

Teaching Experimental Sciences**2015/2016**Code: 102089
ECTS Credits: 5

| Degree | Type | Year | Semester |
|---------------------------|------|------|----------|
| 2500798 Primary Education | OB | 3 | 1 |

ContactName: Anna Marba Tallada
Email: Anna.Marba@uab.cat**Use of languages**

Principal working language: catalan (cat)

TeachersConxita Márquez Bargalló
María Isabel Hernandez Rodriguez**Prerequisites**

It is advisable to have passed the subject "Teaching and learning about the natural, social and cultural environment in primary education".

Objectives and Contextualisation

The approach of this subject within the Programme of Primary Teacher Education is intended to deepen the content knowledge and competencies necessary to teach the subject of "Environmental knowledge" in primary schools.

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

The objectives of this subject are:

- 1) To identify and discuss basic content knowledge of school science - key ideas - that are tackled in primary education.
- 2) To deepen 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, to design and to 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 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 common students' previous ideas? How to make them evolve?
3. **Leaning** and teaching about physical systems in primary school. What are the key ideas? What does the official curriculum include? What are common students' previous ideas? How to make them evolve?
4. **Learning and teaching about the human body in primary school.** What are the key ideas? What does the official curriculum include? What are common students' previous ideas? How to make them evolve?

Methodology

Whole group sessions:

Presentations about basic content knowledge carried out by the professor. These sessions are offered to the whole group and allow discussing 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 share among the rest of the group.

Seminars:

Work spaces in reduced groups (1/3 out of the whole group) supervised by the professor. These sessions are devoted to deepen the contents tackled in whole group sessions. These sessions also include a compulsory field trip.

Tutorials:

Tutorials to discuss doubts and questions about the topics tackled during the course in order to prepare the written exam or the papers 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 of exams, readings.

Activities

| Title | Hours | ECTS | Learning outcomes |
|-------------------------|-------|------|-------------------|
| Type: Directed | | | |
| Seminars | 15.5 | 0.62 | |
| Whole group sessions | 22.5 | 0.9 | |
| Type: Supervised | | | |
| Tutorials | 25 | 1 | |
| Type: Autonomous | | | |
| Students' work | 62 | 2.48 | |

Evaluation

- To obtain a positive final grade in this subject it is necessary to pass (minimum of 5 out of 10) each of the assessment blocks: group work, written exam and individual work.

- 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 or the exam will be available 1 month after their submission at most.
- In case of failing the exam, taking a remedial exam will be possible on the date and time established by the professor. The maximum grade in this exam will be 5.
- The attendance to the field trips is compulsory. Students must attend a minimum of 80% of seminars. Otherwise, the grade will be considered as "not taken".
- 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-authorized document or device, the students will get a grade of 0, without any chance to take a remedial exam.

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*. 5th 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*. 4th 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/

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://svcnpbs.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

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>