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: MARTÍNEZ JIMÉNEZ, ENRIQUE (Coordinator)
Department: MATEMÁTICAS
Area: DIDÁCTICA DE LA MATEMÁTICA
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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.

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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 appropiate 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 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

Unit 1. THE CHALLENGE OF CONSTRUCTING MATHEMATICAL KNOWLEDGE
1.1 Legal Framework for Primary Education in Spain and Andalusia
1.2 International legal frameworks
1.3 Learning and teaching mathematics today
1.4 Mathematical Sense

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1.5 Problem Solving

Unit 2. DIDACTICS OF NATURAL NUMBERS
2.1 Concept of number sense
2.2 Uses and Contexts of Natural Numbers
2.3 Ordinal and cardinal number notions
2.4 Learning the verbal sequence
2.5 Principles of Counting
2.6 Resources and materials in the learning and teaching of the Decimal Numeration System

Unit 3. TEACHING THE OPERATIONS ON THE SET OF NATURAL NUMBERS
3.1 Concepts of basic operations (addition, subtraction, multiplication and division)
3.2 Strategies of operations prior to the teaching of algorithms
3.3 Numerical facts
3.4 Traditional calculation algorithms
3.5 Transparent calculation algorithms

Unit 4. RATIONAL AND INTEGERS TEACHING
4.1 Concept of rational number
4.2 Meanings and representations of rational numbers (fractions, decimals and percentages)
4.3 Resources and materials in the learning and teaching of rational numbers
4.4 Concept of Whole Number
4.5 Historical context of integers
4.6 Situations and contexts of integers
4.7 Models of teaching integers

Unit 5. MEASUREMENT TEACHING
5.1 Measurement sense.
5.2 Concepts of magnitude, measurement and unit of measurement
5.3 Development of the concepts of magnitude, measure and unit of measurement
5.4 Estimation and use of measurement instruments
5.5 Didactic treatment 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.

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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.

Face-to-face activities

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

Off-site activities

Activity	Total
Activities	20
Exercises	10
Group work	10
Self-study	50
Total hours	***90***

WORK MATERIALS FOR STUDENTS

Dossier
Exercises and activities
Oral presentations
Placement booklet
References

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EVALUATION

Intended learning	Exams	Log	Practice Book	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
Total (100%)	***50%***	***10%***	***30%***	***10%***
Minimum grade	***5***	***0***	***5***	***5***

(*)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:

Practice book: This consists of the submission of the specific work indicated by the lecturers during the teaching period in which the subject is taught.

Log (Active participation): This includes significant student activity in class and forums, complementary problem solving and any other activity that is proposed for the development of the competences to be acquired.

Exams: Written test of the ordinary and extraordinary calls of the subject.

Problem solving: Written test, consisting of solving and analysing problems taken from official Primary Mathematics textbooks, using the curricular resources of the area (basic knowledge, notions and skills) appropriate to the educational level corresponding to each exercise. This test will take place before the end of the school term.

Activities in medium-sized groups (practices): these are compulsory and face-to-face. Unjustified absence from 20% of the medium-sized group activities will result in failing this part of the course.

In order to pass the course, it will be necessary to obtain a grade equal to the minimum mark indicated in each evaluation instrument. As well as demonstrating a good level of linguistic and communicative competence. Lack of accuracy in the production of oral or written texts may have a negative impact on the final grade.

In the case 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 log (active participation), the practical book and problem solving constitute the continuous assessment of the subject. The log (active participation) cannot be recovered.

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The person in charge of the subject may establish the adaptations that he/she considers appropriate in relation to students of 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.

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

The marks of the assessment instruments passed in any of the official calls of the current academic year 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

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.

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.

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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. Comunication 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.
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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	2,0	0,5	1,5
2# Fortnight	0,0	1,0	2,0	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	2,0	3,0	1,0	1,0
6# Fortnight	0,0	1,0	2,0	3,0	1,0	1,0
7# Fortnight	2,0	1,0	2,0	2,0	0,5	1,0
8# Fortnight	2,0	0,0	1,0	1,0	0,0	0,0
Total hours:	***4,0***	***7,5***	***15,0***	***20,0***	***5,5***	***8,0***

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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.