UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: CALCULUS II
Type: BASIC
Degree: 412 - UNDERGRADUATE DEGREE PROGRAMME IN ELECTRICAL ENGINEERING
Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING
Year: 1
Main language: Spanish
Use of additional languages:
Web site:

Code: 56306
ECTS credits: 6
Academic year: 2023-24
Group(s): 55
Duration: C2
Second language:
English Friendly: Y
Bilingual: N

Lecturer: **ANGEL ROMERO VILLADA** - Group(s): **55**

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	MATEMÁTICAS		Angel.Romero@uclm.es	

Lecturer: **DOROTEO VERASTEGUI RAYO** - Group(s): **55**

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Elhuyar / Matemáticas	MATEMÁTICAS	926052122	doroteo.verastegui@uclm.es	It will be published at the beginning of each semester.

2. Pre-Requisites

In order for students to achieve the learning objectives described, they must have knowledge and skills that are supposed to be guaranteed in their training prior to accessing the University:

- Knowledge: basic geometry and trigonometry, basic mathematical operations (powers, logarithms, fractions), polynomials, matrices, derivation, integration and graphic representation of functions.

- Basic skills in the handling of instruments: elementary computer management. The programming of Calculus II starts from the assumption that the student has acquired the competences corresponding to the subjects of Calculus I and Algebra. Although there are n

3. Justification in the curriculum, relation to other subjects and to the profession

The Industrial Engineer is the professional who uses the knowledge of the physical, mathematical and statistical sciences, together with engineering techniques, to develop his professional activity in aspects such as the control, instrumentation and automation of prc

4. Degree competences achieved in this course

Course competences

Code	Description
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEB01	Ability to solve mathematical problems that may arise in engineering. Ability to apply knowledge of linear algebra; geometry, differential geometry, differential and partial differential equations, numerical methods, numerical algorithms, statistics and optimisation.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Management of functions of one and several variables including their derivation, integration and graphic representation.

Knowledge of the main approaches for solving by numerical methods, user level implementation of software packages for statistics, data processing, mathematical calculation and visualisation, planning algorithms and programming using a high-level programming language, visualising functions, geometric figures and data, designing experiments, analysing data and interpreting results.

Conocer los fundamentos y aplicaciones de la Optimización.

Proper management and knowledge of the concepts of differential geometry.

Ability to express oneself correctly orally and in writing and, in particular ability to use the language of mathematics as a way of accurately expressing the quantities and operations that appear in industrial engineering. Acquired habits of working in a team and behaving respectfully.

6. Units / Contents

Unit 1: Differential calculation on several variables.
Unit 2: Differential geometry.
Unit 3: Optimization.
Unit 4: Multiple integrals.
Unit 5: Line and surface integrals.
Unit 6: Vectorial analysis.

ADDITIONAL COMMENTS, REMARKS

NOTE.- Taking into account the relationship between its contents, the aforementioned topics can be classified into the following thematic blocks:

BLOCK I.- DIFFERENTIAL CALCULATION OF SEVERAL VARIABLES: Topics 1 and 3

BLOCK II.- INTEGRAL CALCULATION OF SEVERAL VARIABLES: Topics 4, 5 and 6.

BLOCK III.- COMPLEMENTS: Topic 2

Practices in computer classroom:

Practice 1: Introduction and Representation of graphs. Functions, Derivation and Integration of functions with several variables.

Practice 2: Basic programming with MATLAB.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Combination of methods	CB02 CB03 CB04 CB05 CT03	1.2	30	N	-	Participative master class, with blackboard and projector.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB02 CB03 CB04 CB05 CEB01 CG04 CT03	0.6	15	Y	N	Participatory resolution of exercises and problems in the classroom. Presentation of academic work consisting of solving exercises and problems individually outside the classroom (progress tests).
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 CT03	0.4	10	Y	Y	Performing problems through the use of computer programs.
Formative Assessment [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 CEB01 CG04 CT03	0.2	5	Y	Y	The final assessment of the subject includes two partial written tests (not compulsory) and a final written test of the subject that has not been eliminated (compulsory).
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02	3.6	90	N	-	Autonomous personal study of the student and supervised work.
		Total:	**6**	**150**			
		Total credits of in-class work: 2.4					**Total class time hours: 60**
		Total credits of out of class work: 3.6					**Total hours of out of class work: 90**

As: Assessable training activity
Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Progress Tests	20.00%	0.00%	To test the progress of the students, at the end of each chapter, they must hand in an academic work consisting of a collection of solved problems in which the problem statement, the use of appropriate terminology and notation to express the ideas and mathematical relations used, the choice of the most appropriate procedure for each situation, the justification of the different steps of the procedure used, the results obtained and the cleanliness and presentation of the document will be assessed.
Assessment of activities done in the computer labs	10.00%	10.00%	For the evaluation of practices in the computer classroom, with the application of specific software.

Final test	70.00%	90.00%	The FINAL EXAMINATION will consist of TWO ELIMINATING written INTERIM EXAMINATIONS of subject matter (not compulsory) and a FINAL written EXAMINATION of the subject matter not eliminated (compulsory). These exams will consist of questions, theoretical issues and problems where the approach to the subject or problem, the use of appropriate terminology and notation to express the ideas and mathematical relationships used, the choice of the most appropriate procedure for each situation, the justification of the different steps of the procedure used, the results obtained and the cleanliness and presentation of the document will be assessed.
Total:	**100.00%**	**100.00%**	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The FINAL QUALIFICATION for the course will be calculated using the following expression:

0.7*FINAL EXAM + 0.2*PROGRESS TESTS + 0.1*COMPUTER PRACTICALS.

which will be applied provided that the grade of the FINAL TEST is equal to or higher than 4 points. Otherwise, the FINAL QUALIFICATION will be the one obtained in the FINAL TEST.

In order to obtain the mark for the FINAL EXAMINATION, the following procedure will be followed:

1. Students who in the two mid-term exams have obtained a mark equal to or higher than 5 points: the mark in the FINAL EXAM will be the average of the marks obtained in both mid-term exams.

2. Students who in one of the mid-term exams have obtained a mark between 4 and 5 points but whose average with the mark obtained in the other mid-term exam equals or exceeds 5 points: the mark in the FINAL EXAM will be the average of the marks obtained in both mid-term exams.

3. Students, not covered in section 2, who have obtained a grade equal to or higher than 5 points in one of the mid-term exams (eliminating that subject for the final exam) and lower than 5 points in the other mid-term exam: they will have to take the part corresponding to the subject not eliminated in the final exam. The mark in the FINAL EXAM will be the average of the mark obtained in the part of the mid-term exam and the mark obtained in the part of the final exam corresponding to the subject not eliminated.

4. Students who have not passed any of the partial exams: they must take the entire final exam. Their grade in the FINAL EXAM will be the grade obtained in the final exam.

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Non-continuous evaluation:

It will be analogous to the continuous assessment, except that the FINAL QUALIFICATION of the subject will be calculated using the following expression:

0.9*FINAL EXAM + 0.1*COMPUTER PRACTICES

Specifications for the resit/retake exam:

There will be a single final written exam where 90% will be questions, theoretical issues and problems where the approach to the topic or problem, the use of appropriate terminology and notation to express the ideas and mathematical relationships used, the choice of the most appropriate procedure for each situation, the justification of the different steps of the procedure used, the results obtained and the cleanliness and presentation of the document will be assessed; the remaining 10% will be questions related to the computer practices. The student will decide whether or not to participate in the questions related to the computer practices if he/she wants to improve the grade obtained in them in the ordinary exam.

Specifications for the second resit / retake exam:

There will be a single final written exam where 90% will be questions, theoretical issues and problems where the approach to the topic or problem, the use of appropriate terminology and notation to express the ideas and mathematical relationships used, the choice of the most appropriate procedure for each situation, the justification of the different steps of the procedure used, the results obtained and the cleanliness and presentation of the document will be assessed; the remaining 10% will be questions related to the computer practices.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90

General comments about the planning: Time planning may undergo some variations depending on the calendar and the needs of the academic year. The dates of the practices will be specified in the first three school weeks.

Global activity

Activities	**hours**
Formative Assessment [PRESENCIAL][Assessment tests]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Total horas:	150

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
J.E. Mardsen, A. J. Tromba	Calculo Vectorial 6 Ed.	Addison-Wesley Iberoamericana		9788490355787	2018	
C. Pita Ruiz	Cálculo Vectorial	Prentice-Hall Hispanoamericana S. A.	México	9789688805299	1995	
P. Pedregal	Cálculo Vectorial, un enfoque práctico.	Septem Ediciones S.L.	Oviedo	9788495687067	2001	
ARANDA, E; PEDREGAL, P.	Problemas de cálculo vectorial	Lulu.com			2004	
BURGOS, J.	Cálculo infinitesimal de varias variables.	McGraw-Hill				
DEMIDOVICH, B.	5000 problemas de análisis matemático.	Ed. Paraninfo.				
GARCIA, A.; LOPEZ, A.; RODRIGUEZ, G; ROMERO, S; DE LA VILLA, A.	Cálculo II.	Ed. Clagsa			2002	
APOSTOL, T.	Calculus	Ed. Reverté			1995	
GRANERO	Cálculo infinitesimal	McGraw-Hill.				
LARSON , R; HOSTETLER, R; EDWARDS, B;	Cálculo y geometría analítica	Ed. McGraw Hill				
LOPEZ DE LA RICA, A ; DE LA VILLA, A.	Geometría diferencial.	CLAGSA.				
PERAL ALONSO, I.	Primer curso de ecuaciones en derivadas parciales	Ed. Addison-Wesley/Universidad autónoma de Madrid				
SALAS, S; HILLE, E.	Calculus	Ed. Reverté.				
STEWART, J.	Cálculo multivariable	THOMSON				
ZILL, D.	Ecuaciones diferenciales.	THOMSON				
A. Garcia, A. López, G. Rodríguez, S. Romero, A. de la Villa	Calculo II. Teoría y problemas de funciones de varias variables	CLAGSA	Madrid	8492184701	1996	