

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

Code: 45019
ECTS Credits: 6

Degree	Type	Year	Semester
4313815 Research in Education	OT	0	1

Contact

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Teaching groups languages

You can check it through this [link](#). To consult the language you will need to enter the CODE of the subject. Please note that this information is provisional until 30 November 2023.

Teachers

Jordi Deulofeu Piquet

Edelmira Rosa Badillo Jimenez

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:

- acquisition of basic knowledge about the specificity of research in Science Education and Mathematics Education relevant for educational innovation
- learning how to read, talk and write following the criteria emerging from the above mentioned disciplines
- identification of particular rigor criteria of educational research within the areas of mathematics and science contextualized in educational innovations

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 Outcomes

- CA59 (Competence) Assess research on the didactics of mathematics and science while adopting criteria of methodological quality, research consistency and innovative relevance.
- CA60 (Competence) Assess the contributions of research on the didactics of mathematics and sciences for the improvement of the environment.
- CA61 (Competence) Assess the contributions of research to the didactics of mathematics and sciences for the improvement of sex/gender based inequalities.
- KA58 (Knowledge) Describe the paradigms of and approaches to research on the didactics of science and mathematics from a historical perspective.
- KA59 (Knowledge) Identify the most important changes to lines of research on the didactics of mathematics and science.
- KA60 (Knowledge) Identify current problems in science education and mathematics education to guide innovation proposals.
- SA45 (Skill) Review the most relevant sources of scientific literature on the didactics of mathematics and science.
- 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 of this module are: (a) The characteristics of Didactics of Science and Didactics of Mathematics as research disciplines; (b) The importance of historical and philosophical reflection for research and innovation in science education and mathematics education; (c) Research fields in science education and mathematics education; and (d) Communicating research and innovation on science education and mathematics education.

Methodology

The teaching activity will be developed through the following classroom dynamics:

- Frontal teaching
- 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

Students will be asked to fill in the evaluation questionnaires within the classroom according to the guidelines and calendar provided by the Facultat de Ciències de l'Educació from UAB.

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.

Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Frontal teaching and practical activities in the classroom	36	1.44	CA60, CA61, KA58, CA60
Type: Supervised			
Analysis and collective discussion of documents; oral presentations; tutoring	36	1.44	CA60, CA61, KA59, SA46, CA60
Type: Autonomous			
Reading of papers	78	3.12	CA59, KA60, SA45, CA59

Assessment

Continuous Assessment Option: Students assessment will be conducted through 3 activities. The final grade will be the average of the grades obtained in the three assessment activities if the value is equal or higher than 4. The assessment activities are of an individual nature and will be graded by the professors teaching the module. The guidelines related to the assessment activities can be accessed through the Campus Virtual. The deadlines for delivering the assessment activities are the following: Assessment Activity 1 (15-11-2023), Assessment Activity 2 (13-12-2023), Assessment Activity 3 (14-01-2024). The feedback from the professors teaching the module will be done in 15 days from the delivery date. Students failing any of the assessment activities of the Continuous Assessment Option will need to deliver a justification report responding to the evaluators' comments and suggestions before the deadline of February 1st, 2024.

Summative Evaluation Option: Students choosing this assessment option will need to deliver only one report through the Virtual Campus with the three assessment activities presented in the Continuous assessment option: (a) Assessment Activity 1 Critical reading of a research paper on science education or mathematics education, (b) Assessment Activity 2 The research maps of mathematics education and science education; and (c) Assessment Activity 3 Competences and problem solving in science education and mathematics education. The report will be delivered and presented orally in February 1st, 2024 from 15h to 17,30h. Students failing the assessment activities of the Summative Evaluation Option will need to deliver a justification report responding to the evaluators' comments and suggestions before the deadline of February 15th, 2024.

Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
Competences and problem solving in science education and mathematics education	30	0	0	CA60, CA61, KA60, SA45
Critical reading of a research paper on science education or mathematics education	40	0	0	CA59, KA58, KA60, SA46
The research maps of mathematics education and science education	30	0	0	KA58, KA59, KA60, SA45

Bibliography

LLIBRES I REVISTES DE COMPILACIÓ DE RECERQUES

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

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

Abell, S.K. & Lederman, N.G. (Eds.) (2010). *Handbook of research on Science Education Volume I*. New York: Routledge.

Abell, S.K. & Lederman, N.G. (Eds.) (2014). *Handbook of research on Science Education Volume II*. New York: Routledge.

Bishop, A. J., Clements, M. K., Keitel, C., Kilpatrick, J., & Laborde, C. (Eds.). (1996). *International handbook of mathematics education*. Springer Science & Business Media.

Bishop, A., Clements, M.A.K., Keitel-Kreidt, C., Kilpatrick, J., Leung, F.K.-S. (Eds.) (2003). *Second International Handbook of Mathematics Education*. Springer International.

Clements, M.A., Bishop, A., Keitel-Kreidt, C., Kilpatrick, J., Leung, F.K.-S. (Eds.) (2013). *Third International Handbook of Mathematics Education*. Springer International.

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

Fraser, B.J. & Tobin, K.G. (Eds.) (1998). *International Handbook of Science Education*. Dordrecht, The Netherlands: Kluwer Academic.

Fraser, B.J., Tobin, K.G. & McRobbie, C.J. (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. A. (Ed.). (1992). *Handbook of Research on Mathematics Teaching and Learning*: National Council of Teachers of Mathematics. IAP.

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.

Lerman, S. (Ed.). (2014). *Encyclopedia of Mathematics Education*. Springer.

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

REVISTES DE RECERCA EN EDUCACIÓ CIENTÍFICA

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/cienciaeducacao>

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)

REVISTES DE RECERCA EN EDUCACIÓ MATEMÀTICA

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