

**COURSE DATA****Data Subject**

Code	43483
Name	Fundamental research in didactics of mathematics
Cycle	Master's degree
ECTS Credits	7.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
2157 - M.D. in Research in Subject Didactics	Faculty of Teacher Training	1	First term
3112 - Specific Didactics	Doctoral School	0	First term

Subject-matter

Degree	Subject-matter	Character
2157 - M.D. in Research in Subject Didactics	8 - Research in didactics of mathematics	Optional
3112 - Specific Didactics	1 - Complementos de Formación	Optional

Coordination

Name	Department
FERRANDO PALOMARES, IRENE	85 - Mathematics Education
GUTIERREZ RODRIGUEZ, ANGEL	85 - Mathematics Education

SUMMARY

This subject is intended to make future researchers aware of the main lines of research that are being developed in the didactics of mathematics and the general theoretical frameworks that allow characterizing research in this area. The content of this module seeks to start specialised training in research in each subject, which will be studied in greater depth in the other subjects of the module. Achieving the objectives and competencies that this module should provide will put students in a position to begin planning a research for their master's degree final project.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

No enrolment restrictions with other subjects in the curriculum have been specified.

Other types of requirements

For the proper development of this subject, students will have to use some knowledge previously studied in subjects 43472, 43473, 43474 and 43492.

OUTCOMES

2157 - M.D. in Research in Subject Didactics

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- Students should be able to integrate knowledge and address the complexity of making informed judgments based on incomplete or limited information, including reflections on the social and ethical responsibilities associated with the application of their knowledge and judgments.
- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Elegir el marco metodológico más adecuado para intentar contestar las preguntas de investigación y dominar las técnicas metodológicas necesarias.
- Use appropriate bibliographical references that are relevant scientific background to the proposed research.
- Students should possess and understand foundational knowledge that enables original thinking and research in the field.
- Analyse and synthesise the main current research agendas in Specific Didactics.
- Conduct quality research in the scientific field of Specific Didactics using the methodologies, techniques and procedures of this discipline.
- Integrate ethical values and responsibility associated with research tasks into one's own research.
- Create spaces for research and learning with special attention to equity, emotional and values education, equal rights and opportunities between men and women, citizenship training and respect for human rights that facilitate life in society, decision-making and the construction of a sustainable future.



- Evaluate current research problems on teaching or learning in the fields of knowledge characteristic of Specific Didactics.
- Synthesise historical, epistemological and ontological aspects associated with the emergence and evolution of research in Specific Didactics.
- Evaluate the relevance of a research project, its quality and future projection, with scientific criteria appropriate to the international standards of the studied speciality.
- Synthesise relevant research problems on learning or teaching in the disciplines belonging to Specific Didactics.
- Search and synthesise information on research results in bibliographic, material, virtual, etc. repertoires useful to support a new research project.
- Critically analyse, from the point of view of research in Specific Didactics, the performance of teaching, good practice and guidance using quality indicators.
- Understand and apply specialised research procedures in Specific Didactics.
- Identify, analyse and evaluate national or international research publications in the field of Specific Didactics.
- Decide, with objective criteria, which methodological paradigm quantitative, qualitative or mixed best fits the objectives of your own research.
- Plantear preguntas de investigación pertinentes sobre un tema de investigación actual.
- Adequately analyse and evaluate the partial and final results of one's own research and contrast, refute or modify the first hypotheses.

LEARNING OUTCOMES

The subject Fundamental Research in the Didactics of Mathematics must provide students with the central core of knowledge for the research training they will obtain in this specialisation of the master's degree. Students must successfully acquire the necessary didactic and methodological knowledge in order to successfully address the different tasks involved in carrying out a research project. By the end of the course and always referring to the research in the didactics of mathematics, students of this course are expected to have achieved the following results:

- Know the main current research agendas.
- Know the most important lines of research of the previous agendas, especially the lines that are being developed by the researchers of the University of Valencia.
- Know and effectively use the main sources of information, databases, books and magazines, Internet servers, etc.
- Know in detail the main theoretical frameworks currently used in the main lines of research.



- Use the knowledge acquired in this subject and other subjects to be able to critically analyse publications of research results.
- Know elements of the history of mathematics that can be useful to aid didactic research.
- Pose questions that can be used as a basis for didactic research designs and selecting appropriate theoretical frameworks and methodological tools to provide answers to such questions.

DESCRIPTION OF CONTENTS

1. Research in visualisation and dynamic geometry environments

- 1.1. Overview of international research on teaching and learning geometry.
- 1.2. Van Hiele's mathematical reasoning model. Evaluation of reasoning. Teaching design.

2. Research on the use of modelling and applications in the teaching and learning of mathematics

- 2.1. Design and use of tools for the analysis of oral and written productions of students.
- 2.2. Research from the perspective of the teacher: difficulties, the role of the teacher, and initial and continuous training.
- 2.3. Analysis of the learning process through modelling tasks.

3. Fundamental research on high mathematical abilities

- 3.1. The context of high abilities and especially gifted students. Terminology, explanatory models of high abilities, characterisation of talent. Legislation. Attention to high abilities
- 3.2. Talent in mathematics. Characteristics of the reasoning of students of high ability in mathematics. Specific programs of attention for students with high mathematical abilities.
- 3.3. Research related to high mathematical abilities from the perspective of mathematical didactics: Research related to the identification of students, the identification of specific characteristics and classroom intervention.

4. Research in mathematics education in technological environments

- 4.1. Overview of research on the teaching and learning of mathematics in computer environments.
- 4.2. Research perspectives associated with interaction and multiple systems of representation in technological environments.
- 4.3. Research perspectives associated with learning analytics in technological environments.

**WORKLOAD**

ACTIVITY	Hours	% To be attended
Theory classes	42,00	100
Development of group work	40,00	0
Development of individual work	40,00	0
Study and independent work	40,00	0
Readings supplementary material	13,00	0
TOTAL	175,00	

TEACHING METHODOLOGY

Various methodologies for teaching and student work will be applied, depending on the type of activity to be carried out. The following may be used:

- Lectures on the content given by teaching staff (usually in theory classes).
- Discussion among students under the teacher's observation, with or without the teacher's intervention (usually in seminars).
- Supervised or independent work, either individual or in small groups, to carry out projects, prepare materials, search for information, etc. (usually in the laboratory or as out-of-class activities)
- Supervised or independent individual study time (usually to prepare papers or assessment tests).
- Presenting the work carried out to teaching staff and/or other students (usually in seminars).
- One-to-one meetings with the tutor to track the student's progress.

EVALUATION

Assessment will be based on the evaluation of evidence of learning, which may be collected by one or more of the following means:

- Regular tracking of the student's progress both in theory classes and seminars, as well as in tutorials.
- Assessment of required assignments.
- Assessment of individual and group participation in the activities carried out during the theory classes and seminars (presentations of the assignments themselves, participation in discussions, etc.).
- Taking exams or other tests designed to assess the student's level of mastery of the subject competencies.



Each member of the teaching staff will be responsible for the assessment and grading of the part of the course that they have taught. For this purpose, the following shall be taken into account:

-The activities carried out by the students during the face-to-face class sessions (with a maximum value of 40%). These activities will only be counted when the student has attended at least 80% of face-to-face classes.

- Out-of-class assignments during the course or other assessment procedures that the teacher may decide (with a minimum value of 60%).

At the beginning of the course, each member of the teaching staff will report on the assessment procedure that they will apply and the distribution of percentages to be taken into account.

The final grade of the subject will be the weighted arithmetic average of the grades of the different members of the teaching staff. To pass the course, the grades from all members must be equal to or greater than 3.5 points out of 10 and the final grade of the subject must be equal to or greater than 5 points out of 10.

REFERENCES

Basic

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