

**Teaching Experimental Sciences**

Code: 102089  
ECTS Credits: 5

Degree	Type	Year	Semester
2500798 Primary Education	OB	3	1

**Contact**

Name: Anna Marbà Tallada  
Email: Anna.Marba@uab.cat

**Use of languages**

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

**Teachers**

Antoni Alcázar Salas  
Maria Isabel Hernandez Rodriguez

**Prerequisites**

It is advisable to have passed the module "Teaching and Learning about the Natural, Social and Cultural Environment in Primary Education".

**Objectives and Contextualisation**

This module forms part of the Programme of Primary Teacher Education and is intended to deepen the content knowledge and competencies necessary to teach the module "Environmental Knowledge" in primary schools.

This module puts an emphasis on the scientific ideas that should be discussed with primary school students (what we call "content knowledge of school science"). This module also looks at pedagogical approaches that promote an understanding of science as an activity that integrates inquiry, modelling and communication.

The objectives of the module are:

- 1) To identify and discuss basic content knowledge of school science - key ideas - that are studied in primary education.
- 2) To embed pedagogical approaches that promote an understanding of school science as an activity that integrates inquiry, modelling and communication (doing, thinking and talking).
- 3) To become familiar with, design and evaluate teaching activities that promote students' development of scientific competencies in primary school.

**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.
- Know the school curriculum for these sciences.
- Maintain a respectful attitude to the natural, social and cultural environment to foster values, behaviours and practices that attend to gender equality, equity and respect for human rights.
- Raising and solving problems related to everyday life.
- 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.
- Understanding the basic principles and fundamental laws of the experimental sciences (physics, chemistry, biology and geology).
- Value science as a cultural event.
- Work in teams and with teams (in the same field or interdisciplinary).

## Learning outcomes

1. Apply knowledge of science education to critically analyse the curriculum and establish interdisciplinary relations with other curricular areas.
2. Being able to apply scientific knowledge in order to understand and act on the phenomena in everyday life.
3. Being able to develop innovative proposals for the teaching and learning of the scientific content in the area of environmental studies.
4. Being able to evaluate teaching units as a way of guiding the processes for improving the quality of teaching.
5. Being able to use basic models of the experimental sciences in order to interpret and act on the phenomena in everyday life.
6. Being able to use the diversity of cognitive-linguistic skills to reflect on the processes of teaching/learning in the sciences.
7. Being capable of developing innovative didactic units for teaching and learning the scientific content in the area of Environmental Studies that incorporate attention to diversity and the interdisciplinary focus of the curriculum.
8. Demonstrate a critical ability to use a range of cognitive linguistic skills to reflect on processes in the teaching and learning of science.
9. Demonstrate an understanding of science as part of cultural heritage.
10. Demonstrate that attitudes regarding human rights as knowledge and tools for coexistence, as well as gender equality, are identified, practiced and defended.
11. Demonstrate that attitudes regarding sustainability of the natural environment are identified, practiced and defended.
12. Demonstrate the ability to incorporate the above values in the school curriculum.
13. Demonstrate the ability to work in teams when designing a curriculum.
14. Identifying the purposes, content and structure of the experimental sciences in the environmental studies curriculum in primary education.
15. Meaningfully apply ICT resources to educational proposals.

## Content

1. **Learning** and teaching about the Earth and its changes in primary school. What are the key ideas?

What does the official curriculum include? What are the most common students' previous ideas? How to make them evolve?

2. **Learning** and teaching about materials and their changes in primary school. What are the key ideas?

What does the official curriculum include? What are the most common students' previous ideas? How to make them evolve?

3. **Learning** and teaching about physical systems in primary school. What are the key ideas? What does the official curriculum include? What are the most common students' previous ideas? How to make them evolve?

4. **Learning and teaching about the living beings in primary school.** What are the key ideas? What does the official curriculum include? What are the most common students' previous ideas? How to make them evolve?

## Methodology

Whole group sessions:

Teacher presentations about basic content knowledge. These sessions are offered to the whole group and allow for discussion of the main contents promoting students' active participation. These sessions include activities that can be performed individually, in pairs or in small groups of students, and then, the results of their reflections and discussions are shared with the rest of the group.

Seminars:

Work spaces in small groups (1/3 out of the whole group) supervised by the teacher. These sessions are aimed at embedding the contents studied in whole group sessions. These sessions also include a compulsory field trip.

Tutorials:

Tutorials to address queries and questions about the topics studied during the course in order to prepare for the written exam or the assignments to be submitted. Exam review.

Students' work:

Students' elaboration of papers, seminar reports, and tasks related to the whole group sessions. Students' search for information and materials, study and preparation for exams, readings.

This subject includes a two-days outdoor visit (includes overnight stay), which will be organised together with professors of the following subjects: Learning and development II, Musical and Visual Education and Learning, Physical Educació and its Didactics. This outdoor visit will take place on 19th - 20th October (Groups 21-41) and on 16th - 17th October (Groups 31-71).

## Activities

Title	Hours	ECTS	Learning outcomes
<b>Type: Directed</b>			
Seminars	15.5	0.62	
Whole group sessions	22.5	0.9	
<b>Type: Supervised</b>			

Tutorials	25	1
<b>Type: Autonomous</b>		
Students' work	62	2.48

## Evaluation

To calculate the average mark of this subject, three grades will be considered:

- average grade of individual tasks (compulsory delivery)
- average grade of group tasks (compulsory delivery)
- exam grade (minimum of 5).

To be allowed to sit the exam, students who have failed some of the (individual or group) tasks must ask for a tutorial to discuss them.

In case of failing the exam, it will be possible to sit a make-up exam on the date and time established by the professor. To be allowed to sit the make-up exam, students must have sat the first exam and must have submitted all the requested tasks (individual and group) and have attended the tutorial to discuss the tasks that have been failed. In case of passing this second exam, the maximum total grade of this subject is 5.

All the assessment tasks carried out throughout the course must be submitted before the deadline established in the subject program by the professor.

The grades on each paper and the exam will be available 1 month after their submission at most.

The attendance to the outdoor visit is compulsory. Students must attend a minimum of 80% of seminars. Otherwise, the grade will be considered as "not taken".

In case of failing the final exam or average final grade, the final mark will be 4.5 (if the average grade is equal or higher than this grade) or the average grade itself (if it is lower than inferior 4.5).

To pass this subject, students must show a good general communicative competence, both oral and writing, and should master the working languages included in the teaching guide. Therefore, in all (individual and group) tasks, linguistic accuracy, appropriate writing and presentation formal aspects will be taken into consideration.

Students should be able to express themselves fluently and accurately and show a high degree of understanding of academic texts. Any task can be handed back (without any assessment) or failed if the professor considers that it does not fulfil these requirements.

Take into consideration that, in the case of the Catalan language, in 1st and 2nd grade students are required to have a linguistic competence equivalent to Level 1 for Pre-school and Primary Education Teachers; and from 3<sup>rd</sup> grade on students must have proved a linguistic competence equivalent to Level 2 for Pre-school and Primary Education Teachers (more information on these levels at <http://www.uab.cat/web/els-estudis/-competencia-linguistica-1345698914384.html>)

In accordance with UAB regulations, plagiarism or copy of any individual or group paper will be punished with a grade of 0 on that paper, losing any possibility of remedial task. During the elaboration of a paper or the individual exam in class, if the professor considers that a student is trying to copy or s/he discovers any kind of non-authorised document or device, the students will get a grade of 0, without any chance to take a make-up exam.

For further general details, the so-called General assessment criteria and guidelines of the School of Educational Sciences passed by COA on 28th May 2015 and modified by Faculty Board on 6th April 2017.

## Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Group reports, design or evaluation of teaching activities and other tasks	25%	0	0	15, 14, 3, 7, 5, 6
Individual tasks related to the whole group sessions, seminars and field trips.	25%	0	0	15, 1, 8, 13, 12, 9, 11, 10, 14, 2, 4, 3, 7, 5, 6
Written exam about content knowledge	50%	0	0	1, 8, 12, 9, 14, 2, 4, 5, 6

## Bibliography

Arcà, M. (1990). Enseñar Ciencias. ¿Cómo empezar? Reflexiones para una educación científica de base. Barcelona: Paidós.

Driver, R. et al. (1989). Ideas científicas de la infancia y la adolescencia. Madrid. Morata.

Giordan, A. (1988). Los orígenes del saber: de las concepciones personales a los conceptos científicos. Sevilla: Díada Editores.

Giordan, A. (2001). El meu cos, la primera maravella del món. Barcelona: la Campana.

Harlen, W.; Qualter, A. (2009). The teaching of science in primary schools. 5<sup>th</sup> Edition. London: David Fulton Publishers.

Izquierdo, M.; Aliberas, J. (2004) Pensar, actuar i parlar a la classe de ciències. Bellaterra: Servei de Publicacions UAB.

Izquierdo, M (ccord) (2011). Química a Infantil i Primària. Ed Graó

Jorba, J.; Sanmartí, N. (1994) Enseñar, aprender y evaluar: un proceso de regulación continua. Madrid: Centro de Investigación y Documentación Educativa.

Márquez, C., Prat, A. (coord.) (2010). Competència científica i lectora a Secundària. L'ús de textos a les classes de ciències. Barcelona: Dossiers Rosa Sensant, 70.

Martí, J. (2012). Aprender ciències a l'educació primària. Barcelona: Graó.

NGSS Lead States (2013). Next Generation Science Standards: For states, by states. Washington, DC: The National Academy Press.

Pujol, R.M. (2001). Les ciències, més que mai, poden ser una eina per formar ciutadans i ciutadanes. Perspectiva escolar, 257, 2-8.

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

Ramiro, E. (2010). La Maleta de la ciència: 60 experiments d'aireiaigua i centenars de recursos per a tothom. Barcelona: Graó.

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

Skamp, K. (2012). Teaching primary science constructively. 4<sup>th</sup> Edition. Cengage Learning.

## Official documents

Currículum de l'àrea del medi natural, social i cultural. **DECRET 119/2015, de 23 de juny, d'ordenació dels ensenyaments de l'educació primària.**

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

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

núm. 4915.

<http://www.xtec.cat/alfresco/d/d/workspace/SpacesStore/c54ef8e6-58a5-4e21-9987-35144cbb88b9/competencie>

### **Journals of Research and Innovation in Teaching and Learning in Science**

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

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

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

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

[http://crecim.uab.cat/revista\\_ciencies/](http://crecim.uab.cat/revista_ciencies/)

### **Journals of Research and Innovation in Teaching and Learning in general (including experimental science)**

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>

### **Webs of interest**

CDEC (Centre de Documentació i Experimentació en Ciències). <http://srvcnpbs.xtec.cat/cdec/>

Primary Science Project (1995). Nuffield Foundation.

<http://www.nationalstemcentre.org.uk/elibrary/collection/448/nuffield-primary-science>

Seeds of Science, Roots of Reading Project. University of California, Berkeley.

<http://www.scienceandliteracy.org/>

Aplicatiu de Recobriment Curricular (educational materials). <http://apliense.xtec.cat/arc/cercador>

Habitat Guides for environmental education. <http://80.33.141.76/habitat/>

Leer.es. <http://www.leer.es>

Kimeia Group. [grupkimeia.blogspot.com.es](http://grupkimeia.blogspot.com.es)

### **Other**

Concept maps of content knowledge in learning progression (from Science Continuum P10, Victoria, Australia).

<http://www.education.vic.gov.au/studentlearning/teachingresources/science/scicontinuum/conceptmaps.htm>