

## MATHEMATICS FUNDAMENTALS 2

### 35509 - MATHEMATICS FUNDAMENTALS 2 (2024-25)

#### General

**Code:** 35509

**Lecturer responsible:**

BELDA PALAZON, SANTIAGO

**Credits ECTS:**

**6,00**

Theoretical credits:

1,20

Practical credits:

1,20

Distance-base hours:

3,60

#### 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 2024-25

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.

**General Competences (CG)**

- **CG.4** : Comprendre els problemes de la concepció estructural, de construcció i d'enginyeria vinculats als projectes d'edificis, a més de les tècniques de resolució d'aquests.
- **CG.5** : Conèixer els problemes físics, les diverses tecnologies i la funció dels edificis, per tal de dotar-los de condicions internes de comoditat i protecció dels factors climàtics.

**Skills/Skills**

- **CB 1** : Que els estudiants hagen demostrat posseir i comprendre coneixements en una àrea d'estudi que parteix de la base de l'educació secundària general i se sol trobar a un nivell que, si bé es basa en llibres de text avançats, inclou també alguns aspectes que impliquen coneixements procedents de l'avantguarda del seu camp d'estudi.
- **CB 2** : Que els estudiants sàpien aplicar els coneixements al seu treball o vocació d'una forma professional i posseïsquen les competències que solen demostrar-se per mitjà de l'elaboració i defensa d'arguments i la resolució de problemes dins de la seua àrea d'estudi.
- **CB 4** : Que els estudiants puguen transmetre informació, idees, problemes i solucions a un públic especialitzat o no especialitzat.
- **CB 5** : Que els estudiants hagen desenvolupat les habilitats d'aprenentatge necessàries per a emprendre estudis posteriors amb un alt grau d'autonomia.

**Inherent transversal**

**competences:>>Cognitive Instrumental**

- **CT.10** : Habilitat per a l'anàlisi i la síntesi. Habilitat per a separar les parts d'un procés d'indagació i habilitat per a recompondre el tot a partir d'unes parts.

**UA Basic Transversal Competences**

- **CT.6** : Capacitat d'adaptar-se a nous conceptes i mètodes. Capacitat d'aprendre i aplicar, autònomament i interdisciplinària, nous conceptes i mètodes.

**Inherent transversal**

**competences:>>Technological Instrumental**

- **CT.21** : Habilitat per a la visió espacial. Habilitat per a entendre i assimilar un objecte, un procés o un espai amb independència de les visualitzacions previstes, a més de la capacitat per a generar-ne de noves.

**Specific Competences:>>Preparatory Block**

- **CE.11** : Coneixement aplicat del càlcul numèric, la geometria analítica i diferencial i els mètodes algebraics.
- **CE.3** : Coneixement adequat i aplicat a l'arquitectura i l'urbanisme dels sistemes de representació espacial.
- **CE.5** : Coneixement adequat i aplicat a l'arquitectura i l'urbanisme de la geometria mètrica i projectiva.
- **CE.7** : Coneixement adequat i aplicat a l'arquitectura i l'urbanisme dels principis de la mecànica general, l'estàtica, la geometria de masses i els camps vectorials i tensorials.

**Exclusive skill taught in this course**

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No data

## Learning outcomes (Training objectives)

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No data

## Specific objectives stated by the academic staff for academic year 2024-25

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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 for academic year 2024-25

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#### 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.

### Related links

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No data

### Cálculo de varias variables

**Author(s):** BRADLEY, Gerald L. ; SMITH, Karl J.

**Issue:** Madrid : Prentice Hall, 1998;

**ISBN:** 84-89660-77-8

**Category:** Básico

### Ecuaciones diferenciales

**Author(s):** EDWARDS, C.Henry ; PENNEY, David E.

**Issue:** México, D.F. : Pearson, 2001;

**ISBN:** 968-444-438-9

**Category:** Básico

### Cálculo II Teoría y problemas de funciones de varias variables

**Author(s):** García López, Alfonsa

**Issue:** Madrid : Clagsa, 2002;

**ISBN:** 978-84-921847-5-0

**Category:** Complementario

### Cálculo 2 de varias variables

**Author(s):** Larson, Ron

**Issue:** México : McGraw Hill-Interamericana, 2010;

**ISBN:** 978-970-10-7134-2

**Category:** Básico

### Cálculo : varias variables

**Author(s):** Thomas, George B

**Issue:** Naucalpan de Juárez (México) : Addiso-Wesley, 2010;

**ISBN:** 978-607-32-0209-1

**Category:** Básico

### **Análisis matemático en ingeniería: problemas resueltos**

**Author(s):** VILLACAMPA ESTEVE, Yolanda; VIGO, I.; VIVES, F.

**Issue:** Alicante : Ramón Torres Gosálvez., 1997;

**ISBN:** 84-922775-3-X

**Category:** Básico

### **Ecuaciones diferenciales con aplicaciones de modelado, décima edición**

**Author(s):** ZILL, Dennis G.

**Issue:** México : Cengage Learning, 2015;

**ISBN:** 978-607-519-446-2

**Category:** Básico

### **Ecuaciones diferenciales**

**Author(s):** Campos Sancho, Beatriz

**Issue:** Castelló : Publicacions de la Universitat Jaume I,  
2011;

**ISBN:** 978-84-693-9777-0

**Category:** Complementario

### **Single and multivariable calculus : early transcendentals**

**Author(s):** Guichard, David

**Issue:** No disponible : No disponible, 2017;

**ISBN:** -

**Category:** Complementario

### **Single variable calculus**

**Author(s):** Guichard, David

**Issue:** University of Washington : Creative Commons  
License, 2017;

**ISBN:** -

**Category:** Complementario

**Apuntes de cálculo diferencial e integral de funciones de varias variables**

**Author(s):** Pérez Gonzáles, Francisco Javier

**Issue:** Granada : Departamento de Análisis Matemático  
Universidad de U. de Granada, 2016;

**ISBN:** -

**Category:** Complementario

**Active calculus, 2016 edition**

**Author(s):** Boelkins, Matthew

**Issue:** Allendale : Orthogonal Publishing L3C, 2016;

**ISBN:** 978-0-9898975-3-2 (libro e.)

**Category:** Complementario

## Assessment

### Assessment procedures and criteria 2024-25

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#### General system of Evaluation

The assessment is based on the following:

Passing criteria is annually revised taking into account the experience and results of previous years. The assessment is based on the following:

1. The general evaluation system does not provide for a final test, so the overall evaluation will be the result of the various activities organized for this purpose during the semester. These activities consist of the completion of theoretical-practical questionnaires, active assistance and the handing in of practice in computer classes and written tests.

2. The theoretical-practical questionnaires and written tests will be RECOVERABLE at the end of the ordinary and extraordinary period. The active attendance to practical computer classes and the practical computer exams will be NON RECOVERABLE.

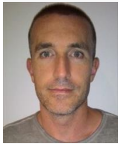
Description	Criteria	Type	Weighting system
Deliveries, tests and computer practices.	<p><b>Summary of the evaluation:</b>  80% of the total mark is obtained in the 2 partial exams.  10% of the total mark is obtained from the online theoretical-practical questionnaires.  10% of the total mark is obtained from active role in practice classes. (NOT RECOVERABLE)</p> <p><b>Continuous assessment.</b>  The continuous assessment is obtained from the realization of several exercises, theoretical tests, practical tests, as well as the assistance and the delivery of computer practices and auxiliary materials throughout the development of the subject.</p> <p>Theoretical and practical questionnaires: A maximum of 4 tests (TE). 10% of the total mark and proportional to the number of tests carried out during the semester.  Computer practice (PO): Attendance and delivery of computer practices. Assessment: 10% NOT RECOVERABLE because they are made in the practical classes.  Partial exam of knowledge (PARC): Two written exams will be carried out at the end of the ordinary and extraordinary periods. Both partial exams have the same value and they account for 80% of the total mark.</p> <p><b>Overall evaluation (EG):</b>  The final mark of the course, (EG), is obtained from the continuous evaluation during the semester and it can be calculated as:</p> $EG=10\%PO+10\%TE+40\%PARC1+40\%PARC2$ <p>If the final mark of the evaluation in the semester is equal or higher than 5, it is not necessary to make the final exam.  If the final mark of the evaluation in the semester is less than 5, it is mandatory to make a final exam of the entire course content. The exam questions will include the recovery of the tests and the partial exams. We call it FINAL EXAM. The evaluation is calculated as:</p> $EG=10\%PO+90\% \text{ (FINAL EXAM)}$ <p>The same evaluation will be applied to the extraordinary call</p>	ACTIVITIES OF EVALUATION DURING THE SEMESTER	100



## Official exam dates for academic year 2024-25

Exam session	Date	Time	Group - Classroom(s) allocated	Comments
(C3) Periodo ordinario para asignaturas de segundo semestre y anuales	29/05/2025			Teoría
(C4) Pruebas extraordinarias para asignaturas de grado y máster	09/07/2025			Teoría

## Academic staff



**BELDA PALAZON, SANTIAGO**  
Lecturer responsible

THEORY CLASS: Groups: 1 , 2 , 3



**BELMONTE REQUENA, MONICA**

COMPUTER PRACTICALS: Groups: 2



**MARTINEZ BELDA, MARIA DEL CARMEN**

COMPUTER PRACTICALS: Groups: 2



**NAVARRO GONZALEZ, FRANCISCO JOSE**

COMPUTER PRACTICALS: Groups: 5



**ROJAS RUIZ, JAVIER GABRIEL**

COMPUTER PRACTICALS: Groups: 4 , 6 , 7



**VARGAS ALEMAÑY, JUAN ADRIAN**

COMPUTER PRACTICALS: Groups: 1 , 3 , 8

## Groups

### THEORY CLASS




Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 1 (THEORY CLASS) : 1 (ARA)	2S	Afternoon	English	23	▪ Allowed DEGREE IN FUNDAMENTALS OF ARCHITECTURE
Gr. 2 (THEORY CLASS) : 2	2S	Morning	Spanish	85	
Gr. 3 (THEORY CLASS) : 3	2S	Afternoon	Spanish	81	▪ Allowed DEGREE IN FUNDAMENTALS OF ARCHITECTURE

### COMPUTER PRACTICALS








Group	Semester	Morning or afternoon session	Language	No. of enrolled students	
Gr. 1 (COMPUTER PRACTICALS) : 1 (ARA)	2S	Afternoon	English	23	▪ Allowed DEGREE IN FUNDAMENTALS OF ARCHITECTURE
Gr. 2 (COMPUTER PRACTICALS) : 2	2S	Morning	Spanish	24	
Gr. 3 (COMPUTER PRACTICALS) : 3	2S	Morning	Spanish	22	
Gr. 4 (COMPUTER PRACTICALS) : 4	2S	Morning	Spanish	18	
Gr. 5 (COMPUTER PRACTICALS) : 5	2S	Morning	Spanish	21	
Gr. 6 (COMPUTER PRACTICALS) : 6	2S	Morning	Spanish	26	
Gr. 7 (COMPUTER PRACTICALS) : 7	2S	Afternoon	Spanish	29	
Gr. 8 (COMPUTER PRACTICALS) : 8	2S	Morning	Spanish	26	

## Timetables

### THEORY CLASS

Group	Start date	End date	Day	Start time	End time	Lecture room
1	27/01/2025	23/05/2025	JUE	15:00	17:00	<a href="#">0039PS014</a> 
2	27/01/2025	23/05/2025	JUE	09:00	11:00	<a href="#">EP/S-02M</a> 
3	27/01/2025	23/05/2025	JUE	17:00	19:00	<a href="#">EP/S-02M</a> 

### COMPUTER PRACTICALS

Group	Start date	End date	Day	Start time	End time	Lecture room
1	27/01/2025	23/05/2025	MAR	15:00	17:00	<a href="#">0039PB013</a> 
2	27/01/2025	23/05/2025	MAR	09:00	11:00	<a href="#">0039PB052</a> 
3	27/01/2025	23/05/2025	MAR	09:00	11:00	<a href="#">A3/INF1</a> 
4	27/01/2025	23/05/2025	MAR	11:00	13:00	<a href="#">0039PB052</a> 
5	27/01/2025	23/05/2025	MAR	11:00	13:00	<a href="#">A3/INF1</a> 
6	27/01/2025	23/05/2025	MAR	13:00	15:00	<a href="#">0039PB052</a> 
7	27/01/2025	23/05/2025	MAR	15:00	17:00	<a href="#">0039PB052</a> 
8	27/01/2025	23/05/2025	MAR	13:00	15:00	<a href="#">A3/INF1</a> 