

## COURSE DESCRIPTION

### COURSE DETAILS

Title (of the course): **DIDÁCTICA DE LAS OPERACIONES NUMÉRICAS Y LA MEDIDA**

Code: 100816

Degree/Master: **GRADO DE EDUCACIÓN PRIMARIA**

Year: 2

Name of the module to which it belongs: ENSEÑANZA Y APRENDIZAJE DE LAS MATEMÁTICAS

Field: DIDÁCTICA DE LAS OPERACIONES NUMÉRICAS Y LA MEDIDA

Character: OBLIGATORIA

Duration: SECOND TERM

ECTS Credits: 6.0

Classroom hours: 60

Face-to-face classroom percentage: 40.0%

Study hours: 90

Online platform: Sí

### LECTURER INFORMATION

Name: ADAMUZ POVEDANO, NATIVIDAD (Coordinator)

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Name: MARTÍNEZ JIMÉNEZ, ENRIQUE

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### PREREQUISITES AND RECOMMENDATIONS

#### Prerequisites established in the study plan

None

#### Recommendations

This course will focus on the teaching and learning processes related to the contents Natural and Rational Numbers, Integers, and Measuring. For that reason, students should have achieved an appropriate level of content knowledge of Mathematics in their pre-university studies and during their previous university studies.

To ensure a successful performance in this subject students should work on a regular basis throughout the semester.

## COURSE DESCRIPTION

### INTENDED LEARNING OUTCOMES

CB2	Students must know how to apply their knowledge to their job or vocation in a professional manner and they must possess the competencies which are usually demonstrated by means of the elaboration and defense of arguments and the solution of problems in their field of study.
CB3	Students have the ability to gather and interpret relevant data (usually within their field of study) to inform judgements that include reflection on relevant social, scientific or ethical issues.
CB4	Students can communicate information, ideas, problems and solutions to specialist and non-specialist audiences.
CB5	Students must develop those necessary learning abilities to undertake subsequent studies with a high degree of autonomy.
CU2	To know and improve the user level in the field of ICT.
CE1	Knowledge of the curricular areas of primary education, the interdisciplinary relationship between them, evaluation criteria and the body of knowledge on teaching methods regarding procedures.
CE10	Reflect on classroom practices to innovate and improve teaching. Acquire habits and skills for independent and cooperative learning and foster them in students.
CE11	Knowledge of and ability to apply information and communication technologies in the classroom. Ability to selectively distinguish audiovisual information that contributes to learning, civic education and cultural wealth.
CM6.6	To develop and evaluate curriculum contents through appropriate didactic resources and promote the acquisition of relevant competences among students (in musical, Visual Arts Education).

### OBJECTIVES

- O1. Consolidate the mathematical training necessary to master the basic mathematical concepts that make up the Primary Education curriculum, referring to the thematic blocks of numbers and operations, and magnitudes and measurements.
- O2. To provide knowledge of the fundamentals of mathematical education in Primary Education.
- O3. Develop the ability to analyse and evaluate the curricular content of the activities and exercises that appear in Primary Mathematics textbooks.
- O4. Know the teaching and learning processes associated with the transmission of knowledge of numbers and operations, magnitudes and measurements, and the errors and difficulties that may arise.
- O5. Develop the ability to organise the curricular contents, define the assessment methods associated with the educational processes linked to knowledge of numbers and operations, and magnitudes and measurements in Primary Education.
- O6. Know resources and materials of didactic use for the teaching and learning of numerical operations and measurement, and develop the ability to use technological resources in these teaching and learning processes.
- O7. To guide and encourage contact processes and the exchange and transfer of knowledge between our students and mathematics teachers in primary schools.
- O8. To promote and highlight the role of women in science, and more specifically in the area of Mathematics.

### CONTENT

#### 1. Theory contents

##### CHAPTER 1. PROBLEM SOLVING (Cross-cutting)

- 1.1. Methodologies for problem solving.
- 1.2. Problem-solving in the primary classroom. Situations and contexts. Resources and materials
- 1.3. Use of ICT in problem-solving.

##### CHAPTER 2. THE CHALLENGE OF CONSTRUCTING MATHEMATICAL LEARNING



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2.1. Legal framework for Primary Education in Andalusia.

2.2. International legal frameworks

2.3. Learning and Teaching Mathematics today

### CHAPTER 3. DIDACTICS OF NATURAL NUMBERS

3.1. Introduction to the idea of the number

3.2. Resources and materials in the learning and teaching of the Decimal Numeration System

3.3. Traditional calculation algorithms vs. current numerical operations

### CHAPTER 4. DIDACTICS OF RATIONAL NUMBERS

4.1. Meanings and representations of rational numbers

4.2. Resources and materials in the learning and teaching of rational numbers

### CHAPTER 5. DIDACTICS OF THE INTEGERS

5.1. Meanings of integers. Situations and contexts

5.2. Resources and materials in the learning and teaching of integers

### CHAPTER 6. DIDACTICS OF MEASUREMENT

6.1. Conceptual structure of the notions of magnitude and measurement

6.2. Progression in the teaching-learning of measurement

6.3 Resources and materials in the learning and teaching of measurement

## 2. Practical contents

Those related to methodological alternatives and the use of didactic resources related to theoretical contents.

## SUSTAINABLE DEVELOPMENT GOALS RELATED TO THE CONTENT

Quality education

Gender equality

## METHODOLOGY

### General clarifications on the methodology (optional)

The design of the course is based on a regular student-teacher interaction.

The Virtual Classroom of the UCO and other electronic resources will be used for the development of the course.

The use of manipulative and virtual resources will also be encouraged.

The teachers will present and develop the topics of the program, as well as the relevant activities for a better understanding of the contents covered. Additionally, proactive and interested participation of the students will be expected.

In the practical sessions, work in small groups with manipulative or virtual resources will be encouraged. The teacher will present the activity providing a script, guide the work, and attend to any doubts that may arise.

### Methodological adaptations for part-time students and students with disabilities and special educational needs

The person in charge of the subject may establish the monitoring mechanisms that he/she considers appropriate in relation to students enrolled part-time.

In the case of students with special educational needs, the recommendations are given by the Inclusive Education Unit (UNEI) will be followed.

## COURSE DESCRIPTION

### Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	4	-	4
<i>Debates</i>	5	2.5	7.5
<i>Group work (cooperative )</i>	10	5	15
<i>Lectures</i>	20	-	20
<i>Speaking Activities</i>	3	2.5	5.5
<i>Writing Activities</i>	3	5	8
<b>Total hours:</b>	<b>45</b>	<b>15.0</b>	<b>60.0</b>

### Off-site activities

Activity	Total
<i>Activities</i>	20
<i>Exercises</i>	10
<i>Group work</i>	10
<i>Self-study</i>	50
<b>Total hours</b>	<b>90</b>

## WORK MATERIALS FOR STUDENTS

Dossier  
Exercises and activities  
Oral presentations  
Placement booklet  
References

## EVALUATION

Intended learning	Exams	Log	Placement reports	Problem solving
CB2	X	X	X	X
CB3		X	X	X
CB4	X	X	X	
CB5		X	X	X

## COURSE DESCRIPTION

Intended learning	Exams	Log	Placement reports	Problem solving
CE1	X	X	X	
CE10		X	X	X
CE11		X	X	X
CM6.6	X	X	X	
CU2		X	X	X
<b>Total (100%)</b>	<b>50%</b>	<b>10%</b>	<b>30%</b>	<b>10%</b>
<b>Minimum grade</b>	<b>5</b>	<b>0</b>	<b>5</b>	<b>5</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

### Attendance will be assessed?:

No

### General clarifications on instruments for evaluation:

Practical activities are compulsory and face-to-face. Unexcused absence from 20% of the practical activities will mean failing this part of the course.

In order to pass the subject, it will be necessary to obtain a grade equal to or higher than the minimum mark indicated in each evaluation instrument. The final mark in the subject will be the mean of the marks of each instrument.

In the event that a student does not achieve the minimum mark in any of these instruments, the marks of the assessment instruments passed will be kept until the first extraordinary exam of the following year.

The practical activities will be assessed by means of a written test or the submission of specific work indicated by the lecturers during the teaching period in which the subject is taught.

The section "Problem solving" will be evaluated by means of a written test, consisting of solving and analysing some problems taken from official Mathematics textbooks for Primary Education, using the curricular resources of the area (basic knowledge, notions, and skills) appropriate to the educational level that corresponds to each exercise. This test will take place before the end of the school term.

The person in charge of the subject may establish the adaptations that he/she considers appropriate in relation to second or successive enrolments.

### Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

The person in charge of the subject may establish the adaptations he/she considers appropriate in relation to students enrolled part-time.

In the case of students with special educational needs, the recommendations are given by the Inclusive Education Unit (UNEI) will be followed.

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### Clarifications on the evaluation of the first extraordinary call and extra-ordinary call for completion studies:

The marks of the assessment instruments passed in any of the previous academic year's examinations will be kept.

### Qualifying criteria for obtaining honors:

Defined in the Academic Regulations of the University of Cordoba.

## BIBLIOGRAPHY

### 1. Basic Bibliography

Blanco Nieto, L. J., Cárdenas Lizarazo, J. A., & Caballero Carrasco, A. (2015). *La resolución de problemas de Matemáticas en la formación inicial de profesores de Primaria*. Investigación en Educación Matemática XIX. [https://doi.org/10.1016/S0944-7113\(11\)80011-5](https://doi.org/10.1016/S0944-7113(11)80011-5)

Chamorro, M. del C., & Belmonte, J. M. (1996). *El problema de la medida. Didáctica de las magnitudes lineales*. Madrid: Editorial Síntesis.

Chamorro, M. C., Belmonte, J. M., Ruiz, M. L., & Vecino, F. (2005). *Didáctica de las matemáticas para Educación Infantil*. (M. C. Chamorro, Ed.). Madrid: Pearson Educación.

Echenique, I. (2006). *Matemáticas resolución de problemas*. Gobierno de Navarra.

Flores, P., & Rico, L. (2015). *Enseñanza y aprendizaje de las matemáticas en Educación Primaria*. Madrid: Pirámide.

García-Pérez, T., & Adamuz-Povedano, N. (2019). *Del número al sentido numérico y de las cuentas al cálculo táctico*. Barcelona: Octaedro.

Haylock, D. (2010). *Mathematics Explained for primary teachers* (4th ed.). Sage Publications Ltd.

Kennedy, L., Tipps, S., & Johnson, A. (2007). *Guiding children's learning of mathematics*. Cengage Learning.

Martínez Montero, J., Sánchez Cortés, C., & De la Rosa, J. M. (2020). *Enseñar matemáticas con el método ABN*. Wolters Kluwer.

Van de Walle, J. A. (2019). *Elementary and middle school mathematics: Teaching developmentally* (Tenth ed.). Pearson.

## COURSE DESCRIPTION

### 2. Further reading

- Adamuz-Povedano, N., Fernández-Ahumada, E., García-Pérez, M. T., & Montejo-Gámez, J. (2021). Developing Number Sense: An Approach to Initiate Algebraic Thinking in Primary Education. *Mathematics*, 9(5), 518. <https://doi.org/10.3390/math9050518>
- Albanese, V., Adamuz-Povedano, N., & Bracho-López, R. (2015). Algoritmos alternativos y cálculo mental en las comunidades gitanas. In M. I. Amor, J. L. Luengo, & M. Martínez (Eds.), *Educación Intercultural: metodología de aprendizaje en contextos bilingües* (pp. 55-59). Granada: Atrio.
- Dehaene, S. (1997). *The number sense*. New York: Oxford University Press.
- Dehaene, S. (2016). *El cerebro matemático*. Buenos Aires: Siglo XXI editores.
- Molina Ayuso, Á., Adamuz Povedano, N., & Bracho López, R. (2020). La resolución de problemas basada en el método de Polya usando el pensamiento computacional y Scratch con estudiantes de Educación Secundaria. *Aula Abierta*, 49(1), 83-90. <https://doi.org/10.17811/rifie.49.1.2020.83-90>
- Montoro, V., Cifuentes, M., Salva, N., & Bianchi, M. J. (2017). Students' understanding of the number line / Estudiantes pensando en la recta numérica. *Infancia y Aprendizaje*, 40(2), 302-342. <https://doi.org/10.1080/02103702.2017.1304879>
- Resnick, M., Maloney, J., Rusk, N., Eastmond, E., Brennan, K., Millner, A., Rosenbaum, E., Silver, J., Silverman, B., & Kafai, Y. (2009). Scratch: Programing for all. *Communication of the ACM*, 52(11), 62-67. <https://doi.org/10.1145/1592761.1592779>
- Rico, L., Lupiañez, J. L., & Molina, M. (2013). *Análisis Didáctica en Educación Matemática*. Granada: Comares.
- Socas, M. (2011). Aprendizaje y enseñanza de las Matemáticas en Educación Primaria. *Buenas Prácticas. Educatio Siglo XXI*, 29 (2), 199-224.
- Sowder, J. (1992). Estimation and number sense. In D. A. Grouws (Ed.), *Handbook of Research in Mathematics Teaching and Learning* (pp. 371-389). New York: Macmillan Publishing Co.
- Wing, J. (2006). Computational Thinking. *Communication of the ACM*, 49(3), 33-35.

## COORDINATION CRITERIA

Common evaluation criteria  
Common learning outcomes  
Joint activities: lectures, seminars, visits ...  
Tasks deadlines

## SCHEDULE

Period	Assessment activities	Debates	Group work (cooperative)	Lectures	Speaking Activities	Writing Activities
1# Fortnight	0,0	1,0	2,0	3,0	0,5	1,5
2# Fortnight	0,0	1,0	2,5	3,0	1,0	1,0
3# Fortnight	0,0	1,0	2,0	3,0	1,0	1,0
4# Fortnight	0,0	1,0	2,0	3,0	0,5	1,5
5# Fortnight	0,0	1,5	2,5	3,0	1,0	1,0
6# Fortnight	0,0	1,0	2,0	3,0	1,0	1,0
7# Fortnight	4,0	1,0	2,0	2,0	0,5	1,0



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## COURSE DESCRIPTION

Period	Assessment activities	Debates	Group work (cooperative )	Lectures	Speaking Activities	Writing Activities
<b>Total hours:</b>	<b>4,0</b>	<b>7,5</b>	<b>15,0</b>	<b>20,0</b>	<b>5,5</b>	<b>8,0</b>

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.

## CONTINGENCY PLAN: CASE SCENARIO A

Case scenario A will correspond to a diminished on-site academic activity due to social distancing measures affecting the permitted capacity of classrooms.

## METHODOLOGY

### General clarifications on the methodology on case scenario A

A multimodal (hybrid) teaching system will be adopted, combining both on-site and remote classes via videoconference (synchronous) that will be held in the timetable approved by the corresponding Faculty or School. The time distribution of teaching activities (both on-site and remote) will be decided by the aforementioned Faculties and Schools bearing in mind the permitted capacity of classrooms and social distancing measures as established at that time.

The design of the course is based on a regular student-teacher interaction.

The Virtual Classroom of the UCO and other electronic resources will be used for the development of the course.

The use of manipulative and virtual resources will also be encouraged.

The teachers will present and develop the topics of the program, as well as the relevant activities for a better understanding of the contents covered. Additionally, proactive and interested participation of the students will be expected.

In the practical sessions, work in small groups with manipulative or virtual resources will be encouraged. The teacher will present the activity providing a script, guide the work, and attend to any doubts that may arise.



## COURSE DESCRIPTION

## EVALUATION

Intended learning	Exams	Log	Placement reports	Problem solving
CB2	X	X	X	X
CB3		X	X	X
CB4	X	X	X	
CB5		X	X	X
CE1	X	X	X	
CE10		X	X	X
CE11		X	X	X
CM6.6	X	X	X	
CU2		X	X	X
<b>Total (100%)</b>	<b>50%</b>	<b>10%</b>	<b>30%</b>	<b>10%</b>
<b>Minimum grade</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>4</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

**Attendance will be assessed (Scenario A)?:**

No

**General clarifications on instruments for evaluation (Scenario A):**

Practical activities are compulsory and face-to-face. Unexcused absence from 20% of the practical activities will mean failing this part of the course.

In order to pass the subject, it will be necessary to obtain a grade equal to or higher than the minimum mark indicated in each evaluation instrument. The final mark in the subject will be the mean of the marks of each instrument.

In the event that a student does not achieve the minimum mark in any of these instruments, the marks of the assessment instruments passed will be kept until the first extraordinary exam of the following year.

The practical activities will be assessed by means of a written test or the submission of specific work indicated by the lecturers during the teaching period in which the subject is taught.

The section "Problem solving" will be evaluated by means of a written test, consisting of solving and analysing some problems taken from official Mathematics textbooks for Primary Education, using the curricular resources of the area (basic knowledge, notions, and skills) appropriate to the educational level that corresponds to each exercise. This test will take place before the end of the school term.

The person in charge of the subject may establish the adaptations that he/she considers appropriate in relation to second or successive enrolments.

## COURSE DESCRIPTION

### **Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario A):**

The person in charge of the subject may establish the adaptations he/she considers appropriate in relation to students enrolled part-time.

In the case of students with special educational needs, the recommendations are given by the Inclusive Education Unit (UNEI) will be followed.

## CONTINGENCY PLAN: CASE SCENARIO B

Case scenario B will bring about a suspension of all on-site academic activities as a consequence of health measures.

## METHODOLOGY

### **General clarifications on the methodology on case scenario B**

On-site teaching activities will be held via videoconference (synchronous) in the timetable approved by the corresponding Faculty or School. Alternative activities will be proposed for reduced groups in order to guarantee the acquisition of course competences.

The design of the course is based on a regular student-teacher interaction.

The Virtual Classroom of the UCO and other electronic resources will be used for the development of the course.

The use of manipulative and virtual resources will also be encouraged.

The teachers will present and develop the topics of the program, as well as the relevant activities for a better understanding of the contents covered. Additionally, proactive and interested participation of the students will be expected.

In the practical sessions, work in small groups with manipulative or virtual resources will be encouraged. The teacher will present the activity providing a script, guide the work, and attend to any doubts that may arise.

## COURSE DESCRIPTION

## EVALUATION

Intended learnig	Exams	Log	Placement reports	Problem solving
CB2	X	X	X	X
CB3		X	X	X
CB4	X	X	X	
CB5		X	X	X
CE1	X	X	X	
CE10		X	X	X
CE11		X	X	X
CM6.6	X	X	X	
CU2		X	X	X
<b>Total (100%)</b>	<b>50%</b>	<b>10%</b>	<b>30%</b>	<b>10%</b>
<b>Minimum grade</b>	<b>4</b>	<b>0</b>	<b>4</b>	<b>4</b>

(\*)Minimum mark (out of 10) needed for the assessment tool to be weighted in the course final mark. In any case, final mark must be 5,0 or higher to pass the course.

Moodle Tools	Exams	Log	Placement reports	Problem solving
Assessment rubric	X			X
Attendance		X	X	
Forum		X	X	X
Participation		X	X	
Questionnaire	X	X		
Surveys and predefined surveys	X			X
Synchronous tests via videoconference	X			X
Task	X			X
Videoconference	X	X	X	X
Workshops			X	

**Attendance will be assessed (Scenario B)?:**

No

## COURSE DESCRIPTION

### General clarifications on instruments for evaluation (Scenario B):

Practical activities are compulsory and face-to-face. Unexcused absence from 20% of the practical activities will mean failing this part of the course.

In order to pass the subject, it will be necessary to obtain a grade equal to or higher than the minimum mark indicated in each evaluation instrument. The final mark in the subject will be the mean of the marks of each instrument.

In the event that a student does not achieve the minimum mark in any of these instruments, the marks of the assessment instruments passed will be kept until the first extraordinary exam of the following year.

The practical activities will be assessed by means of a written test or the submission of specific work indicated by the lecturers during the teaching period in which the subject is taught.

The section "Problem solving" will be evaluated by means of a written test, consisting of solving and analysing some problems taken from official Mathematics textbooks for Primary Education, using the curricular resources of the area (basic knowledge, notions, and skills) appropriate to the educational level that corresponds to each exercise. This test will take place before the end of the school term.

The person in charge of the subject may establish the adaptations that he/she considers appropriate in relation to second or successive enrolments.

### Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario B):

The person in charge of the subject may establish the adaptations he/she considers appropriate in relation to students enrolled part-time.

In the case of students with special educational needs, the recommendations are given by the Inclusive Education Unit (UNEI) will be followed.