COMILLAS
UNIVERSIDAD PONTIFICIA
ICAI ICADE CIHS

Syllabus
2025 - 2026

GENERAL INFORMATION

Data of the subject	
Subject name	Algebra and Geometry
Subject code	DMA-IMAT-101
Mainprogram	Bachelor's Degree in Mathematical Engineering and Artificial Intelligence
Involved programs	Grado en Ingeniería Matemática e Inteligencia Artificial [First year]
Level	Reglada Grado Europeo
Quarter	Anual
Credits	12,0 ECTS
Type	Básico
Department	Department of Applied Mathematics
Coordinator	David Alfaya Sánchez

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DESCRIPTION OF THE SUBJECT

Contextualization of the subject

Prerequisites

This course is an introduction to Linear Algebra and Differential Geometry. It focuses on providing the basic tools from the lineal algebra and differential geometry and in showing some of their applications in the engineering field. All the contents will be analyzed including several examples taken from the real life or other sciences like physics, economics, etc. The theoretical classes complement each other with the laboratory where the problems are solved using the computer.

Basic knowledge of Algebra, Geometry and Real Analysis is required for attending this course.

Course contents

EVALUATION AND CRITERIA

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight

Theoretical-practical exams: • Short continuous assessment tests (10%) • Mid term exams (1.5-hour long) (25%) • Final term exams (65%)	Incluir breve descripción	80
Evaluation of the experimental wok: • Practice exam with MATLAB (at the end of the second semester)	Incluir breve descripción	10
Maths Team Contest (MTC)	Incluir breve descripción	10

Grading

Incluyo el Gradind de Álgebra GITI. Modifícalo brevemente para ajustarlo a las características de iMAT. Haz una descripción mucho más light que la versión en castellano.

- The grade obtained in the partials/final exams must be at least 4 over 10 to take into account the previous ponderations of the overall assessment criteria. In other case, the term overall grade will be the grade obtained in the exam.
- The final second term exam will only cover the contents taught in the second term, if the first term overall grade is at least 4 over 10. In other casa, it will cover all the contents of the course.
- The following conditions must be accomplished to pass the course:
  - If the first term overall grade was at least 4, then the second term overall grade must be at least 4 over 10 and the average of both overall grades (first and second terms) must be at least 5 over 10.
  - If the first term overall grade was less than 4, then the second term overall grade must be at least 5 over 10.

BIBLIOGRAPHY AND RESOURCES

Basic References

- De la Villa, A. Problemas de Álgebra con esquemas teóricos. Ed. CLAGSA Madrid 2010.
- López de la Rica, A. y De la Villa, A. Geometría Diferencial. Ed. CLAGSA, Madrid 1997.

Complementary References

- Hernández Rodríguez, E., Vázquez Gallo, M. J. y Zurro Moro, M. A. Álgebra Lineal y Geometría, Ed. Pearson, Madrid 2012.
- Merino, L. y Santos, E. Álgebra Lineal con Métodos Elementales, Ed. Thomson, 2006.
- Halmos, P. R., Finite-dimensional vector spaces, Undergraduate Texts in Mathematics 1958, Springer-Verlag New York 1958
- Hackbusch, W., Tensor Spaces and Numerical Tensor Calculus, Springer Series in Computational Mathematics 56, Berlin 2012.
- Lang, S., Undergraduate Algebra, Undergraduate Texts in Mathematics, Springer-Verlag New York 2005
- Do Carmo. Geometría Diferencial de curvas y superficies. Ed. Alianza, 1994.

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