UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: ALGEBRA
Code: 56300
Type: BASIC
ECTS credits: 6
Degree: 420 - UNDERGRADUATE DEGREE PROGRAMME IN MECHANICAL ENGINEERING
Academic year: 2023-24
Center: 605 - SCHOOL OF INDUSTRIAL ENGINEERS. AB
Group(s): 14 15 16
Year: 1
Duration: First semester
Main language: Spanish
Second language: English
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **ANTONIO MARTINEZ PLAZA** - Group(s): **14 15 16**

Building/Office	Department	Phone number	Email	Office hours
INFANTE JUAN MANUEL/1B7	MATEMÁTICAS	2470	antonio.mplaza@uclm.es	

2. Pre-Requisites

In order to achieve the learning objectives, the students should have the knowledge and skills that their previous education provides to their access to the University training:

- Knowledge: geometry, basic trigonometry, basic mathematical operations (power, logarithms, fractions, etc.), polinomials, matrices, derivation, integration and graphical

representation of elementary functions.

- Basic skills in the managment of instrumentation: elementary use of computers and mathematical software.

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

Industrial engineers are professionals who use knowledge of physical and mathematical sciences and engineering techniques to develop his professional activity in aspects such as control, instrumentation an automation of processes and equipment, as well as design, construction, operation and maintenance of industrial products. This training allows them to participate succesfully in the different branches integrated in industrial engineering, such as mechanics, electricity, electronics, etc. It also make them adopt the changes of technologies in these areas, where appropriate, to respond to the needs that arise in the productive branches and services, so achieving the welfare of society.

Within the mathematical knowledge, the methods developed in the course of Algebra have revealed as the most adequate for the modern treatment of many disciplines including in the curriculum. Such disciplines will allow industrial engineers to face real problems that they can find at work.

Therefore, this subject is an essential part of the basic training of future engineers. Its main purpose is to provide students the algebraic and geometric resources to solve problems concerning maths and engineering. In this sense, this subject will help them to enhance the capacities of abstraction, understanding, analysis, implementation and synthesis that are common in mathematics and neccesary to any other scientific discipline or branch of engineering.

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 theory of matrices and determinants and ability to carry out the corresponding calculations. Knowledge of the fundamentals and applications of linear algebra and Euclidean geometry.

Ability to manage and perform elementary operations with complex numbers
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: COMPLEX NUMBERS
Unit 2: MATRICES AND DETERMINANTS
Unit 3: SYSTEMS OF LINEAR EQUATIONS
Unit 4: VECTOR SPACES
Unit 5: LINEAR MAPS
Unit 6: DIAGONALIZATION
Unit 7: EUCLIDEAN SPACES AND ORTHOGONAL TRANSFORMATIONS
Unit 8: GEOMETRY. AFFINE SPACES
Unit 9: DIFFERENCE EQUATIONS

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 CT03	1.2	30	Y	N	
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB02 CB03 CB04 CEB01 CG04	0.6	15	Y	N	
Computer room practice [ON-SITE]	Practical or hands-on activities	CB05 CEB01 CG03 CT02	0.4	10	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB02 CB03 CB04 CB05 CEB01 CG03 CG04 CT02 CT03	3.6	90	Y	N	
Formative Assessment [ON-SITE]	Assessment tests	CB02 CB03 CB04 CEB01 CG03 CG04 CT03	0.2	5	Y	Y	
		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
Final test	70.00%	90.00%	
Assessment of activities done in the computer labs	10.00%	10.00%	
Projects	20.00%	0.00%	
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).

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][Problem solving and exercises]	15
Computer room practice [PRESENCIAL][Practical or hands-on activities]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	2.5

Global activity

Activities	**hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	15
Computer room practice [PRESENCIAL][Practical or hands-on activities]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	2.5
Total horas:	147.5

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
	Problemas resueltos de Algebra					

J. Belmonte Beitia	Lineal con aplicaciones.	Lulú			2020	
Fernández, C., Vázquez, F.C. y Vegas, J.M.	Ecuaciones diferenciales y en diferencias	Paraninfo	Madrid		2003	
Larson, R., Edwards, B.H. y Falvo, D.C.,	Algebra Lineal, 5ª edición	Piramide			2004	
Garcia, S.R. y Horn, R.A.	A Second Course in Linear Algebra	Cambridge University Press	Cambridge		2017	
LAY, D. C.	Álgebra Lineal y sus aplicaciones	Prentice Hall		970-26-0080-4	2001	
SERRANO, R. LOZANO, M. VILLAVERDE, J. MARTÍNEZ, A.	Apuntes de álgebra	Popular Libros		84-931937-8-X	2001	
SERRANO, R. LOZANO, M. VILLAVERDE, J. MARTÍNEZ, A.	Apuntes de álgebra : ejercicios	Popular Libros		978-84-932498-7-8	2002	
TORREGROSA, J. R., JORDAN, C.	Teoría y problemas de álgebra lineal y sus aplicaciones	McGraw Hill		9684222149	1991	
ALEDO, J.A., PENABAD, J. VALVERDE, J.C., VILLAVERDE, J.J.	Ejercicios de álgebra y matemática discreta II	Alpeviva		84-931862-1-X (v.II)	2001	
ALEDO, J.A., PENABAD, J. VALVERDE, J.C., VILLAVERDE, J.J.	Álgebra y matemática discreta	Alpeviva		84-931862-2-8	2002	
ANZOLA M., CARUNCHO, J., PÉREZ CANALES, G.	Problemas de Álgebra.Tomo 3. Espacios Vectoriales	Primer Ciclo		843004230X	1981	
ANZOLA M., CARUNCHO, J., PÉREZ CANALES, G.	Problemas de Álgebra.Tomo 6. Geometría Afín y Euclídea	Primer Ciclo		8430052461	1981	
BURGOS, J. de	Álgebra Lineal y Geometría Cartesiana	McGraw Hill		978-84-481-4900-0	2010	
GARCÍA CABELLO, J.	Álgebra lineal: sus aplicaciones en Economía, Ingeniería y otras Ciencias.	Delta Publicaciones		84-96477-12-6	2006	
GARCÍA, J.; LOPEZ PELLICER, M.	Álgebra Lineal y Geometría	Ed. Marfil		8426802699	1992	
GARCÍA, J.; LOPEZ PELLICER, M.	Álgebra Lineal y Geometría. Ejercicios	Ed. Marfil		8426804047	1991	
HERNÁNDEZ RODRÍGUEZ, E., VÁZQUEZ GALLO, MJ, ZURRO MORO, M.A.	Álgebra lineal y Geometría, 3ed	Pearson Universidad		9788478291298	2012	
KEICH NICHOLSON, K	Álgebra Lineal con aplicaciones	McGraw Hill		84-486-3789-2	2003	
Tai-Ran Hsu	APPLIED ENGINEERING ANALYSIS	JOHN WILEY	Hoboken, NJ	9781119071204	2018	It contains all the topics of the subjects related to Mathematics in the industrial Engineering degree
E. Hernández	Algebra y Geometría	Addison-Wesley			1994	
E, Aranda	Algebra Lineal con aplicaciones y Python	Lulú			2019	