this procedure will not be eligible for retake. If passing any of these assessment activities is required to pass the course, the course will be failed directly, with no opportunity to retake it in the same academic year. The numerical grade on the academic record will be the lower of 3.0 and the weighted average of the grades in cases where the student has committed irregularities during an assessment (and therefore, passing by compensation will not be possible).

Single Assessment.

Students who have opted for the single assessment option must take a final exam covering all the course material. This exam will be held on the same day that students taking the second midterm exam for continuous assessment. The student's final grade will be the score on this exam. If the final grade is below 5, the student will have another opportunity to pass the course by taking a resit exam, which will be held on a date set by the degree program coordinator. The student's final grade will be the lower of 8 and the score on this resit exam.

Bibliography

Veure guia en català.

Software

Veure guia en català.

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	1	Catalan	first semester	afternoon
(PAUL) Classroom practices	1	Catalan	first semester	afternoon
(PLAB) Practical laboratories	1	Catalan	first semester	morning-mixed
(PAUL) Classroom practices	2	Catalan	first semester	afternoon
(PLAB) Practical laboratories	2	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	3	Catalan	first semester	morning-mixed
(PLAB) Practical laboratories	4	Catalan	first semester	morning-mixed