



1. General information

Course: ADVANCED MATHEMATICS

Type: BASIC

Degree: 351 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING (ALM)

Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING

Year: 2

Main language: Spanish

Use of additional languages:

Web site:

Code: 56311

ECTS credits: 6

Academic year: 2023-24

Group(s): 56

Duration: First semester

Second language:

English Friendly: N

Bilingual: N

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

To know the fundamental contents related to the differential and integral calculus of one and several variables explained in the subjects of Calculus I and Calculus II, and to Linear Algebra, developed in the subject of Algebra.

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

Not established

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.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Know how to describe processes related to materials in industrial engineering through ordinary differential equations and in partial derivations, resolve them and interpret results

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

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.

Know how functions and data are approximated through development in series of power and Fourier and their applications

6. Units / Contents

Unit 1:

Unit 2:

Unit 3:

Unit 4:

Unit 5:

Unit 6:

7. Activities, Units/Modules and Methodology

		Related Competences					
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Training Activity	Methodology	(only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Combination of methods	CB02 CB03 CB04 CB05 CG03 CG04	1.2	30	N		Development of theoretical content in the classroom, using the participatory master lesson method
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB02 CB03 CB04 CB05 CG03 CG04	0.6	15	Y	N	Exercise and problem solving in the classroom.
Study and Exam Preparation [OFF-SITE]	Self-study		0.6	15	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 CB04 CB05 CG03 CG04	3	75	N		Personal study of the subject and resolution of exercises and problems outside the classroom that will be given to the teacher and that the teacher will evaluate.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities		0.4	10	Y	N	Laboratory practices in the computer classroom with the use and application of specific software
Formative Assessment [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 CG03 CG04	0.2	5	Y	Y	Final evaluation of the course by written test
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
Projects	10.00%	10.00%	
Laboratory sessions	10.00%	10.00%	
Progress Tests	10.00%	0.00%	The academic work carried out by the students in (10%) or out (10%) of class, tutored by the teacher individually or in small groups, for whose evaluation a report should be submitted, in which the approach to the problem, 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 cleaning and presentation of the document should be assessed. Practices in the computer room (10%), with the application of specific software, where the delivery of the work done in them will be evaluated, having to be defended orally before the teacher.
Final test	70.00%	80.00%	Finally, a written test will be taken, consisting of questions, theoretical questions and problems whose evaluation criteria will be similar to those of the academic papers described above.
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 2 evaluation systems described above are calculated, with the specified weights, and a grade of 4 out of 10 or higher must be obtained in the final written test. If the grade obtained in this test is less than 4 points, it will be given as the final grade of the course.

Non-continuous evaluation:

Evaluation criteria not defined

Specifications for the resit/retake exam:

In order to obtain the final grade, the grades obtained in the first evaluation system described above will be kept and a new written Final Exam will be taken, calculating the final grade of the course combining the 2 grades as specified above. Likewise, in the final written test, a grade equal to or higher than 4 points out of 10 must be obtained. If the grade obtained in this test is less than 4 points, it will be given as the final grade of the course. If the 2 evaluation systems are calculated as described in the previous paragraph, and the final grade is lower than the grade obtained in the written Final Exam, the grade obtained in the written Final Exam will be recorded as the final grade of the course.

Specifications for the second resit / retake exam:

A Final Written Test will be taken, the weight of which will be 100% of the overall grade of 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 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 cleaning and presentation of the document.

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][Combination of methods]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	75
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Formative Assessment [PRESENCIAL][Assessment tests]	5
Global activity	
Activities	hours
Study and Exam Preparation [AUTÓNOMA][Self-study]	15
Formative Assessment [PRESENCIAL][Assessment tests]	5
Class Attendance (theory) [PRESENCIAL][Combination of methods]	30
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	15
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	75
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
García, A. y otros	Ecuaciones diferenciales ordinarias : teoría y problemas	CLAGSA		84-921847-7-9	2006	
Marcellán, Francisco	Ecuaciones diferenciales : problemas lineales y aplicaciones	McGraw-Hill		84-7615-511-5	1990	
Pedregal Tercero, Pablo	Iniciación a las ecuaciones en derivadas parciales y al análisis de Fourier	Septem Ediciones		84-95687-07-0	2001	
Bellido, J.C; Donoso, A; Lajara, S.	Ecuaciones en derivadas parciales	Paraninfo		978-84-283-3016-9	2014	
Simmons, George Finlay	Ecuaciones diferenciales : teoría, técnica y práctica	McGraw-Hill		978-0-07-286315-4	2007	
Zill, Dennis G.	Ecuaciones diferenciales con aplicaciones de modelado	Cengage Learning		978-970-830-055-1	2009	
Çengel, Yunus A.	Ecuaciones diferenciales para ingeniería y ciencias	McGraw-Hill Education	México	978-607-15-0989-5	2014	
Bellido Guerrero, J. Carlos	Ecuaciones diferenciales ordinarias	Paraninfo	Madrid	978-84-283-3015-2	2014	
Acero, Ignacio.	Ecuaciones diferenciales : teoría y problemas	Tebar-Flores	Madrid	978-84-7360-609-7	2017	
Casteleiro, José Manuel	Problemas resueltos de ecuaciones diferenciales	Garceta		978-84-1622-886-7	2017	
Simmons, George Finlay	Ecuaciones diferenciales con aplicaciones y notas históricas	McGraw-Hill		84-481-0045-X		
Pérez García, V. M; Torres, P. J.	Problemas de ecuaciones diferenciales	Ariel		84-344-8037-9	2001	