

**Introduction to Research in Scientific Education and
Mathematics Education**

Code: 45019
ECTS Credits: 6

2025/2026

Degree	Type	Year
Research in Education	OP	1

Contact

Name: Carme Grimalt Alvaro

Email: carme.grimalt@uab.cat

Teachers

Jordi Deulofeu Piquet

Edelmira Rosa Badillo Jimenez

Victor Lopez Simo

Teaching groups languages

You can view this information at the [end](#) of this document.

Prerequisites

No prerequisites are necessary.

Objectives and Contextualisation

This module is an introduction to the specialty "research on innovation in science education and mathematics education". The goal of this module is the building of an understanding of didactics of experimental sciences and didactics of mathematics as core disciplines within the research on innovation in science education and mathematics education. The objectives of this module are the following:

- Develop a fundamental understanding of the specific nature of research in Science Education and Mathematics Education, enabling them to critically analyse the relevance and appropriateness of research problems within these fields.
- Develop skills to comprehend, communicate, and produce academic texts according to the standards of the scientific communities in Science Education and Mathematics Education, allowing them to guide the definition and formulation of relevant research problems.
- Be able to identify and apply the specific criteria of rigour and quality required in educational research in science and mathematics, especially in contexts related to innovation and the improvement of teaching practice.

Learning Outcomes

1. CA59 (Competence) Assess research on the didactics of mathematics and science while adopting criteria of methodological quality, research consistency and innovative relevance.
2. CA60 (Competence) Assess the contributions of research on the didactics of mathematics and sciences for the improvement of the environment.
3. CA61 (Competence) Assess the contributions of research to the didactics of mathematics and sciences for the improvement of sex/gender based inequalities.
4. KA58 (Knowledge) Describe the paradigms of and approaches to research on the didactics of science and mathematics from a historical perspective.
5. KA59 (Knowledge) Identify the most important changes to lines of research on the didactics of mathematics and science.
6. KA60 (Knowledge) Identify current problems in science education and mathematics education to guide innovation proposals.
7. SA45 (Skill) Review the most relevant sources of scientific literature on the didactics of mathematics and science.
8. SA46 (Skill) Summarise research expressed in a specific type of scientific communication (report, article, contribution to congresses, case study, poster, etc.)

Content

The specific contents approached within this module are the following:

- (a) Characteristics of didactics of experimental sciences and didactics of mathematics as scientific disciplines.
- (b) The importance of philosophical and historial reflection for the understanding of research and innovation in science education and mathematics education.
- (c) Fields developed within research in science education and mathematics education.
- (d) The communication of research and innovation in science education and mathematics education.

Activities and Methodology

Title	Hours	ECTS	Learning Outcomes
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Type: Directed			
Frontal teaching and practical activities in the classroom	36	1.44	
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Type: Supervised			
Analysis and collective discussion of documents; oral presentations; tutoring	36	1.44	
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Type: Autonomous			
Reading of papers	78	3.12	
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The teaching activity will be developed through the following classroom dynamics:

- Lectures
- Reading of papers and other documentary sources
- Analysis and collective discussion of papers and other documentary sources
- Practical activities in the classroom: Problems/Cases/Exercises
- Oral presentations
- Tutoring

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

Assessment

Continous Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Analysis of the degree of relevance of a research problem in relation to the state of research in mathematics or science education	40	0	0	CA60, CA61, KA58, KA60
Reflexive reading of a research paper on science education or mathematics education	30	0	0	CA59, CA60, KA58, KA59, SA46
Representation of the state of the art of the research in mathematics education or science education	30	0	0	KA58, KA59, KA60, SA45

The continuous and single assessment of student learning will be based on 3 activities, as described below. The final grade of the module will consist of the weighted average of the grades obtained in these three activities as long as and when each of them is equal to or higher than 4. The assessment activities are individual and will be evaluated by the teaching staff of the module. The specific guidelines for carrying out these activities are accessible on the Virtual Campus. All deliveries will be made through the Virtual Campus.

Continuous evaluation:

The assessment of student learning will be based on 3 activities:

- Assessment activity 1: Reflective reading of a research article in science education or mathematics education. Submission date: 16-10-2025.
- Assessment activity 2: Representation of the state of research in mathematics education or science education. Submission date: 13-11-2025.
- Assessment activity 3: Analysis of the degree of relevance of a research problem in relation to the state of research in mathematics or science education. Submission date: 11-12-2025.

The feedback from the teaching staff will be made 15 days after submission.

To recover the evaluation activities that were not passed in the continuous evaluation option, it is necessary to submit the reviewed activities and a report explaining the changes made in the activities based on the input provided by the teaching staff. The maximum mark for the recovered activities is 5. The delivery deadline for the Virtual Campus will be 15-01-2026.

Single assessment:

A single document will be delivered with the three continuous assessment activities of the module:

- Assessment activity 1: Reflective reading of a research article in science or mathematics education.
- Assessment activity 2: Representation of the state of research in mathematics education or science education.
- Assessment activity 3: Analysis of the degree of relevance of a research problem in relation to the state of research in mathematics or science education.

The activities will be submitted through the Virtual Campus and will be defended orally on 08-01-2026 from 3pm to 5.30pm.

To recover the evaluation activities that were not passed in the continuous evaluation option, it is necessary to submit the reviewed activities and a report explaining the changes made in the activities based on the input provided by the teaching staff during the oral defense. The recovery deadline will be through the Virtual Campus and will be 15-01-2026.

General aspects of the assessment relating to plagiarism or academic fraud:

Copying or plagiarism in any type of assessment activity constitutes a crime and will be penalized with a 0 as a grade for the module, losing the possibility of recovering the assessment of the activity. An activity or work will be considered "copied" when it reproduces all or a significant part of the work of another colleague. A work or activity will be considered "plagiarized" when a part of an author's text is presented as one's own without citing the sources, regardless of whether the original sources are on paper or in digital format.

The misuse of artificial intelligence for performing assessment activities constitutes academic fraud and will also be penalized with a 0 as a grade for the module, losing the possibility of recovering the assessment of the activity. An evaluation activity will be considered having misused artificial intelligence when it includes a significant number of incorrect or biased statements, fails to include original sources, cites non-existent work, or incorrect way, or inconsistencies of style in the use of language are evident. If plagiarism or academic fraud is suspected, the assessment activity is subject to an oral defense by the student.

Bibliography

HANDBOOKS OF REFERENCE

Atwater, M. M. (Ed.). (2022). *International Handbook of Research on Multicultural Science Education*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-83122-6>

Beswick, K. (Ed.). (2020). *International handbook of mathematics teacher education* (Second edition). Brill Sense.

Clements, M. A., Kaur, B., Lowrie, T., Mesa, V., & Prytz, J. (Ed.). (2024). *Fourth International Handbook of Mathematics Education*. Springer Nature Switzerland. <https://doi.org/10.1007/978-3-031-51474-6>

English, L. D., & Kirshner, D. (Eds.). (2015). *Handbook of international research in mathematics education*. Routledge.

Fraser, B.J., Tobin, K.G. & McRobbie, CJ (Eds.) (2012). *Second International Handbook of Science Education*. Dordrecht, The Netherlands: Springer.

Gunstone, R. (2015). Encyclopedia of science education. Dordrecht, The Netherlands: Springer.

Grouws, D. (Ed.). (2007). *Handbook of Research on Mathematics Teaching and Learning*. National Council of Teachers of Mathematics. IAP.

Gutiérrez, A., & Boero, P. (Eds.). (2006). *Handbook of research on the psychology of mathematics education: Past, present and future*. Sense Publishers.

Gutiérrez, A., Leder, G., & Boero, P. (Eds.). (2016). *Second Handbook of research on the psychology of mathematics education: Past, present and future*. Sense Publishers.

Johnson, C.C., Mohr-Schroeder, M.J., Moore, T.J., & English, L.D. (Eds.). (2020). *Handbook of Research on STEM Education (1st ed.)*. Routledge. <https://doi.org/10.4324/9780429021381>

Kelly, A.E., & Lesh, R.A. (Eds.). (2000). *Handbook of research Design in Mathematics and Science Education*. New York: Routledge.

Lederman, N. G., Zeidler, D. L., & Lederman, J. S. (2023). *Handbook of Research on Science Education: Volume III (1a ed.)*. Routledge. <https://doi.org/10.4324/9780367855758>

Stevenson, R.B., Brody, M., Dillon, J., & Wals, A. (Eds.). (2013). *International Handbook of research on Environmental Education*. New York: Routledge.

JOURNALS OF RESEARCH IN SCIENCE EDUCATION

Enseñanza de las Ciencias: <http://ensciencias.uab.es>

Didáctica de las ciencias experimentales y sociales: <http://dialnet.unirioja.es/servlet/revista?codigo=418>

Revista Electrónica de Enseñanza de las Ciencias: <http://www.saum.uvigo.es/reec>

Revista EUREKA sobre enseñanza y divulgación de las ciències: <https://revistas.uca.es/index.php/eureka>

Ciencia & Educação: <http://www2.fc.unesp.br/cienciaeeducacao>

Cultural Studies of Science Education:

<http://www.springer.com/education+%26+language/science+education/journal/11422>

International Journal of Science Education: <http://www.tandf.co.uk/journals/titles/09500693.asp>

Journal of Research in Science Teaching: <http://onlinelibrary.wiley.com/journal/10.1002>

Science Education: [http://onlinelibrary.wiley.com/journal/10.1002/\(ISSN\)1098-237X](http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1098-237X)

School Science Review: <http://www.ase.org.uk/journals/school-science-review>

Science Education Review: <http://www.scienceeducationreview.com/editorial.html>

JOURNALS OF RESEARCH IN MATHEMATICS EDUCATION

Avances de Investigación en Educación Matemática: <http://www.aiem.es/index.php/aiem>

Bolema: Boletim de Educação Matemática: www.scielo.br/bolema

Educational Studies in Mathematics: <https://link.springer.com/journal/10649>

For the Learning of Mathematics: <http://flm-journal.org>

Journal of Mathematical Behavior: <https://www.journals.elsevier.com/the-journal-of-mathematical-behavior>

Journal of Mathematics Teacher Education:

<http://www.springer.com/education+%26+language/mathematics+education/journal/10857>

Journal for Research in Mathematics Education:

<http://www.nctm.org/publications/journal-for-research-in-mathematics-education>

Mathematics Education Research Journal:

<http://www.springer.com/education+%26+language/mathematics+education/journal/13394>

Mathematical Thinking and Learning: <http://www.tandfonline.com/toc/hmtl20/current>

PNA, Pensamiento numérico avanzado: <http://revistaseug.ugr.es/index.php/pna/index>

RELIME, Revista latinoamericana de investigación en matemática educativa:

<http://www.clame.org.mx/relime/relimee.html>

Software

No special computer program is necessary in this module

Groups and Languages

Please note that this information is provisional until 30 November 2025. You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject.

Name	Group	Language	Semester	Turn
(TEm) Theory (master)	1	Catalan/Spanish	first semester	afternoon