



35509 - MATHEMATICS FUNDAMENTALS 2 (2018-19)

General

Code: 35509

Lecturer responsible:

VERDU MONLLOR, FERRAN JOSEP

Credits ECTS:	6
Theoretical credits:	1,2
Practical credits:	1,2
Distance-base hours:	3,6

Departments involved

- **Dept:** APPLIED MATHEMATICS
Area: APPLIED MATHEMATICS
Theoretical credits: 1,2
Practical credits: 1,2
 This Dept. is responsible for the course.
 This Dept. is responsible for the final mark record.

Study programmes where this course is taught

- DEGREE IN FUNDAMENTALS OF ARCHITECTURE
 Course type: CORE (Year: 1)

Competencies and objectives

Course context for academic year 2018-19

The subject Fundamentals of Mathematics 2 has been placed in the curriculum in the second semester of the first year because its knowledge constitute a tool for the better development of further subjects. We will do special emphasis on the most basic fundamentals for a technical development of the next areas of the degree.

Course content (verified by ANECA in official undergraduate and Master's degrees)

General Competences (CG)

- **CG-4** : Comprender los problemas de la concepción estructural, de construcción y de ingeniería vinculados con los proyectos de edificios así como las técnicas de resolución de estos.
- **CG-5** : Conocer los problemas físicos, las distintas tecnologías y la función de los edificios de forma que se dote a éstos de condiciones internas de comodidad y protección de los factores climáticos.

Basic Competences and Competences included under the Spanish Qualifications Framework for Higher Education (MECES)

- **CB 1** : Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio.
- **CB 2** : Que los estudiantes sepan aplicar sus conocimientos a su trabajo o vocación de una forma profesional y posean las competencias que suelen demostrarse por medio de la elaboración y defensa de argumentos y la resolución de problemas dentro de su área de estudio.
- **CB 4** : Que los estudiantes puedan transmitir información, ideas, problemas y soluciones a un público tanto especializado como no especializado.
- **CB 5** : Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía.

Inherent transversal competences:>>Cognitive Instrumental

- **CT-10** : Habilidad para el análisis y la síntesis. Habilidad para separar las partes de un proceso de indagación, y la habilidad para recomponer el todo a partir de unas partes.

UA Basic Transversal Competences

- **CT-6** : Capacidad de adaptarse a nuevos conceptos y métodos. Capacidad de aprender y aplicar, de forma autónoma e interdisciplinar, nuevos conceptos y métodos.

Inherent transversal competences:>>Technological Instrumental

- **CT-21** : Habilidad para la visión espacial. Habilidad para entender y asimilar un objeto, proceso o espacio con independencia de las visualizaciones previstas; así como la capacidad para generar otras nuevas.

Specific Competences:>>Preparatory Block

- **CE-11** : Conocimiento aplicado del cálculo numérico, la geometría analítica y diferencial y los métodos algebraicos.
- **CE-3** : Conocimiento adecuado y aplicado a la arquitectura y al urbanismo de los sistemas de representación espacial.
- **CE-5** : Conocimiento adecuado y aplicado a la arquitectura y al urbanismo de la geometría métrica y proyectiva.
- **CE-7** : Conocimiento adecuado y aplicado a la arquitectura y al urbanismo de los principios de la mecánica general, la estática, la geometría de masas y los campos vectoriales y tensoriales.

Exclusive skill taught in this course

No data

Learning outcomes (Training objectives)

No data

Specific objectives stated by the academic staff for academic year 2018-19

The contents of Fundamentals of Mathematics 2 are a useful tool for the better development and understanding of other disciplines. In addition they provide a basic training of mathematical elements which are necessary to the knowledge of the physical models. The first purpose of the subject is the study of the functions of several variables, therefore, to study the surfaces in The space from different points of view, including its graphic visualization with the application of the computational software. To do this, we begin by studying the fundamental elements of differential and integral calculus applied to the functions of several variables and their applications. The second objective is the study and application of differential equations as a tool for modeling phenomena, emphasizing the applications. We complement the subject, on the one hand, with the study of curves and surfaces and their representations, the analytical study of the quadric and, on the other, with an introduction to numerical approximation.

Content and bibliography

Content for academic year 2018-19

Topic 1: Scalar Fields and Vector Fields.

1. General concepts of functions of several variables.
2. Scalar Fields.
 - 2.1. Directional Derivatives.
 - 2.2. Partial Differentiation. The gradient.
 - 2.3. Differentiable scalar fields. The Chain Rule.
 - 2.4. Plane tangent and plan perpendicular to a surface.
3. Vector fields.
 - 3.1 Derivatives if a vector field.
 - 3.2. Differential of a vector field.
4. Rule of the chain and applications.

Topic 2: Curves and Surfaces.

1. Curves in the Euclidean plane.
 - 1.1. Parametrically defined curves.
2. Curves in the Euclidean space.
 - 2.1. Parametrically defined curves.
3. Surfaces in the Euclidean space.
 - 3.1 Parametrically defined surfaces.
4. Analytical study of cuádricas.

Topic 3: Optimization.

1. Maxima and minima in scalar fields.
2. Conditional optimization. Lagrange multipliers.

Topic 4: Multiple Integration.

1. Double integrals.
 - 1.1. Concept. Calculation.
 - 1.2. Double integral in Cylindrical Coodinates.
 - 1.3. Applications of double integral.
2. Triple integration.
 - 2.1. Calculation of the triple integral.
 - 2.2. Applications of triple integrals.
 - 2.3. Cylindrical and Spherical Coordinates.

Topic 5: Differential Equations.

1. General concepts of Differential Equations.
2. First Order Differential Equations.
3. Second Order Linear Equations.
 - 3.1 General concepts.
 - 3.2. Linear differential equations with constant coefficients.
 - 3.3. Applications of linear differential equations.
4. Introduction to differential equations in partial derivatives.

Unit 6: Introduction to Numerical Analysis.

1. Methods of obtaining root functions.
2. Methods of obtaining polynomial roots.
3. Interpolation.

Assessment

Assessment procedures and criteria 2018-19

50% of the grade is obtained in the final exam

30% of the grade is obtained in the partial exams

10% of the grade is obtained from the online questionnaires

10% of the grade is obtained from active participation in practice classes.

Description	Criteria	Type	Weighting system
Deliveries, tests and computer practices.	<p>Continuous assessment is established based on the performance by the students of some exercises, theoretical tests, practical tests and the delivery of computer practices and auxiliary materials throughout the development of the subject.</p> <p>Tests (Up to a maximum of 4 tests). Assessment 10% (proportional to the number of tests) NOT RECOVERABLE as it measures the progress of learning.</p> <p>Practicals: Assessment: 10% NOT RECOVERABLE because the practices are done in class.</p> <p>Partial Exam: nº Up to maximum of 2. RECOVERABLE in the extraordinary test (Not in the ordinary test) upon request of the student. Assessment 30% proportional to the number of tests.</p> <p>The overall assessment will be calculated with the weighted average with the percentages specified provided that a minimum of 4 points out of 10 is obtained in the final test. If the specified minimum is not obtained, the subject will be graded with a SUSPENSION.</p>	ACTIVITIES OF EVALUATION DURING THE SEMESTER	50

Problem Solving	The exam is evaluated on 10 points, assuming 50% of the final grade of the subject. The exam will consist of the realization of practical exercises and questions that correspond to the developed of the taught subject. Note: It will be necessary to have a minimum of four points out of ten in the note that results from the examination to make the average with the continuous assessment note.	FINAL TEST	50
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Official exam dates for academic year 2018-19

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C3) Periodo ordinario para asignaturas de segundo semestre y anuales	07/06/2019			Teoría
(C4) Pruebas extraordinarias para asignaturas de grado y máster	09/07/2019			Teoría

