

BASIC DETAILS:

Subject:	TEACHING OF EXPERIMENTAL SCIENCES (FUNDAMENTOS DE APRENDIZAJE DE LAS CC.EE.)		
Id.:	32540		
Programme:	GRADUADO EN EDUCACIÓN PRIMARIA. PLAN 2015 (BOE 17/08/2015)		
Module:	ENSEÑANZA Y APRENDIZAJE DE: CIENCIAS EXPERIMENTALES		
Subject type:	MATERIA BASICA		
Year:	2	Teaching period:	Segundo Cuatrimestre
Credits:	6	Total hours:	150
Classroom activities:	55	Individual study:	95
Main teaching language:	Inglés	Secondary teaching language:	Castellano
Lecturer:	GONZALEZ FERNANDEZ, M ^a JOSE (T)	Email:	mjgonzalezf@usj.es

PRESENTATION:

The subject takes into consideration the basis of the scientific method and the fundamentals of the teaching of Science in Primary Education. The course will focus on the process of acquiring scientific knowledge in children aged 6-12 and the design of suitable activities, experiments and materials according to the curriculum. This subject is part of the module *Enseñanza y Aprendizaje de Ciencias Experimentales* and is linked to the course *Investigación e Innovación en Ciencias Experimentales*. In addition to this, this course follows the approach of the subject *Didáctica General* along with some other subjects of the same area.

PROFESSIONAL COMPETENCES ACQUIRED IN THE SUBJECT:

General programme competences	G01	Capacity to analyse and synthesise information from different sources.
	G02	Capacity to effectively solve problems and take decisions based on the knowledge and competences acquired.
	G03	Capacity to organise, plan and self-assess the work undertaken.
	G04	Capacity to apply information technologies critically and constructively as tools to promote learning.
	G07	Capacity to communicate in English at a minimum B2 level (per the Common European Framework of Reference for Languages) to adapt to the academic and professional requirements of the Degree.
	G08	Capacity to absorb social and humanistic concepts within a rounded university education which allows the development of ethical values such as solidarity, interculturality, equality, commitment, respect, diversity, integrity, etc.
	G09	Capacity to formulate social transformation proposals, considered ethically, based on democracy and basic rights.
	G12	Capacity to self-assess, nurturing learning, scientific research, practice based on evidence and scientific and social progress.
	Specific programme competences	E13
E25		Understand the basic principles and fundamental laws of the experimental sciences (Physics, Chemistry, Biology & Geology).
E26		Know the school curriculum for these sciences.
E27		Devise and solve problems associated with the sciences and daily life.
E28		Assess the sciences as a cultural element.
E29		Recognise reciprocal influence between science, society and technological development, in addition to the relevant personal compartment, to obtain a sustainable future.
E30		Develop and assess curriculum content through suitable didactic resources and further the learning of basic competences among the pupils.
Regulated profession competences	P01	Know the curriculum areas of Primary Education, the interdisciplinary relationship between them, evaluation criteria and the body of didactic knowledge for the teaching and learning procedures, respectively.
	P02	Define, plan and assess teaching and learning processes, both individually and in collaboration with other teachers and professionals at the school.
	P03	Effectively address language learning situations in multicultural and multilingual situations.
	P04	Encourage reading and critical commentary on texts from the diverse scientific and cultural domains in the school curriculum.

	P05	Design and regulate learning zones in contexts of diversity which address gender equality, equity and respecting the human rights which comprise the values of civic education.
	P07	Stimulate and value the effort, persistence and personal discipline of the pupils.
	P10	Accept that teaching is a matter of getting better and adapting to scientific, pedagogical and social changes over the course of the career.
	P12	Take on the educational side of teaching and foment democratic education for an active citizenry.
	P14	Value individual and collective responsibility in the achievement of a sustainable future.
	P16	Acquire the habits and skills to learn alone or with others and foster this among the pupils.
Learning outcomes	R01	Know the scientific methodology applied to research in education.
	R02	Understand basic concepts linked to the experimental sciences.
	R03	Identify the basic principles and fundamental laws of these key sciences for the teaching and learning process at primary level.
	R04	Analyse and understand the educational and learning processes inside and outside the classroom for the 6-12 age group.
	R05	Value the pursuit of science and its results over the history of mankind with regard to awareness of the self and of others, natural phenomena and social evolution.
	R06	Understand the basic principles and fundamental laws of the experimental sciences and master the specific abilities to generate scientific knowledge (design experiments, fieldwork and scientific communication).
	R07	Develop experiments based on their own creation of the necessary materials.

PRE-REQUISITES:

Having a B1 level is a pre-requisite of this degree programme. If you consider you have not reached this level yet, it is your responsibility to reach the level required through independent study and language support courses, either at the Instituto de Lenguas Modernas or other centres. The Instituto de Lenguas Modernas provides language support classes for those students who have not reached the required B1 level. Please speak to your lecturer regarding how you can enrol for these courses.

SUBJECT PROGRAMME:

Observations:

The subject is organized in three blocks, each of them divided in different units.

- Block I: Fundamentals of Science and Science Teaching
- Block II: Science in the Primary Classroom
- Block III: Natural Science Curriculum

Practical workshops will be present throughout the whole course in order to carry out practical science activities such as experiments or fieldworks.

The sessions will be organized in a way that combines master classes and presentations with practical activities.

Subject contents:

1 - BLOCK 1: FUNDAMENTALS OF SCIENCE AND SCIENCE TEACHING
1.1 - What is Science?
1.2 - The Scientific Knowledge
1.3 - The Teaching of Science through History
1.4 - The Scientific Method
2 - BLOCK 2: SCIENCE IN THE PRIMARY CLASSROOM

2.1 - Why Teaching Science in Primary Education?
2.2 - Children's Preconceptions
2.3 - Approaches to the Teaching of Science
2.4 - Science Activities
3 - BLOCK 3: NATURAL SCIENCE CURRICULUM
3.1 - Introduction to Scientific Activity
3.2 - Human Being and Health
3.3 - Living Things
3.4 - Matter and Energy
3.5 - Technology, Objects and Machines

Subject planning could be modified due unforeseen circumstances (group performance, availability of resources, changes to academic calendar etc.) and should not, therefore, be considered to be definitive.

TEACHING AND LEARNING METHODOLOGIES AND ACTIVITIES:

Teaching and learning methodologies and activities applied:

A wide range of teaching and learning methodologies will be used in this course. The sessions will be based mainly on both the constructivist and the communicative approach, so students will be required to participate actively in order to construct their learning. Lectures will be present as well as debates, presentations and hands-on activities. Taking into account the practical nature of the subject, the approach will be highly practical and experimental. Students will be expected to acquire multiple strategies to be applied in their future classes. Besides, during the course, different teaching materials will be either analysed or created by the students.

Service-Learning methodology will be present in the form of the Service-Learning Project "Construimos un ecosistema de innovación educativa: Escape Room en el CEIP Ciudad de Zaragoza" along with the subject *Fundamentos de Aprendizaje de las Ciencias Sociales*. Stages in the project:

-Stage I: Planning. An educational and social need was encountered at CEIP Ciudad de Zaragoza.

-Stage II: Development of the project. Group work. Revision of materials: Natural Science curriculum, syllabus at CEIP Ciudad de Zaragoza, bibliography...

-Stage II: Development of the project. Group work. Designing of the activities to be carried out during the Escape Room (learning outcomes, contents, assessment criteria...) Revision of the activities and the rubrics.

-Stage II: Implementation and closure. The Escape Room sessions will take place at CEIP Ciudad de Zaragoza on 17th April.

-Stage III: Process of reflection and evaluation about the implementation and all the stages in the project.

Different active methodologies will be also present during the course such as Cooperative Learning (by means of cooperative grouping) or the use of a varied range of applications and ICTs. As the subject will be taught through English, a CLIL approach will be used by the lecturer in the teaching of the course. A portfolio will be used for the students to record their reflections and comments about the class. How this portfolio will be assessed will be explained later in this syllabus.

Students will be encouraged to attend any activities outside the classroom which may be of interest to them such as Learning Space sessions, workshops, talks or visits to schools.

Students will also be expected to attend tutorials. The lecturer will inform students about tutorial times. Students will be asked to make a previous appointment by email with their lecturer (mjgonzalezf@usj.es).

As regards independent study, students will be expected to complete all independent study tasks mentioned in this syllabus. All students are required to upload their assessment tasks on the PDU before the submission deadline.

Student work load:

Teaching mode	Teaching methods	Estimated hours
Classroom activities	Master classes	20
	Other theory activities	10
	Practical exercises	2
	Practical work, exercises, problem-solving etc.	6
	Coursework presentations	5
	Laboratory practice	2
	Assessment activities	4
	Extra-curricular activities (visits, conferences, etc.)	5
Individual study	Tutorials	1
	Individual study	30
	Individual coursework preparation	18
	Group coursework preparation	18
	Research work	10
	Compulsory reading	8
	Portfolio	11
Total hours:		150

ASSESSMENT SCHEME:

Calculation of final mark:

Individual coursework:	25 %
Group coursework:	25 %
Final exam:	30 %
Portfolio:	20 %
TOTAL	100 %

*Las observaciones específicas sobre el sistema de evaluación serán comunicadas por escrito a los alumnos al inicio de la materia.

BIBLIOGRAPHY AND DOCUMENTATION:

Basic bibliography:

ANDREWS, G. and KNIGHTON, K. 100 Science Experiments. Dubai: Usborne, 2012.
CAÑAL DE LEÓN, P., GARCÍA CARMONA, A., CRUZ-GUZMÁN ALCALÁ, M. Didáctica de las Ciencias Experimentales en Educación Primaria. Colección Didáctica y Desarrollo. Madrid: Ediciones Paraninfo, 2016
FRITH, A., MASKELL, H., GILLESPIE, L. J., DAVIES, K. What's Science all about? London: Usborne, 2012
JARA, D. G., CUETOS, M. y SERNA, A. I. Didáctica de las Ciencias Naturales en Educación Primaria. Logroño: UNIR Editorial, 2015

Recommended bibliography:

BARBERÁ, O., FLOR, J. I., GUTIÉRREZ, R. et al. Perspectivas para las ciencias en la educación primaria. MECD (Área de Educación), 2004
COOKE, V. and HOWARD, C. Key Concepts in Primary Science: Audit and Subject Knowledge. Glasgow: Critical Publishing, 2016
DALE, L. and TANNER, R. CLIL Activities. A resource for subject and language teachers. Cambridge: Cambridge

University Press, 2012
 HARLEN, W and QUALTER, A. The Teaching of Science in Primary Schools. Oxon: Routledge, 2014
 IGNOTOFSKY, R. Women in Science: 50 Fearless Pioneers Who Changed the World. Wren and Rook, 2017.
 VÍCHEZ, J. M. et al. Didáctica de las Ciencias para educación primaria. Tomo II. Madrid: Pirámide, D.L, 2014.
 SKAMP, K. and PRESTON, C. Teaching Primary Science Constructively. Cengage Learning Australia, 2014.

Recommended websites:

BBC Bitesize - Science	http://www.bbc.co.uk/education/subjects/zng4d2p
Ciencia en acción	http://www.cienciaenaccion.org/es/2016/experimentos.html
CSIC – El CSIC en la Escuela	http://www.csicenlaescuela.csic.es/
Easy Science for Kids	http://easyscienceforkids.com/
Fundación Española para la Ciencia y la Tecnología	http://www.fecyt.es/es/ciencia-para-todos
Kids CSIC	http://www.kids.csic.es/
Kids Health	http://kidshealth.org/en/kids/
Primary Science	http://www.primaryscience.ie/activities_advanced_search.php
Recursos- Graó Publicaciones	http://alambique.grao.com/recursos
Science Experiments for Kids	http://www.sciencekids.co.nz/experiments.html