# 30706 - Mathematics 2

## Syllabus Information

**Academic Year:** 2019/20
**Subject:** 30706 - Mathematics 2
**Faculty / School:** 110 -

**Degree:** 470 - Bachelor's Degree in Architecture Studies

**ECTS:** 6.0
**Year:** 1
**Semester:** Second semester
**Subject Type:** Basic Education
**Module:**

# 1.General information

## 1.1.Aims of the course

## 1.2.Context and importance of this course in the degree

## 1.3.Recommendations to take this course

# 2.Learning goals

## 2.1.Competences

## 2.2.Learning goals

## 2.3.Importance of learning goals

# 3.Assessment (1st and 2nd call)

## 3.1.Assessment tasks (description of tasks, marking system and assessment criteria)

# 4.Methodology, learning tasks, syllabus and resources

### 4.1.Methodological overview

The metodology followed in the course is oriented towards the achievement of the learning objectives.

Most of central ideas and topics are given by lectures to the whole group of students. They  break up into small groups of 15 to 20 students  for computer classes. The problem classes allow students to  work out  hand-outs  under the close assistance and guideline of the teacher. In addition, there are computer sessions every two weeks which allow to emphasize  numerical aspects of the subject.

Students are expected to participe actively in the classes throughout the semester.

Classroom materials will be avalaible via Moodle.

### 4.2.Learning tasks

Lectures, computer classes, problem classes, group work

### 4.3.Syllabus

The course will address the following topics:

**Linear Algebra**

1. Bilinear forms. Matrix representation, change of basis. Symmetric forms and their link with quadratics forms. Diagonalization of quadratics forms. Law of inertia, classification by rank and signature.
2. Inner products spaces, ortonormal sets. Gram-Schmidt orthogonalitation. QR factorization of rectangular matrices.

**Differential and Integral Calculus in $R^n$**

1. Limits and continuity of real-valued functions defined on subsets of $R^n$.
2. Partial and directional derivatives. Differentiability. The gradient. Higher-order derivatives. Local extrema. Vector-valued functions defined on subsets of $R^n$. Differentiation, the Jacobian matrix.The chain rule.
3. Double and triple integrals. Change of variables.

**Differential Geometry**

1. Curves and smooth surfaces in $R^3$. Parameterised curves, arc length, curvature and torsion. Frenet-Serret frame. Parameterised surfaces in $R^3$. Area.
2. Line integrals. Surface integrals. Integration theorems.

## 4.4.Course planning and calendar

Schedules and classrooms for lectures,  problem classes and computer classes may be found at  http://eina.unizar.es
Scheduling of examinations is agreed by the School Board  and are avalaible at  http://eina.unizar.es
Deadlines  for intermediate examination and submission of  group work will be announced in advance.

## 4.5.Bibliography and recommended resources

- Lay, David C.: Álgebra lineal y sus aplicaciones. México : Pearson Educación, 2007
- Salas, Saturnino L.: Calculus : una y varias variables / Salas, Hille, Etgen . 4ª ed. española, reimp. / actualización de la 4ª ed. española correspondiente a la 8ª ed. en inglés y revisión de la obra, Carles Casacuberta Vergés Barcelona : Reverté, D.L. 2005-2007
- Carmo, Manfredo P. do: Geometría diferencial de curvas y superficies. Madrid : Alianza Editorial, 1990
- Marsden, Jerrold E.: Cálculo vectorial . Jerrold E. Marsden, Anthony J. Tromba ; traducción Patricio Cifuentes Muñiz ... [et al.] ; revisión técnica Eugenio Hernández Rodríguez . 5ª ed., reimp. Madrid [etc.] : Addison-Wesley, 2005