TEACHING GUIDE

Didactics of mathematics in the Primary Education II: Building the mathematical language, magnitudes, measurements and processing of information, chance and probability

COURSE OUTLINE		
Name of the subject: Didactics of mathematics in the Primary Education II: Building the mathematical language, magnitudes, measurements and processing of information, chance and probability/ Didactics of Mathematics in Primary Education II		
Module: Teaching and learning mathematics		
Code number: 202110213		**Curriculum year:** 2010
Type: Compulsory		**Academic course:** 2021-22
ECTS Credits: 6	**Course:** 3rd	**Semester:** 1st
Language of clases: Theoretical lessons in Spanish and practical lessons in English		

TEACHING STAFF INFORMATION		
Coordinator: Nuria Climent Rodríguez		
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Office hours first semester: Monday 11.00-14.30; wednesday 13.30-14.30; thursday 17.30-19.00

Monday	Tuesday	Wednesday	Thursday	Friday
11.00-14.30		13.30-14.30		
				17.30-19.00

Office hours second semester: To be decided

Monday	Tuesday	Wednesday	Thursday	Friday

CLASSES HOURS

Monday	Tuesday	Wednesday	Thursday	Friday
9.00-11.00		12.30-14.30		

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Monday	Tuesday	Wednesday	Thursday	Friday
		9.30-12:30		11.00-14.00

Office hours second semester: To be decided

Monday	Tuesday	Wednesday	Thursday	Friday

CLASSES HOURS

Monday	Tuesday	Wednesday	Thursday	Friday
9.00-11.00		12.30-14.30		

SUBJECT DESCRIPTION

PRE-REQUISITES AND RECOMENDATIONS:

None

Basic competences

CB1. Learn to learn.

CB2. Solve problems effectively.

CB3. Apply critical, logical and creative thinking.

CB4. Work autonomously with initiative.

CB5. Work collaboratively.

CB7. Communicate effectively in a work environment.

CB8. Ability to develop coherent and logically organized speeches.

CB9. Ability to present the ideas developed, orally and in writing.

CB11. Ability to understand the different audiovisual and multimedia codes and use of computer tools.

CB12. Ability to select, analyze, evaluate and use different resources on the Internet and multimedia.

CB14. Ability to work in a cooperative team, to organize and plan work, making decisions and solving problems, both jointly and individually.

CB15. Ability to use various sources of information, select, analyze, synthesize and extract important ideas and manage information.

CB16. Critical and creative ability in the analysis, planning and performance of tasks, as a result of flexible and divergent thinking.

CB17. Ability to analyze and self-evaluate both one's own work and group work.

Transversal competences

TC1. Be completely fluent in English, mastering the different styles and the specific languages required to develop and communicate the acquired knowledge in the scientific and academic environment.

TC2. Develop a critical attitude, being able to analyse and synthesize.

TC3. Develop an attitude of inquiry that permanently enables to review and deepen in the knowledge.

TC4. Acquire Computer and Information Skills (CI2) and apply them working.

TC5. Master strategies for active job search and entrepreneurship.

TC6. To promote, respect and safeguard human rights, democratic values, social equality and environmental sustainability, without discrimination on the basis of birth, race, sex, religion, opinion or other personal or social circumstances.

Specific competences

S.4. Identifying learning difficulties and negotiating strategies to overcome them.

S.5. Awareness of current developments in learning competences.

S.13. Promoting cooperation and individual work and effort.

S.16. Designing, planning and evaluating teaching and learning.

S.19. Awareness and application of research methodology in education; designing projects for innovation, and designing indicators for evaluation.

S.30. Development and evaluation of curricular elements, using appropriate resources and encouraging the acquisition of basic competences in the students.

S.37. Acquisition of basic mathematical competences (numerical, calculus, geometric, spatial representation, estimate and measure, organising and interpreting data etc.).

S.38. Awareness of mathematics curriculum. Analysing, explaining and communicating mathematical items.

S.39. Recognition of the central role played by mathematics in scientific thinking. S.49. Designing problems relating to everyday experience, and finding solutions.

S.40. Value the relationship between mathematics and sciences as a one of the pillars of the scientific thought.

LEARNING OUTCOMES:

O1. Learn and reflect on what is stated in the official proposals regarding the teaching of mathematics in primary education.
O2. Get into the processes of making mathematical conjectures and their proof.
O3. Acquire notions that allow to interpret learning situations of the mathematical contents in primary education.
O4. Critically analyse materials and resources for teaching mathematical contents in primary education, with special attention to ICT resources.
O5. Design materials and activities for teaching mathematical contents in primary education.
O6. Formulate and solve mathematical problems in primary education, reflecting on the strategies, or related heuristics.
O7. Know the mathematical competences and their relationships with the basic's competences in the primary education curriculum.
O8. Rethink the vision of the mathematics in the school, contrasting it with a dynamic vision of it and its teaching and learning.

TEACHING METHODOLOGY

EDUCATIONAL ACTIVITIES

Both individually and in groups, for further class discussion, students will analyse the contents, activities, assignments and problems concerning the respective mathematical contents in textbooks of Primary Education. Likewise, they will analyse different resources, discussing their potentialities and limitations, develop didactical proposals in order to deal with the contents, analyse obstacles, learning difficulties and learning failures in theses contents in the primary education and analyse in depth the contents in primary education.

Concerning the continuous evaluation model, the students will carry out a guided group work to prepare a didactic proposal for primary education lessons, including the discussion or analysis of the treatment of the contents in the textbooks, the analysis of the potentialities and limitations of the resources mentioned above, and deepening of the mathematical content broached.

Learning and teaching activities	Hours	Presence percentage
Lecture hours (Large group)	33	100%
Supervised practical workshop (Small group)	12	100%
Independent learning hours (Self-directed or guided assignments)	105	0%
Other	0	

Theory sessions	x	Practical sessions	x
Seminars and discussion	x	Groupwork	x
Obligatory reading	x	Case studies, practical instances	x
Role-playing		Visits and trips	
Specialised tutorials	x	Research projects	

CONTENTS

BLOCK I BUILDING THE MATHEMATICAL LANGUAGE IN PRIMARY EDUCATION (1 ECTS)

Unit 1: Semiotics

1.1 The use of signs and symbols in mathematical communication in PE

1.2 The meaning mediated by the significant

1.3 The role of language in the development of mathematical concepts and procedures and in the ability to solve problems.

Unit 2: Argumentation

2.1 The meaning of show, check, argue, demonstrate and test
2.2 The different degrees of argumentation and the test (formal, informal and informal with formal aspects)
2.3 The argumentation and the test in PE

BLOCK 2: MAGNITUDES AND MEASUREMENT (2 ECTS)

Unit 3: Measurement of magnitudes: length, surface, capacity, volume, mass, time and monetary system

3.1. Magnitude and measure. Measure as function.
3.2. Perception of quality. Quality comparison. Concept of quantity and order of magnitude. The necessity of the measure.
3.3. Direct and indirect measurement. Units and instruments. Conventional and unconventional units. Historical units.
3.4. The Decimal Metric System as the extension of the Decimal Numbering System. Instruments and their uses.
3.5. Estimate, approach and operations with quantities. Social and Cultural importance of the measurement.
3.6. Contexts, situations and problems to give meaning to the measure.
3.7. The analysis of length, surface, capacity, volume, mass, time and monetary system magnitudes. Concepts, representations, contexts and uses.
3.8. Education treatment of the measure: arithmeticization of the measure and proportionality in measurement contexts. Ratio and proportion.
3.9. Proportional reasoning: difficulties and common mistakes.
3.10. Measurement learning in Primary Education: learning processes, difficulties and obstacles, learning indicators.

Units 4: Design and critical analysis of proposals for teaching magnitudes and measurement in Primary Education

4.1. The treatment of these contents right through primary education. Some sequencing proposals.
4.2. Treatment of the concepts of magnitude and measure in the textbooks.
4.3. Design and analysis of the teaching units. Resources and teaching materials to address these contents in primary education.

BLOCK 3: INFORMATION PROCESSING, CHANCE AND PROBABILITY (3

ECTS)

Unit 5: The organization of the information

5.1 Identification of variables. Different ways of recording information: data tables. Usual situations and phenomena.

5.2 Basic concepts of populations and variables. Discrete and continuous variables.

5.3 Preparation and interpretation of data graphs: bar diagrams, block diagrams, line diagrams and pie diagrams

5.4 5.4 Numerical descriptions of the data: measures of centralisation (mode, median and arithmetic mean). Relative nature of centralizing measures: measures of dispersion (range, deviation and bias)

5.5 Difficulties in the representation and interpretation of graphs. Common problems in obtaining and interpreting centralization measures.

BIBLIOGRAPHY

General

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ASSESSMENT

Final grades will be calculated as the total of the scores obtained in each of the assignments below:

A) CONTINUOUS EVALUATION (for ordinary calls I y II)

The final evaluation will be achieved taking into account the scores obtained in each of the following activities:

Activity	Weighting (%)
Essay (examination)	70%
Guided assignments on quantitative experimental studies or design of teaching units	20%
Homework and research tasks, class participation	10%

The content tests will consist of the discussion and/or resolution of problems and problematic situations related to the teaching and learning of mathematical content: building of mathematical language, magnitudes and measurements, treatments of information, chance and probability. These tests will take 2 hours and 15 minutes.

NOTES:
a. The primary education teaching Team (entered in the minutes 05/03/2019, published in the Master Degree website) has agreed that non-compliance with the rules of spelling, punctuation and expression in practices, assignments and exams in all calls and modalities, will be grounds for failing the subject and will negatively influence the evaluation as expressed in the following criteria:

1. Ethical Commitment: in addition to, respecting a minimum of personal and social values, the students must accept the ethical standards of intellectual honesty. Among other principles, the student must take into account that the

following issues may be punishable with a score of 0 points in the test affected: copying on exams, falsification of the bibliography used, identify theft in evaluation tests, as well as total or partial plagiarism of a work. According to the the RAE dictionary (2001), "to plagiarize is substantially copy other people's works and pass-it off, as one's own". This implies that in the preparation of academic papers, phrases, paragraphs, or complete works of other authors cannot be used without citing and properly referencing them. Likewise, it is recalled that some behaviours (copying, impersonating, etc.) may also lead to the opening of a disciplinary file.

2. The written expression must be correct in the two tasks to be assessed A) and B): coherence and cohesion in the written expression are essential requirements for passing the assessments tests. Spelling and expressions errors will be assessed as follows: Spelling mistakes will not be allowed in student's works (if a spelling mistake is found, it will result in a fail grade). In the theoretical- practical exams, the final score will be subtracted: -0,25 for the first misspelling; - 0,5 for the second misspelling; and from the third spelling mistake 1 point will be deducted for each misspelling.

b. Basic errors math literacy may result in fail grade for the course. In the qualification of the different productions subject to evaluation (exam, practical work...), each sample of ignorance or misuse of elements of basic mathematical literacy (knowledge required of a student of primary education) will subtract one point from the total score. More than three basic mathematical errors, of those described above, will lead to zero score in the evaluation of said production.

c. In order to pass the subject, a minimum of 3.5 points (out of 7.5) must be obtained in the proof test/development test (exam), a minimum of 1 point (out of 2) in guided works and a minimum of 5 points for the total evaluated activities. Notwithstanding the foregoing where students do not achieve any of the required grades, the final score will in no case exceed 4 points. To be eligible for the evaluation of the practical part, attendance of at least 80% of the time dedicated to said part will be mandatory. Otherwise, the student must face the practical part of the exam.

The delivery of the mentored Works can be done before the official examination session in February. In general, the dates for submitting these Works coincide with the end of the education period for the subject, although earlier dates may be proposed. In the second ordinary call, the percentage referred to mentored Works and participation in lessons (30%), can be reached in the exam through practical questions. For the ordinary calls I and II, the exam and practical Work scores will be saved (if the minimums indicated in February have been exceeded). as well as participation. The student has the option of taking one or more of these parts in the exam and renouncing their previous grade.

B) SINGLE EVALUATION (for ordinary III and extraordinary call).

Any student may choose this evaluation system in the period established in article 8 of the UHU regulations on exams and evaluations. The single

evaluation will consist of a test of discussion and/or resolution of problems and problematic situations related to the teaching and learning of the contents of Primary Education: building the mathematical language, magnitudes and measurement, treatment of information, chance and probability, about the resource's usage or task's design. Likewise, all students will be evaluated by this procedure in the ordinary III and extraordinary calls. These tests will last three hours.

The mention of "Honourable mention" (MH) may be awarded to students who have obtained a score equal to or greater than 9.0. The number may not exceed 5% of the students enrolled in the subject in the corresponding academic year, unless the number of students enrolled is less than 20, in which case a single "Honourable mention" may be granted. The "Honourable mention" will be awarded to the student who obtains the highest score (higher than 9 from 10 points) in ordinary call I. In the event that there is more than one student with the same qualification, who could opt for the "Honourable mention" (as long as the quota to obtain this mention is exceeded), a specific work will be commissioned, whose evaluation will determine the obtaining of the "Honourable mention" score, following the same evaluation criteria of the subject.

Tutorial Attention: the attention will be carried out during tutoring hours, by prior confirmed appointment, in person or through the available communication media.

Criteria

- Significant treatment of the most important knowledge collected in the program.
- In-depth analysis of documents and teaching situations (real or simulated).
- Originality and involvement in the ideas that are arise.
- Use of sound foundations and rigour to build arguments.
- Relationships between ideas.
- Reasoned criticism.
- Clarity and order in the oral and written presentations.
- Use of summary elements in productions: indexes, introduction, conclusions, graphs, tables, illustrations, etc.
- Taking care of formal aspects: spelling, presentation, authors, quotations...
- Use and management of relevant bibliography.

Techniques and instruments

- Monitoring of the progress of the work
- Public exhibition of the knowledge: presentations of topics and activities.
- Preparation of reports.
- Participation in specific tutorials and seminars.
- Individuals and group interviews following agreed agenda.

- Problems solving.
- Tests and exams.

Control and monitoring mechanisms

- Review the productions during their development process until their final version: personals and team tutorials.
- Regular contacts through virtual spaces.
- Observations and diaries to systematized data and information.
- Specific lessons sessions to review and redirect the work's dynamics.
- Qualitative and dialogued evaluation: team tutorials.