

Introduction to Research in Scientific Education and Mathematics Education

Code: 45019

Credits: 6

2026/2027

Degree programme	Type	Course
Research in Education	OP	1

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Group languages

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

Prerequisites

No prerequisites are necessary.

Objectives

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

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

Contents

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 historical 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.

Learning activities and methodology

Title	Hours	ECTS	Learning outcomes

Reading of papers	78	3.12	CA59, KA58, KA60, SA45, SA46
Frontal teaching and practical activities in the classroom	36	1.44	CA59, CA60, CA61, KA58, KA59, SA45
Analysis and collective discussion of documents; oral presentations; tutoring	36	1.44	CA59, CA60, CA61, KA58, KA59, KA60, SA45

The learning activities will be carried out through methodologies aimed at fostering a critical understanding of research in science education and mathematics education, as well as the ability to analyse and formulate relevant research problems.

The main learning activities will include:

- Lectures and seminars led by the teaching staff to introduce the main theoretical frameworks, research lines, and current debates in science education and mathematics education.
- Critical reading of research articles, book chapters, and other relevant documentary sources.
- Collective analysis, discussion, and critical examination of academic texts and research findings.
- Practical activities focused on the interpretation of scientific literature, the analysis of research problems, and the identification of current research trends.
- Oral presentations and discussions of academic work and productions developed by students.
- Individual and group tutorials to support the learning process and the completion of assessment activities.

Active student participation and critical reflection on the relationship between research in science and mathematics education and educational innovation will be encouraged. The teaching methodology is based on learning through scientific literature, academic discussion, and the progressive development of an independent research perspective.

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

Continuous assessment activities

Title	Weight	Hours	ECTS	Learning outcomes
Reflexive reading of a research paper on science education or mathematics education	30	0	0	CA59, CA60, KA58, KA59, SA46
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
Representation of the state of the art of the research in mathematics education or science education	30	0	0	KA58, KA59, KA60, SA45

Continuous and single assessment of student learning will be based on three individual assessment activities. The final mark for the module will be calculated as the weighted average of the marks obtained in these three activities, provided that each activity receives a minimum mark of 4 out of 10. Specific guidelines for completing the assessment activities will be available on the Virtual Campus. All submissions must be made through the Virtual Campus.

Continuous evaluation:

Student learning will be assessed through the following activities:

- Assessment Activity 1 (30%): Reflective reading of a research article in science education or mathematics education. Submission date: 29-10-2026.
- Assessment Activity 2 (30%): Representation of the state of research in mathematics education or science education. Submission date: 26-11-2026.
- Assessment Activity 3 (40%): Analysis of the relevance of a research problem in relation to the current state of research in mathematics education or science education. Submission date: 17-12-2026.

Feedback from the teaching staff will be provided within a maximum period of 20 working days after the submission of each activity.

All three assessment activities are eligible for reassessment. To be eligible for reassessment, students must have previously completed assessment activities representing at least two-thirds of the total module grade.

To reassess failed activities under the continuous assessment system, students must submit revised versions of the activities together with a report justifying the changes made based on the feedback provided by the teaching staff. The maximum mark obtainable through reassessment will be 5 out of 10. The deadline for reassessment submissions will be 14 January 2027.

Single assessment:

Single assessment will consist of the submission of a single document containing the following three activities, maintaining the same weighting as in continuous assessment:

- Assessment Activity 1 (30%): Reflective reading of a research article in science education or mathematics education.
- Assessment Activity 2 (30%): Representation of the state of research in mathematics education or science education.
- Assessment Activity 3 (40%): Analysis of the relevance of a research problem in relation to the current state of research in mathematics education or science education.

The activities must be submitted through the Virtual Campus and will be defended orally on 7 January 2027 from 3:00 p.m. to 5:30 p.m.

Reassessment for the single assessment system will consist of submitting revised versions of the activities together with a report justifying the changes made based on the feedback provided during the oral defence. To

be eligible for reassessment, students must have previously completed assessment activities representing at least two-thirds of the total module grade. The reassessment submission deadline will be 14 January 2027 through the Virtual Campus.

Synthesis examination:

This module does not provide a synthesis examination option for students enrolled for a second time.

Not Assessable:

Students will receive a "Not Assessable" grade if they have not submitted assessment activities representing at least 66% of the final module grade.

Use of generative artificial intelligence:

In this module, the use of generative artificial intelligence technologies is permitted exclusively for linguistic revision of texts, including grammar, spelling, style correction, and improvements to formal structure. The use of these technologies to generate academic content, conduct analyses, summarise readings, construct arguments, or develop any substantive part of the assessment activities is not permitted.

General assessment regulations regarding plagiarism and academic misconduct:

Copying or plagiarism in any assessment activity constitutes a serious breach of academic integrity and will be penalised with a mark of 0 for the module, with no possibility of reassessment for the affected activity. An activity or assignment will be considered "copied" when it reproduces all or a substantial part of another student's work. An activity or assignment will be considered "plagiarised" when a text or part of a text written by another author is presented as one's own without proper citation, regardless of whether the original source is printed or digital.

Any use of generative artificial intelligence beyond the explicitly permitted uses in this module will be considered academic misconduct and will result in a mark of 0 for the corresponding activity, with no possibility of reassessment. In cases of suspected plagiarism or academic misconduct, the activity may be subject to an oral defence by the student.

Bibliography

HANDBOOKS AND RESEARCH COMPILATIONS

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* (2nd ed.). Brill Sense.

Cai, J. (Ed.). (2021). *Compendium for research in mathematics education*. National Council of Teachers of Mathematics.

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, C. J. (Eds.). (2012). *Second International Handbook of Science Education*. Springer.

Gunstone, R. (2015). *Encyclopedia of science education*. Springer.

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*. Routledge.

Lederman, N. G., Zeidler, D. L., & Lederman, J. S. (2023). *Handbook of Research on Science Education: Volume III* (1st 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*. Routledge.

RESEARCH JOURNALS 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 ciencias: <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: <https://onlinelibrary.wiley.com/journal/10982736>
- Science Education: <https://onlinelibrary.wiley.com/journal/1098237x>
- School Science Review: <http://www.ase.org.uk/journals/school-science-review>
- Science Education Review: <http://www.scienceeducationreview.com/editorial.html>

RESEARCH JOURNALS 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: <https://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:

Software

No special computer program is necessary in this module

Course groups and languages

The information provided is provisional until November 30. After this date, you will be able to consult the language of each group through this [link](#). To access the information, you will need to enter the course CODE

Type of teaching	Group	Language	Semester	Shift
(TEm) Theory (master)	1	Catalan	first semester	afternoon