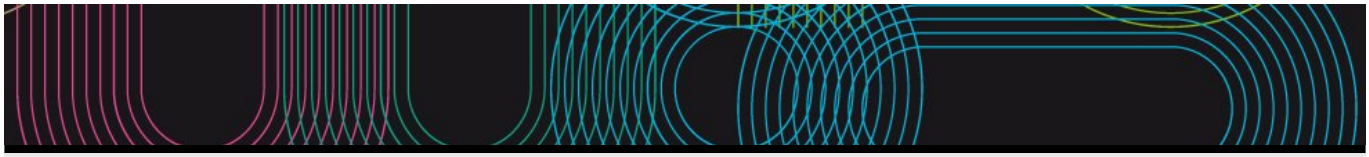

IDENTIFYING DATA

Mathematics: Calculus II and differential equations

Subject	Mathematics: Calculus II and differential equations			
Code	P52G381V01201			
Study programme	Grado en Ingeniería Mecánica			
Descriptors	ECTS Credits	Choose	Year	Quadmester
	6	Basic education	2nd	1st
Teaching language	Spanish			
Department				
Coordinator	Alvarez Hernandez, Maria			
Lecturers	Alvarez Hernandez, Maria González Coma, José Pablo			
E-mail	maria.alvarez@cud.uvigo.es			
Web	http://moovi.uvigo.gal			
General description	The aim of this course is for students to learn the basic techniques of integral calculus in several variables, vector calculus, ordinary differential equations and their applications.			

Skills

Code	
B3	Knowledge in basic and technological subjects that will enable students to learn new methods and theories, and provide them the versatility to adapt to new situations.
B4	Ability to solve problems with initiative, decision making, creativity, critical thinking and the ability to communicate and transmit knowledge and skills in the field of Industrial Engineering in Mechanical specialty.
C1	Ability to solve mathematical problems that may arise in engineering. Ability to apply knowledge about: linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial differential equations, numerical methods, numerical algorithms, statistics and optimization.
D1	Analysis and synthesis
D2	Problems resolution.
D3	Oral and written proficiency
D6	Application of computer science in the field of study.
D9	Apply knowledge.
D15	Objectification, identification and organization.
D16	Critical thinking.

Learning outcomes

Expected results from this subject	Training and Learning Results		
Understanding of the basic concepts of integral calculus in several variables.	B3	C1	D1
Knowledge of the main techniques of integration of functions of several variables.	B3 B4	C1	D1 D2 D9
Knowledge of the main results of vector calculus and its applications.	B3 B4	C1	D1 D2 D9
Understand the importance of integral calculus, vector calculus and differential equations for the study of the physical world.		C1	D9 D16
Apply knowledge of integral calculus, vector calculus and differential equations.		C1	D2 D6 D9 D16

Acquisition of the ability to use this knowledge to solve questions, exercises and problems manually and by computer.		C1	D1 D2 D3 D6 D9 D15 D16
Acquire the basic knowledge for solving linear differential equations and systems.	B3	C1	
ENAEE LEARNING OUTCOME: KNOWLEDGE AND UNDERSTANDING: LO1.1 - Knowledge and understanding of mathematics and other basic sciences inherent to his/her engineering specialisation, at a level that allows the acquisition of the rest of the competences of the degree [development level (basic (1), adequate (2) and advanced (3)) of this sub-outcome: Adequate (2)].	B3	C1	
ENAEE LEARNING OUTCOME: ENGINEERING ANALYSIS: LO2.2 - The ability to identify, formulate and solve engineering problems in their speciality; to choose and apply established analytical, computational and experimental methods appropriately; to recognise the importance of social, health and safety, environmental, economic and industrial constraints [Adequate (2)].	B4	C1	D1 D2 D9 D16
ENAEE LEARNING OUTCOME: RESEARCH AND INNOVATION: LO4.3 - Ability and skill to design and carry out experimental investigations, interpret results and draw conclusions in their field of study [Adequate (2)].			D9

Contents

Topic	
Integration in several variables	Curves and surfaces. Integration in the plane. Integration in space. Geometric and physical applications of the multiple integral.
Vector Calculus	Integration of fields along a curve. Integration of fields over a surface. Classical theorems of vector calculus. Applications.
Differential equations	General concepts. Methods for solving first-order ordinary differential equations. Second order linear differential equations. Systems of linear differential equations.
Numerical methods for initial value problems	Euler and Runge-Kutta methods.

Planning

	Class hours	Hours outside the classroom	Total hours
Lecturing	28	28	56
Problem solving	10	10	20
Mentored work	7	0	7
Practices through ICT	3	2	5
Seminars	15	13	28
Problem and/or exercise solving	4	4	8
Laboratory practice	1	1	2
Essay questions exam	9	15	24

*The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies

	Description
Lecturing	The lecturer will expose in the theoretical classes the contents of the course. Students will have basic reference texts for the monitoring of the subject.
Problem solving	The lecturer will solve problems and exercises and the student will have to solve similar exercises to acquire the necessary capabilities.
Mentored work	The student will have to solve exercises and problems that will be corrected by the professor. Those exercises will be tackled in groups and will work on them.
Practices through ICT	The lecturer will solve problems and exercises through the use of the Matlab tool and the student will have to solve similar exercises to acquire the necessary abilities
Seminars	Intensive course of 15 hours for those students who have failed the subject in the first exam, prior to the exam at the second call.

Personalized assistance

Methodologies	Description
Problem solving	The faculty will personally answer the students' questions and queries, according to the timetable that will be published on the center's website, and by telematic means (e-mail, videoconference, Moovi forums, etc.) by appointment. In the sessions for problem solving, the professor will answer the questions raised by the students in a personalised manner.

Practices through ICT	In the sessions devoted to the accomplishment of informatics practices, the lecturer will answer the questions raised by the students.
Mentored work	In group tutorials, the lecturer will personally answer the questions of the students, will do complementary exercises or other activities.

Assessment

	Description	Qualification	Training and Learning Results		
Problem solving	A complementary activity will be carried out consisting of resolution of exercises.	15	B3 B4	C1	D1 D2 D3 D6 D9 D15 D16
Problem and/or exercise solving	There will be two mid-term exams on Topics 1 and 2.	30	B3 B4	C1	D1 D2 D3 D9 D15 D16
Laboratory practice	A practical problem-solving exercise will be carried out with Matlab.	15	B3 B4	C1	D2 D6 D9
Essay questions exam	There will be a final continuous assessment exam on the contents of the whole subject.	40	B3 B4	C1	D1 D2 D3 D9 D15 D16

Other comments on the Evaluation

GENERAL OBSERVATIONS ON THE CALCULATION OF THE MARK:

The continuous assessment will consist of two written tests, for the first two themes, with a weight of 15% each, a Matlab laboratory practical, with a weight of 15%, and a hand-in of exercises to be developed, with a weight of 15%, being the weight of the final exam of 40%.

Students will have to take the ordinary exam of all the contents of the course, which will be 100% of the grade, in the following cases:

- Failure to complete or hand in any of the above points.

- Obtaining a mark of less than 4 points out of 10 in the final continuous assessment exam.

- Obtaining a mark lower than 5 points in the continuous assessment.

In the circumstances described in the first two sections of the above list, the continuous assessment mark would be assigned as the minimum value between a 4.5 and the mark calculated according to the weightings described above.

In any case, students who have passed the continuous assessment will have the possibility of taking the ordinary exam in order to obtain a higher mark. The assessment of students in the second and successive examinations will consist of an exam about the contents of the subject which will account for 100% of the mark.

ETHICAL COMMITMENT:

Students are expected to behave ethically. If unethical behaviour is detected (cheating, plagiarism, use of unauthorised electronic devices or other) will be automatically penalised with a grade of 0.0 in the current session.

Sources of information

Basic Bibliography

E. Marsden, A.J. Tromba, **Cálculo Vectorial**, Pearson-Addison Wesley, 2004

G.F. Simmons, **Ecuaciones diferenciales con aplicaciones y notas históricas**, Mc-Graw Hill, 1993

Complementary Bibliography

A. Quarteroni, F. Saleri, **Cálculo científico con Matlab y Octave**, Springer, 2006

Recommendations

Other comments

In case of discrepancies, the Spanish version of this guide shall prevail.