

**Sequencing and Evaluation of Science and
Mathematics Learning**

Code: 102087
ECTS Credits: 6

Degree	Type	Year	Semester
2500798 Primary Education	OT	4	0

Contact

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Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Prerequisites

It is recommended to have pass the scientific and mathematical courses of the degree. In concrete:

- Mathematics for Teachers
- Learning Mathematics and the Curriculum
- Teaching and Learning about the Natural, Social and Cultural Environment
- Teaching Experimental Sciences
- Management and Innovation in the Mathematics Classroom

Objectives and Contextualisation

The approach of the subject within the curriculum of primary school teachers aims to introduce and deepen the tools for the design and evaluation of teaching and learning sequences, projects and classroom nooks in the field of mathematical and / or scientific education.

Scientific and mathematical ideas (what we call school science and mathematics content) and approaches for the teaching of science and mathematics (such as modeling and scientific and mathematical argumentation, the role of language, the importance of contextualization, etc.) that have been learned in the compulsory subjects of science and mathematics in the primary education degree will be used to design and plan both the implementation and evaluation of innovative classroom activities and teaching and learning sequences within a competence-based framework.

From a view of teaching and learning of both science and mathematics as participation of scientific and mathematical practice, the aim is to plan and evaluate activities where pupils can think, do and talk science and mathematics in the classroom, that is, to promote scientific and mathematical modelling, scientific inquiry and mathematical problem-solving, and / or argumentation of science and mathematics, with pupils reflecting on the nature of scientific and mathematical activity encompassed in these activities

From a view of learning as a progression of knowledge and competence throughout schooling, design and sequencing of learning arises at the level of conversation, meeting, teaching unit, course and school staging, using the ideas of the learning cycle and learning progression to guide the teaching action.

From the point of view of evaluation as regulation of learning, evaluation is presented as integrated into the process of teaching and learning, where the promotion of metacognition and self-regulation in students is considered essential and is promoted through the use of strategies innovative assessment such as co-avaluació and self-evaluation and sharing of design assessment rubrics.

Finally, from a competence-based framework in which the teaching and learning of science and mathematics allows to "act" in the world (that is, to think, argue, decide, evaluate, etc. with scientific and mathematical knowledge), these activities and teaching and learning sequences must be contextualized in appropriate contexts of personal, social or global relevance to students.

The objectives of the course are:

- 1) Deepening inquiry, problem solving, modeling and argument (do, think and speak) as school scientific and mathematical practices and planning and evaluating teaching and learning activities that integrate both.
- 2) Designing and evaluating sequences of teaching and learning activities, projects, nooks, ... according to the ideas of learning cycle progression and knowledge to micro and macro levels of scientific-mathematical field.
- 3) Propose and evaluate evaluation activities from the perspective of the evaluation and regulation of learning.
- 4) Justify and use contexts of teaching and learning appropriate for teaching science and mathematics and relevant for students from the personal, social or global viewpoint.

Skills

- Design and regulate learning spaces in contexts of diversity that take into account gender equality, equity and respect for human rights and observe the values of public education.
- Design, plan and evaluate education and learning processes, both individually and in collaboration with other teachers and professionals at the centre.
- Develop the functions of tutoring and guidance of pupils and their families, attending to the pupils own needs. Understand that a teachers functions must be perfected and adapted in a lifelong manner to scientific, pedagogical and social changes.
- Foster reading and critical analysis of the texts in different scientific fields and cultural contents in the school curriculum.
- Generate innovative and competitive proposals in research and in professional activity.
- Know and apply information and communication technologies to classrooms.
- Know the curricular areas of Primary Education, the interdisciplinary relation between them, the evaluation criteria and the body of didactic knowledge regarding the respective procedures of education and learning.
- Reflect on classroom experiences in order to innovate and improve teaching work. Acquire skills and habits for autonomous and cooperative learning and promote it among pupils.
- Work in teams and with teams (in the same field or interdisciplinary).

Learning outcomes

1. Identifying aspects common to all the experimental sciences and examining them in depth.
2. Identifying the difficulties in the teaching and learning of experimental sciences, and designing activities that respond to the diversity of students learning experiences.
3. Identifying, describing, and analysing the characteristics pertaining to management of the area of experimental sciences in the classroom, and the implementation of activities involving experimentation and the use of CLTs.
4. Knowing how to communicate and present an argument in science lessons.
5. Planning for scientific learning situations in contexts outside of the school.

6. Produce and apply resources related to the teaching and learning of experimental sciences.
7. Promoting the use of explanatory models.
8. Relating science with its technological applications, with its social impact on the didactic situations pertaining to the school.

Content

1. **The approach of teaching and learning as participation to school scientific and mathematical practice in the primary school classroom**
2. **The approach to evaluation as regulation of learning**
3. **The sequencing of teaching and learning following a learning progression**
4. **The importance of contextualisation in the teaching and learning of Science and Mathematics**

Methodology

The protagonist in the educational learning process is the student. It is under this premise that the methodology has been planned:

- Teacher lectures about the basic contents of the subject to the whole class group in an interactive way. Teaching and learning activities to reflect, follow, create, etc will be included to be done at personal or small group level "in situ".
- Directed activities that could include lab work sessions, use of ICT's and oral presentations of students' productions. It includes the preparation and staging of micro-teaching episodes with self- and co-evaluation tasks of final productions.
- Autonomous or supervised activities where students will need to elaborate tasks related with the lectures and the activities done in the classroom. In concrete, the students will have to desing a complete teaching and learning sequence.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Seminar sessions	45	1.8	6, 3
Type: Supervised			
Autonomous design and elaboration of productions	30	1.2	6, 3
Type: Autonomous			
Teacher lectures	75	3	6, 3

Evaluation

The summative evaluation of the course includes both group and individual activities. In order to pass the student will have to get over a 4 in both the individual and the group marks.

Section 1. Group work:

- A complete Teaching and Learning sequence (including justification, activities designed to the level of the

student and a teaching guide). Students must include a signed document showing how the distribution of the group work has been done.

- Oral presentation of the Teaching and Learning Sequence designed by group (teacher will decide presentation order if necessary)

Block 2. Individual:

- A self-assessment of the didactical quality of their micro-teaching activity

- A co-assessment of another group Teaching and learning sequence (TLS) justified according to an evaluation rubric designed by the each student themselves according to pre-established evaluation criteria throughout the course.

Specifically, the percentage of each of these tasks in the global mark of the subject is as follows:

Workgroups

- 40% of the mark is the mark of the TLS (75% graded by the teacher and 25% by students' self-evaluation report) 21th december

- 10% note of the presentation of the UD (100% grade by teacher) 19th december

Individual work

- 25% of self-assessment report of their micro-teaching activity (2 weeks after microteaching, each group will have a different date from october to november)

- 25% note of the co-assessment rubric of the TLS of another group (criteria of good UD) 10th january

The evaluation activities will be delivered preferably via Virtual Campus. Other possibilities will be discussed, if necessary, and informed both presentially and via Virtual Campus

Feedback to all evaluation activities will be done before a month after their submission.

80% of attendance is compulsory.

To pass the course each student should pass each of the individual and group evaluation blocks independently.

The microteaching report to evaluate individually could be done again, if failed, by submitting a new proposal during the intersemestral week.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Group work productions	50%	0	0	6, 2, 3
Individual productions	50%	0	0	6, 1, 2, 3, 5, 7, 8, 4

Bibliography

BOOKS

Flores, P. & Rico, L. (2015) Enseñanza y aprendizaje de las matemáticas en educación primaria. Madrid: Pirámide

Pujol, R.M. (2003). Didáctica de les Ciències en la educació primària. Madrid: Síntesis

Sanmartí, N. (2007). 10 ideas clave. Evaluar para aprender. Barcelona: Graó

CURRICULUM DOCUMENTS

Decret 119/2015, de 23 de juny, d'ordenació dels ensenyaments de l'educació primària.

<http://portaldogc.gencat.cat/utillsEADOP/PDF/6900/1431926.pdf>

Orientacions sobre l'aplicació del nou currículum: resolució de problemes matemàtics

http://www.xtec.cat/alfresco/d/d/workspace/SpacesStore/13de531f-8a15-4fc1-9d53-fdfe534ba0c/Ambit_matema

Orientacions sobre la proposta curricular competencial:

<http://www.xtec.cat/alfresco/d/d/workspace/SpacesStore/ba660da6-65cf-4a60-ad02-d70b78c13bb4/desplegament>

Decret 142/2007, de 26 de juny. DOGC núm.4915

http://www.xtec.es/estudis/primaria/06_curriculum_2007/coneixement_medi_pri.pdf

Annex I. Competències bàsiques. Currículum educació primària - Decret 142/2007 DOGC núm. 4915

http://www.xtec.es/estudis/primaria/06_curriculum_2007/competencies_pri.pdf

JOURNALS (SCIENCE AND MATHEMATICS EDUCATION)

Alambique. <http://alambique.grao.com>

Avances de Investigación en Educación Matemática. Publicación Oficial de la Sociedad Española de Investigación en Educación Matemática (SEIEM) <http://www.aiem.es/index.php/aiem>

Ciències: Revista del Professorat de Ciències d'Infantil, Primària i Secundària.

http://crecim.uab.cat/revista_ciencies/revista/index.htm

Enseñanza de las ciencias. Revista de Investigación y Experiencias Didácticas.

<http://www.raco.cat/index.php/ensenanza>

Suma. Revista para la enseñanza y el aprendizaje de las matemáticas

<http://revistasuma.es>

Uno. Revista de Didáctica de las Matemáticas

<http://uno.grao.com>

JOURNALS (GENERAL EDUCATION)

Aula de Innovación Educativa <http://aula.grao.com>

Perspectiva Escolar <http://www.rosasensat.org/perspectiva/>

Infancia y Aprendizaje <http://www.fia.es/online/framehomepage.php?sos=win>

RESOURCES

CREAMAT (matemàtiques) <http://srvcnpbs.xtec.cat/creammat/joomla/>

CDEC (ciències): <http://srvcnpbs.xtec.cat/cdec/>

Aplicatiude Recobriment Curricular (materials didàctics ciències i matemàtiques)

http://arc-educacio.cat/elements_didactics