



COURSE GUIDE

Official Master's Degree in Teacher Training for Secondary Education,
Bachelor, Vocational Training and Language Teaching

EDUCATIONAL RESEARCH AND INNOVATION IN MATHEMATICS DIDACTICS

Specific Module of Mathematics

Universidad Católica de Valencia

Year 2023/24



COURSE GUIDE

EDUCATIONAL RESEARCH AND INNOVATION IN MATHEMATICS DIDACTICS

| | | ECTS |
|---|---|------|
| SUBJECT: Educational research and innovation in Mathematics Didactics | | 6 |
| Field: Teaching innovation and initiation to educational research | | 6 |
| Subject: Specific module Mathematics | | 24 |
| Type of learning: Compulsory | Year: 2023/24 Semester: 2nd | |
| Teacher: Dr. Sonia Martín Carbonell Dr. Soledad Gómez García | Department: Mathematics, Natural Sciences and Social Sciences applied to Education | |
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SUBJECT ORGANIZATION

| | | | | |
|---|------|--|---------|-------------------|
| Specific module Mathematics | | | 24 ECTS | |
| Duration and temporal location within the curriculum: This module aims to provide teaching skills related to the teaching-learning process of Mathematics. It consists of four subjects, two of which take place in the first semester and the other ones in the second. | | | | |
| Subjects and Courses | | | | |
| Subject | ECTS | COURSES | ECTS | Course / Semester |
| Complements for the disciplinary training | 6 | Mathematics in the Secondary Education | 6 | 1/1 |



| | | | | |
|--|----|--|---|-----|
| Learning and teaching of the related subjects | 12 | Mathematics Teaching | 6 | 1/1 |
| | | Resources for the teaching of Mathematics | 6 | 1/2 |
| Teaching innovation and introduction to educational research | 6 | Innovation and Research in Mathematics Didactics | 6 | 1/2 |

COURSE GUIDE TO THE SUBJECT:

Educational research and innovation in Mathematics Didactics

Prerequisites: No prerequisites, except from access to the expertise and knowledge of the languages of the Spanish educational system.

GENERAL GOALS

- Critically analyze the performance of teaching, good practices and guidance based on quality indicators.
- Identify situations related to teaching and learning in Secondary Education, to be able to propose investigations that suppose alternatives and solutions.
- Transform educational proposals into work and activity programs, acquiring selection criteria and developing educational materials.
- Know innovative teaching proposals, dynamic improvement and search for quality in education, and apply them to the classroom.
- Know and apply basic educational research and evaluation methodologies and techniques.
- Design and develop research, innovation and evaluation projects.
- Search, obtain and process information and transform it into knowledge in teacher self-training processes.
- Relate theory to practice improving the latter while participating in the construction of knowledge of the teaching profession.
- Communicate proposals and research to specialized audiences, explaining and arguing information and knowledge.



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| CROSS-SECTIONAL COMPETENCES | Competence measuring scale | | | |
|---|----------------------------|---|---|---|
| Instrumentales | 1 | 2 | 3 | 4 |
| G1 Ability to apply knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study. | | | X | |
| G2 Being able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments. | | | | X |
| G3 ability to communicate their findings (and the knowledge and rationale underpinning these,) to specialists and non-specialists in a clear and unambiguous. | | | | X |
| G4 Possessing learning skills to enable them to continue studying in a way that will be largely self-directed or autonomous. | | | | X |
| G5 Know the curriculum of the matters relating to the corresponding teaching specialization, and the body of didactic knowledge around teaching and learning processes concerned. For vocational training will include knowledge of the respective professions. | | X | | |
| G6 plan, develop and evaluate the teaching and learning process enhancing educational processes that facilitate the acquisition of the competences of the respective teachings, based on the level and previous training of the students and guiding them, both individually and in collaboration with other teachers and school professionals. | | | X | |
| G7 Search for, obtain, process and communicate information (oral, print, visual, digital or multimedia), transform it into knowledge and apply it in the teaching and learning materials Studied own specialization. | | | X | |
| Interpersonal | 1 | 2 | 3 | 4 |
| G10. Acquire strategies to encourage student effort and promote their ability to learn for yourself and others, and develop thinking skills and decision-making to facilitate autonomy, confidence and personal initiative. | | | X | |
| G11. Know the processes of interaction and communication in the classroom, mastering skills and social skills necessary to promote learning and living together in the classroom, and addressing problems of discipline and conflict resolution. | | | X | |
| G15. Inform and advise families about the process of teaching and learning and on the personal, academic and professional of their children. | X | | | |
| Systemic | 1 | 2 | 3 | 4 |
| G8 Fleshing out the curriculum that will be implemented in a school participating in collective planning of the same, develop and implement teaching methodologies both groups and individually adapted to the diversity of students. | X | | | |
| G9. Design and develop learning with a focus on equity, emotional and values education, equal rights and opportunities for men and women, civic education and respect for human rights that make life easier in society, decision making and building a sustainable future. | X | | | |



| | | | | |
|---|---|--|--|--|
| G12. Design and conduct formal and informal activities that help make the school a place of participation and culture in the environment where it is located, perform the functions of mentoring and guiding students in a collaborative and coordinated participation in evaluation, research and innovation in teaching and learning processes. | X | | | |
| G13. Knowing the rules and institutional organization of the education system and models of quality improvement with application to the schools. | X | | | |
| G14. Understand and analyze the historical characteristics of the teaching profession, current situation, perspectives and interaction with the social reality of the time. | X | | | |

| SPECIFIC COMPETENCES | | | | |
|---|---|---|---|---|
| Disciplinary | 1 | 2 | 3 | 4 |
| E1. Knowing the cultural and educational value of the relevant areas of specialization and contents that are taught in the respective teachings. | X | | | |
| E2. Knowing the history and recent developments and prospects materials to convey a dynamic view of the same. | | X | | |
| E3. Knowing contexts and situations in which use or apply the various curricula. | X | | | |
| E4. Knowing the theoretical and practical aspects of teaching and learning relevant material. | | X | | |
| Professional | 1 | 2 | 3 | 4 |
| E5. Transform the educational program to activities programs and work activities. | | | X | |
| E6. Acquire selection criteria and preparing educational materials. | | | X | |
| E7. Foster a climate that facilitates learning and put in value the contributions of students. | | X | | |
| E8. Integrating training of media studies in the teaching-learning process. | | | | X |
| E9. Learn strategies and techniques for assessing and understanding the assessment as a tool to regulate and stimulate the effort. | | | X | |
| Attitudinal | 1 | 2 | 3 | 4 |
| E10. Know and apply innovative teaching proposals in the field of specialization Studied. | | | | X |
| E11. Analyze critically the process of teaching, of good practice and orientation using quality indicators. | | | | X |
| E12. Identify issues related to teaching and learning matters and to propose alternatives and solutions. | | | | X |
| E13. Understand and apply methods and techniques of research and evaluation and to be able to design and develop research, innovation and evaluation. | | | | X |



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| LEARNING OUTCOMES | COMPETENCES |
|---|--|
| R1. Know the concept of quality to critically analyze teaching practices. | G2, G10, G9, G12, G13, G14, E7, E8, E9, E10, E11, E12, E13 |
| R2. Identify the most frequent situations related to the teaching and learning process. | G1, G2, G4, G5, G6, G10, G11, G15, G8, G12, E2, E3, E4, E6, E7, E8, E9, E11, E12 |
| R3. Know how to transform a simple educational proposal into a sequence of activities by selecting the most appropriate educational material. | G1, G4, G5, G6, G11, G9, G8, E1, E3, E4, E5, E6, E8, E9 |
| R4. Understand the concept of innovation and evaluation in relation to the classroom. | G5, G12, G13, E2, E7, E8, E9, E10, E11, E12, E13 |
| R5. Being able to design a short research project and evaluate the result. | G2, G7, G12, E9, E10, E11, E12, E13 |
| R6. Know how to obtain relevant information on topics related to specific didactics. | G1, G4, G5, G7, G9, G12, E1, E2, E12, E13 |
| R7. Know how to relate theory and practice to build teaching knowledge. | G2, G4, G5, G6, G7, G10, G14, E2, E3, E4, E5, E6, E8, E9, E11, E13 |
| R8. Knowing how to communicate a brief teaching or research proposal in a formal situation. | G1, G3, G6, G7, G11, G12, E7, E13 |



| ON-CAMPUS EDUCATIONAL ACTIVITIES | | | |
|----------------------------------|--|---|-------------|
| ACTIVITY | Teaching-Learning Methodology | Relationship with Learning Outcomes for the subject | ECTS |
| ON-CAMPUS CLASS | Teacher presentation of contents, analysis of competences, explanation and in-class display of skills, abilities and knowledge. | R1, R2, R3, R4, R5 | 30% 0,72 |
| PRACTICAL CLASSES | Group work sessions supervised by the professor. Case studies, diagnostic tests, problems, field work, computer room, visits, data search, libraries, on-line, Internet, etc. Meaningful construction of knowledge through interaction and student activity. | R1, R2, R3, R4, R5, R6, R7, R8 | 30% 0,72 |
| GROUP PRESENTATION OF PAPERS | Application of multidisciplinary knowledge | R1, R2, R3, R5, R6, R7, R8 | 20% 0,48 |
| OFFICE ASSISTANCE | Personalized and small group attention. Period of instruction and/or orientation carried out by a tutor to review and discuss materials and topics presented in classes, seminars, readings, papers, etc. | R1, R2, R5, R6 | 15% 0,36 |
| ASSESSMENT | Set of oral and/or written tests used in initial, formative or additive assessment of the student. | R1, R3, R4, R5, R6, R7, R8 | 5% 0,12 |
| Total | | | 2,4 |



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| INDEPENDENT WORK ACTIVITIES | | | |
|---|--|---|----------------------|
| ACTIVITY | Teaching-Learning Methodology | Relationship of Course with Learning Outcomes | ECTS |
| GROUP WORK | Group preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es) | R3, R4, R5, R6, R7, R8 | 40% 1,44 |
| INDEPENDENT WORK | Student study: Group Individual preparation of readings, essays, problem solving, seminars, papers, reports, etc. to be presented or submitted in theoretical lectures, practical and/or small-group tutoring sessions. Work done on the university e-learning platform (www.plataforma.ucv.es) | R3, R4, R5, R6, R7, R8 | 60% 2,16 |
| Total | | | 3,6 |
| SYSTEM FOR ASSESSING THE ACQUISITION OF THE COMPETENCES AND ASSESSMENT SYSTEM | | | |
| Assessment Tool | LEARNING OUTCOMES ASSESSED | | Allocated Percentage |
| Realization and exhibition of individual works | R1, R2, R3, R4, R5, R6, R7, R8 | | 20% |
| Performing and exposing group work | R1, R2, R3, R4, R5, R6, R7, R8 | | 40% |
| Assistance and participation in face-to-face and virtual activities | R1, R2, R3, R4, R5, R6, R7, R8 | | 40% |
| Written test | R1, R2, R3, R4, R5, R6, R7, R8 | | 20% |

**MENTION OF DISTINCTION:**

Mention of distinction will be granted if the student obtains the final grade of Outstanding and has stood out for the excellence of their work and the interest shown by the subject.

General regulations: Only one mention of distinction can be given for every 20 students, not for a fraction of 20, with the exception of the case of groups of less than 20 students in total, in which one can enroll.

| DESCRIPTION OF CONTENTS | COMPETENCES |
|--|----------------------|
| Action-research processes: quality and improvement processes as the engine of classroom work. Research as a process of educational improvement. Classroom situations in teaching different subjects. Collaborative work: the educational team. Quality in education. | E2, E3, E5, E11, E12 |
| Research methodologies and techniques in education. Main lines of research and evaluation in specific didactics. Methodological approaches: formulating objectives and hypotheses, selecting strategies, obtaining and interpreting data, and drawing conclusions. Information and knowledge: the transmission of knowledge. | E6, E11 |
| Real or simulated experiential activities. Self-training for teachers. Didactic programming and educational materials. | E1, E4 |
| Innovative teaching proposals in the field of specific didactics. Innovation in specific didactics. Innovation as motivation: strategies and self-learning. The classroom as a creative space. | E7, E13 |



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21.03.2020

Addendum to the Course Guide of Educational Research and Innovation in Mathematics Didactics

Official Master's Degree in Teacher Training for Secondary, Baccalaureate, Vocational Training and Language Teaching Master's Degree in Primary Education

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject:

Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).

In this case, no changes are made in the guide of the subject.

Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).

In this case, the following changes are made:

Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching.



Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Microsoft Teams | <input checked="" type="checkbox"/> Blackboard Collaborate Ultra |
| <input checked="" type="checkbox"/> Kaltura | <input checked="" type="checkbox"/> Plataforma UCV Net |

Situation 3: Confinement due to a new State of Alarm.

In this case, the following changes are made:

1. Educational Activities of Onsite Work:

All the foreseen onsite activities described in this section of the Course Guide, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

- | | |
|---|--|
| <input checked="" type="checkbox"/> Microsoft Teams | <input checked="" type="checkbox"/> Blackboard Collaborate Ultra |
| <input checked="" type="checkbox"/> Kaltura | <input checked="" type="checkbox"/> Plataforma UcvNet |

Explanation about the practical sessions:

1. They will be carried out individually or in groups through Teams or the Blackboard Collaborate and the UCVNet Platform.
2. Telematic attendance at practical sessions is compulsory. In case of not being able to attend the online sessions for a justified reason, it will be



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compulsory to present that justification and hold tutorials with the teacher to follow up on the practical sessions.

2. System for Assessing the Acquisition of the competences and Assessment System

ONSITE WORK

Regarding the Assessment Tools, the Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.

ONLINE WORK

Regarding the Assessment Tools:

The following changes will be made to adapt the subject's assessment to the online teaching.

| Course guide | | Adaptation | |
|--|----------------------|--------------------------------------|---------------------|
| Assessment tool | Allocated Percentage | Description of the suggested changes | Platform to be used |
| Realization and exhibition of individual works | 20% | 30% | UCVnet/Teams |
| Realization and exhibition of | 40% | 30% | UCVnet/Teams |



| | |
|------------------|--|
| groupal works | |
|------------------|--|

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

Observations to the evaluation system:

It is an essential requirement that all members of the group are connected during the performance and preparation of group work and exhibitions.