UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: CALCULUS I
Code: 56301
Type: BASIC
ECTS credits: 6
Degree: 419 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING
Academic year: 2023-24
Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING
Group(s): 56
Year: 1
Duration: First semester
Main language: Spanish
Second language: Spanish
Use of additional languages:
English Friendly: Y
Web site:
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	It will be published at the beginning of the semester

2. Pre-Requisites

For students to achieve the learning objectives described, they must possess knowledge and skills that are supposed to be guaranteed in their training prior to entering the University:

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

- Basic skills in instrumental management: elementary management of computers.

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 the engineering techniques, to develop his professional activity in aspects such as the control, instrumentation and automation of processes and equipment, as well as the design, construction, operation and maintenance of industrial products. This training allows you to successfully participate in the different branches that make up industrial engineering, such as mechanics, electricity, electronics, etc., adapt to changes in technology in these areas and, where appropriate, generate them, responding thus to the needs that arise in the productive and service branches to achieve the well-being of the society to which it is due.

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

Knowledge of the fundamentals and applications of optimisation

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.

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.
Ability to approximate functions and data by means of power series and de Fourier developments and their applications.
Management of functions of one and several variables including their derivation, integration and graphic representation.

6. Units / Contents

Unit 1: Introduction to Calculus.
Unit 2: Real functions of one variable.
Unit 3: Derivation.
Unit 4: Numerical series and power series.
Unit 5: Numerical Integration.
Unit 6: Improper Integrals.
Unit 7: Numerical Algorithmic.
Unit 8: Series Numéricas y Potencias

ADDITIONAL COMMENTS, REMARKS

Practices in the Computer classroom:
Practice 1: Introduction to MATLAB. Mathematical functions with MATLAB.
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]	Lectures	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 CT03	1.2	30	N	-	Participatory master lesson, with blackboard and projector cannon.
Problem solving and/or case studies [ON-SITE]	Combination of methods	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 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]	Combination of methods	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 CT03	0.4	10	Y	Y	Realisation of problems through the use of computer programmes
Formative Assessment [ON-SITE]	Assessment tests	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 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 CT03	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%	Evaluation of the 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.
			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

Progress Tests	20.00%	0.00%	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.
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 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..

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.
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][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Combination of methods]	15
Class Attendance (practical) [PRESENCIAL][Combination of methods]	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 course. The dates of the practices will be specified in the first three school weeks.

Global activity

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

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
P. Pedregal	Cálculo esencial	ETSI Industriales,			12002	Libro de teoría

		UCLM				
	Calculus.org Resources For The Calculus Student					Algunos recursos en internet
	http://www.calculus.org/					
C. H. Edwards, D. E. Penney	Cálculo diferencial e integral	Cuarta Edición, Pearson Educación			1997	Libro de teoría
R. Larson, R.P. Hostetler, B. H. Edwards	Cálculo I	Mc. Graw-Hill Interamericana			2005	Libro de teoría.
A. García, A. López, G. Rodríguez, S. Romero, A. de la Villa	Calculo I. Teoría y problemas de funciones en una variable	CLAGSA	Madrid	84-921847-0-1	1996	Libro de teoría y problemas
B. P. Demidovich	5000 problemas de análisis matemático	Thompson			2002	Libro de problemas.
B. P. Demidovich	Problemas y ejercicios de análisis matemático	11 edición, Ed. Paraninfo			1993	Libro de problemas.
E. J Espinosa, I. Canals, M. Medea, R. Pérez, C. A. Ulín	Cálculo diferencial: Problemas resueltos	Reverte			2009	Libro de problemas.
T. Apostol	Calculus	Vol. I, Segunda edición, Reverté			1990	Libro de teoría.
L. S. Salas, E. Hille, G. Etgen	Calculus Volumen I: Una y varias variables	Cuarta Edición en español, Ed. Reverté			2002	Libro de teoría.