UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: CALCULUS II
Type: BASIC
Degree: 351 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING (ALM)
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): 56
Duration: C2
Second language:
English Friendly: Y
Bilingual: N

Lecturer: **ANGEL ROMERO VILLADA** - Group(s): **56**

Building/Office	Department	Phone number	Email	Office hours
	MATEMÁTICAS		Angel.Romero@uclm.es	

Lecturer: **DOROTEO VERASTEGUI RAYO** - Group(s): **56**

Building/Office	Department	Phone number	Email	Office hours
Elhuyar / Matemáticas	MATEMÁTICAS	926052122	doroteo.verastegui@uclm.es	

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 operatio

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
A01	To understand and have knowledge in an area of study that moves on from the general education attained at secondary level and usually found at a level that, while supported in advanced text books, also includes some aspects that include knowledge found at the cutting edge of the field of study.
A02	To know how to apply knowledge to work or vocation in a professional manner and possess the competences that are usually demonstrated by the formulation and defence of arguments and the resolution of problems in the field of study.
A03	To have the capability to gather and interpret relevant data (normally within the area of study) to make judgements that include a reflection on themes of a social, scientific or ethical nature.
A07	Knowledge of Information Technology and Communication (ITC).
A08	Appropriate level of oral and written communication.
A17	Ability to apply principles and methods of quality control.
B01	Ability to solve mathematical problems that occur in engineering. Aptitude to apply knowledge of: linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics and optimization.
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

5. Objectives or Learning Outcomes

Course learning outcomes

Description

To know the tundamentals and applications of Optimization

Know the use of the functions of one and various variables including its derivation, integration and graphic representation

Know the main approaches for resolution through using numerical methods, to use some statistical software packages at user level, data processing, mathematical calculus and vizualization, set out algorithms and program through programming language of a high level, vizualize functions, geometric figures and data, design experiments, analyze data and interpret results

Be familiar with the concepts of differential geometry and use them appropriately.

Be able to express yourself correctly both orally and in writing, and, in particular, to know how to use mathematical language to express with precision quantities and operations that appear in industrial engineering. Become accustomed to working in a team and behaving respectfully.

Additional outcomes

Know how to describe processes related to the subjects of industrial engineering through ordinary differential equations, solve them and interpret results.

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	A01 A02 A03 A07 B01 CB02 CB03 CB04 CB05	1.2	30	N	-	Participatory master lesson, with blackboard and projector cannon.
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	A02 A07 B01 CB02 CB03 CB04 CB05	0.6	15	Y	N	Solving exercises and problems in the classroom.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	A02 A07 B01 CB02 CB03 CB04 CB05	0.4	10	Y	Y	Performing problems through the use of computer programs.
Formative Assessment [ON-SITE]	Assessment tests	A01 A02 A03 A07 A08 A17 B01 CB02 CB03 CB04 CB05	0.2	5	Y	Y	Final evaluation of the subject by written test.
Study and Exam Preparation [OFF-SITE]	Self-study	A02 A03 A08 B01 CB02 CB03 CB04 CB05	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
Assessment of activities done in the computer labs	10.00%	10.00%	For the evaluation of the practices in the computer room, with application of specific software, the delivery of the work carried out in the same ones and a documentation with the resolution of the same will be valued.
Final test	70.00%	90.00%	Finally, there will be a written test that will consist of questions, theoretical questions and problems whose evaluation criteria will be similar to those of the academic works described above.
			For the evaluation of the problems carried out by the students, the approach of the problem will be assessed, the use of terminology and appropriate notation to express the ideas and mathematical

Progress Tests	20.00%	0.00%	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 cleaning and presentation of the document.
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:

In order to obtain the final grade, the 4 evaluation systems described are computed, with the specified weights, and a grade equal to or greater than 4 points out of 10 must be obtained in the final written test. If the grade obtained in said test was less than 5 points, it will be considered as the final grade of the subject.

Non-continuous evaluation:

To carry out the non-continuous evaluation, the proposed activities must be delivered during the activities in the computer rooms and a final test will be carried out. If the proposed activities are not delivered, the student must obtain at least 5.6 in the final test to pass the subject.

Specifications for the resit/retake exam:

A final written test will be carried out, the weight of which will be 90% of the overall grade for the subject and will consist of questions, theoretical questions and problems where the approach to the topic or problem will be assessed, the use of appropriate terminology and notation to express ideas and relationships mathematics 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 cleaning and presentation of the document. The remaining 10% of the grade corresponds to Matlab practices.

Specifications for the second resit / retake exam:

A final written test will be carried out, the weight of which will be 90% of the overall grade for the subject and will consist of questions, theoretical questions and problems where the approach to the topic or problem will be assessed, the use of appropriate terminology and notation to express ideas and relationships mathematics 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 cleaning and presentation of the document. The remaining 10% of the grade corresponds to Matlab 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**
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
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
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	