

MODULE	AREA	YEAR	SEMESTER	ECTS CREDITS	COURSE
Basic formation	Matemáticas I	1º	1º	6	Basic
<b>PROFESSORS</b>			<b>ADDRESS</b>		
Rafael López Camino			Dpto. De Geometría y Topología. Facultad de Ciencias Campus Fuentenueva. E-18071 Granada		
			Office nº 5, second floor, Mathematics. E-mail: rcamino[at]ugr.es		
			<b>TUTORIAL ASSISTANCE</b>		
			Friday, 8-14h.		
<b>GRADE</b>			<b>OTHER DEGREES</b>		
Industrial Electronics Engineering Grade					
<b>RECOMMENDATIONS</b>					
No prerequisites					
<b>BRIEF DESCRIPTION OF CONTENTS</b>					
Linear algebra-differential geometry.					
<b>GENERAL AND SPECIFIC SKILLS</b>					
<p>Transversal skills:</p> <p>T1 - Capacity for analysis and synthesis: Find, analyze, critique (critical thinking), relate, structure and synthesize information from various sources and integrate ideas and knowledge.</p> <p>T2 – Organization, planning and management of production information.</p> <p>T3 - Oral and written communication in academic and professional fields.</p> <p>T4- Ability to communicate in a foreign language, particularly English.</p>					



T5 - Ability to solve problems and apply knowledge in practice.  
 T6- Ability to use and application of ICT in the academic and professional field.  
 T7 - Ability to make decisions based on objective criteria (experimental data or scientific simulation) and ability to argue or logically justify those decisions.  
 T8 - Capacity for independent learning and initiative and entrepreneurship  
 T9 - Ability to work in team.  
 T10- Ability to adapt to new situations and new technologies.  
 T11- Ability to innovate and generate new ideas. Creativity.  
 T12 - Motivation for quality and continuous improvement, acting with rigor, responsibility and ethics professional.  
 T13- Sensitivity to environmental issues.  
 T14- Respect for fundamental rights and equality between men and women.  
 T15- Ability to project the knowledge, skills and acquired skills to promote a society based on the values of freedom , justice , equality and pluralism.

Specific skills module:

B1 – Ability to solve mathematical problems that arise in engineering. Ability to apply knowledge of lineal algebra and geometry, and differential geometry.

## GOALS

- The student should be able:
- To use the fundamental tools of linear algebra and differential geometry of curves and surfaces.
- To use his intuition and capacity to solve geometric problems in the plane and the space.

## SYLLABUS

THEME CONTENT:

UNIT 1: Matrices, determinants, and systems of linear equations

Matrices and Matrix Operations.

Determinants. Rank of a matrix.

Solving Systems of linear equations

UNIT 2: Vector spaces. Linear maps. Diagonalization.

Definition of a vector space. Span, linear independence, and basis.

Linear map. Matrix of a linear map.

Eigenvalues and eigenvectors. Diagonalization.

UNIT 3: Euclidean vector spaces

Inner product. Orthonormal basis.

Angles. Cross product.

UNIT 4: Curves and differential vector fields.

Plane and space curves. Curvature and torsion.

Differential vector fields. Divergence and rotational.

UNIT 5: Introduction to the theory of surfaces in Euclidean Space.

Graphs and surfaces of revolution. Definition of surface.

Gauss map and fundamental forms. Gauss curvature and mean curvature.

## REFERENCES



UNIVERSIDAD  
DE GRANADA

INFORMACIÓN SOBRE TITULACIONES DE LA UGR  
[grados.ugr.es](http://grados.ugr.es)

- S. Lipschutz, *Álgebra Lineal*, Mc Graw Hill, 2003 (2ª edición).
- F. Ayres, *Matrices*, Mc Graw Hill, 1962 .
- L. Merino y E. Santos, *Álgebra Lineal con métodos elementales*, Thomson, 2006.
- A.M. Amores Lázaro, *Curso básico de curvas y superficies*. Sanz y Torres, 2001.
- S. Montiel and A. Ros, *Curves and surfaces*, American mathematical Society, 2005.

## LINKS

<http://www.ugr.es/~geometry/docencia.htm>  
<http://www.ugr.es/~ingelectronica/>  
<http://www.ugr.es/~rcamino>

## METODOLOGY

For the development of the teaching and learning process will be carried out different training actions that will allow students to acquire the skills programmed:

1.- Theoretical classes (master lesson): the theoretical concepts will be presented in the classroom and the proposed contents will be developed. We will try to transmit these contents motivating the students to reflect, facilitating the discovery of the relationships between different concepts and trying to form a critical mentality.

Purpose: To transmit the contents of the subjects of the module motivating the students to reflect, facilitating the discovery of the relationships between different concepts and forming a critical mentality.

Competences developed: T1, T2, T3, T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, B1.

2. Practical classes, including the following:

1.1.- Problem solving: Each theme will be associated with one or more problem relationships that allow a deep understanding of the subject. The general rule is that students solve these problems on the board with the help of the teacher and the other students.

1.2.- Practices with computers: Students will analyze practical cases that can be solved analytically or numerically, under the supervision of the teacher. Computer tools may be used. They can be individual or group.

1.3.- Seminars: It will be expanded and deepened in some specific aspects related to the subject. They will be participatory, motivating the student to reflect and debate.

Purpose: To transmit the contents of the subjects of the module motivating the students to reflect, facilitating the discovery of the relationships between different concepts and forming a critical mentality.

Competences developed: T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, B1.

## EVALUATION SYSTEM

The evaluation will preferably be continuous, meaning the diversified assessment based on the combination of some of the following activities:



- Exams of written or oral type.
- Works presented, and academically directed, in relation to the contents of the subject.
- Implementation of different types of practices.
- Active participation of the students in the theoretical classes, practices, seminars, workshops and other activities related to the subject.
- Other tests and specific activities that ensure an objective evaluation of learning and performance.

During the course there will be at least two partial exams. If the arithmetic mean value of these exams is greater than or equal to 5, this will be the student's grade, which will not have to take the final exam unless he wants to increase his grade. If the average grade of the partial exams is less than 5, then the student will go with the whole subject in the June exam.

All other matters related to the evaluation (Final single evaluation, Extraordinary evaluation, etc.) will be governed by the Evaluation and Qualification Regulations of the students of the University of Granada.

**DESCRIPTION OF THE TESTS THAT WILL BE PART OF THE FINAL SINGLE EVALUATION ESTABLISHED IN THE "REGULATIONS FOR EVALUATION AND QUALIFICATION OF STUDENTS OF THE UNIVERSITY OF GRANADA"**

The exam will be of the same type as that of the June exam.

