



Information about the subject

Degree: Bachelor of Arts Degree in Primary School Education

Faculty: Faculty of Teacher Training and Education Sciences

Code: 1160303 **Name:** Teaching of Natural Sciences

Credits: 6,00 **ECTS Year:** 3 **Semester:** 1

Module: Teaching and learning Experimental Science

Subject Matter: Experimental Sciences and their Didactics **Type:** Compulsory

Field of knowledge: Social and Legal Science

Department: Mathematics, Natural Sciences, and Social Sciences applied to Education

Type of learning: Classroom-based learning / Online

Languages in which it is taught: Spanish

Lecturer/-s:

1163A	<u>Jose Martinez Fernandez</u> (Responsible Lecturer)	jose.martinez@ucv.es
1163B	<u>Maria Inmaculada Hernando Mora</u> (Responsible Lecturer)	mi.hernando@ucv.es
1163G	<u>Jose Martinez Fernandez</u> (Responsible Lecturer)	jose.martinez@ucv.es
116A3Z	<u>Eugenio Salvador Ivorra Catala</u> (Responsible Lecturer)	eugenio.ivorra@ucv.es
116D122	<u>Jose Martinez Fernandez</u> (Responsible Lecturer)	jose.martinez@ucv.es
116OL3	<u>Laura Padilla Bautista</u> (Responsible Lecturer)	laura.padilla@ucv.es
1412DZ	<u>Eugenio Salvador Ivorra Catala</u> (Responsible Lecturer)	eugenio.ivorra@ucv.es



142BD	<u>Esther Moreno Latorre</u> (Responsible Lecturer)	esther.moreno@ucv.es
142CD	<u>Esther Moreno Latorre</u> (Responsible Lecturer)	esther.moreno@ucv.es
142DA	<u>Maria Inmaculada Hernando Mora</u> (Responsible Lecturer)	mi.hernando@ucv.es
CAAL	<u>Ana Isabel Carceles Medina</u> (Responsible Lecturer)	anaisabel.carceles@ucv.es
CAOL	<u>Ana Isabel Carceles Medina</u> (Responsible Lecturer)	anaisabel.carceles@ucv.es



Module organization

Teaching and learning Experimental Science

Subject Matter	ECTS	Subject	ECTS	Year/semester
Experimental Sciences and their Didactics	12,00	Fundamentals of Natural Sciences	6,00	2/2
		Teaching of Natural Sciences	6,00	3/1

Learning outcomes

At the end of the course, the student must be able to prove that he/she has acquired the following learning outcomes:

- R1 Interprets and applies the processes through which scientific knowledge is constructed.
- R2 Recognizes the foundations of the main didactic approaches in the teaching and learning of Natural Sciences based on the educational curriculum and the characteristics of scientific knowledge.
- R3 Designs didactic proposals coherent with meaningful learning of sciences, applying didactic models studied in the subject and considering attention to diversity.



Competencies

Depending on the learning outcomes, the competencies to which the subject contributes are (please score from 1 to 4, being 4 the highest score):

GENERAL	Weighting			
	1	2	3	4
CG1				X
CG2				X
CG4				X
CG8			X	
CG9			X	
CG10				X
SPECIFIC	Weighting			
	1	2	3	4
CE23	X			
CE24				X
CE25	X			
CE26		X		



CE27 Recognize the mutual influence between science, society, and technological development, as well as relevant civic behaviors to promote a sustainable future.

X

CE28 Develop and evaluate curriculum content using appropriate didactic resources and promote the acquisition of basic competencies in students.

X



Assessment system for the acquisition of competencies and grading system

In-class teaching

Assessed learning outcomes	Granted percentage	Assessment method
	0,00%	Oral presentation of group and individual works: Self-assessment systems (oral, written, individual, in groups). Oral tests (individual, in groups, presentation of topics or works).
	20,00%	Active participation in theoretical-practical sessions, seminars, and tutorials: Attitude scale (to gather opinions, values, social and managerial skills, interaction behaviors).
	40,00%	Written tests: Objective tests with short and extended responses.
	20,00%	Projects. Development and/or design works.
	20,00%	Reports/Practice reports.

Observations

All the works will have a concrete date of execution and delivery. In order to pass the subject the student must pass both the theoretical and the practical content separately.

The exam will consist of the following parts:

- Objective test consisting of multiple-choice questions with a penalty for incorrect answers, related to theoretical content and scientific reasoning issues.
- Developmental questions related to theoretical content and didactic-scientific reasoning issues.
- Questions related to the practical knowledge acquired in the development of the final project.

A student who is unable to attend any of the classes, will be allowed to take the following assessment method:

- Written tests (short-answer objective tests, developmental tests): 60%
- Projects. Development and/or design works: 20%
- Reports/Practice reports: 10%
- Active participation in tutorials: 10%

In order to qualify for this assessment, the student must ask for authorisation from their Professor and supply any relevant documentation within four weeks from the date when the course begins.



Online teaching

Assessed learning outcomes	Granted percentage	Assessment method
	40,00%	Written tests: short-answer objective tests, developmental tests. Projects. Reports/Practical reports. Design work, development
	0,00%	Exposición oral de trabajos grupales e individuales: sistemas de autoevaluación (oral, escrita, individual, en grupo). Pruebas orales (individual, en grupo, presentación de temas-trabajos)
	20,00%	Active participation in theoretical-practical sessions, seminars, and tutorials: Attitude scale (to gather opinions, values, social and managerial skills, interaction behaviors).
	40,00%	Projects. Development and/or design works.

Observations

The exam will consist of the following parts:

- Developmental questions related to theoretical content and didactic-scientific reasoning issues.
- Questions related to the practical knowledge acquired in the development of the final project.

CRITERIA FOR THE AWARDING OF HONOURS:

In accordance with the regulations governing the assessment and grading of subjects in force at UCV, the distinction of "Matrícula de Honor" (Honours with Distinction) may be awarded to students who have achieved a grade of 9.0 or higher. The number of "Matrículas de Honor" (Honours with Distinction) may not exceed five percent of the students enrolled in the group for the corresponding academic year, unless the number of enrolled students is fewer than 20, in which case a single "Matrícula de Honor" (Honours with 9 Distinction) may be awarded. Exceptionally, these distinctions may be assigned globally across different groups of the same subject. Nevertheless, the total number of distinctions awarded will be the same as if they were assigned by group, but they may be distributed among all students based on a common criterion, regardless of the group to which they belong. The criteria for awarding "Matrícula de Honor" (Honours with Distinction) will be determined according to the guidelines stipulated by the professor responsible for the course, as detailed in the "Observations" section of the evaluation system in the course guide.



Learning activities

The following methodologies will be used so that the students can achieve the learning outcomes of the subject:

- M1 Participatory Master Class
- M3 Project-based Learning
- M4 Learning Contracts
- M5 Seminar Work
- M7 Cooperative/Collaborative Work
- M9 Group and Individual Tutoring
- M10 Individual Tutoring
- M11 Participatory Master Class
- M13 Seminar Work
- M15 Project-based Learning
- M16 Learning Contracts
- M18 Cooperative/Collaborative Work
- M19 Individual Tutoring
- M20 Group and Individual Tutoring



IN-CLASS LEARNING

IN-CLASS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Group Work Presentation M3	R1, R2, R3	29,00	1,16
Theoretical Class M1	R1, R2, R3	20,00	0,80
Practical Class M5	R1, R2, R3	2,00	0,08
Tutoring M9	R1, R2, R3	6,00	0,24
Evaluation M10	R1, R2, R3	3,00	0,12
TOTAL		60,00	2,40

LEARNING ACTIVITIES OF AUTONOMOUS WORK

	LEARNING OUTCOMES	HOURS	ECTS
Group work M7	R1, R2, R3	34,00	1,36
Individual work M10	R1, R2, R3	56,00	2,24
TOTAL		90,00	3,60



ON-LINE LEARNING

SYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Theoretical class (e-learning mode) M11	R1, R2, R3	35,00	1,40
Practical class (e-learning mode) M18	R1, R2, R3	5,00	0,20
Seminar (e-learning mode) M11	R1, R2, R3	6,00	0,24
Individual tutoring (e-learning mode) M19	R1, R2, R3	1,50	0,06
Evaluation (e-learning mode) M19	R1, R2, R3	2,50	0,10
TOTAL		50,00	2,00

ASYNCHRONOUS LEARNING ACTIVITIES

	LEARNING OUTCOMES	HOURS	ECTS
Individual work Activities (e-learning mode)		58,75	2,35
Group Work (e-learning mode)		27,50	1,10
Discussion Forums (e-learning mode)		2,50	0,10
Asynchronous Tutoring (e-learning mode)		1,25	0,05
Theoretical-Practical Class (distance mode)		10,00	0,40
TOTAL		100,00	4,00



Description of the contents

Description of the necessary contents to acquire the learning outcomes.

Theoretical contents:

Content block	Contents
SCIENTIFIC LITERACY. THE NATURAL SCIENCES CURRICULUM IN THE VALENCIAN COMMUNITY IN PRIMARY EDUCATION	INTRODUCTION - SCIENTIFIC LITERACY - INTRODUCTION TO THE CONCEPT OF ENVIRONMENT - THE NATURAL SCIENCES CURRICULUM IN THE VALENCIAN COMMUNITY IN PRIMARY EDUCATION
LEARNING NATURAL SCIENCES IN PRIMARY EDUCATION	STUDENTS' CONCEPTIONS - LEARNING NATURAL SCIENCES IN PRIMARY EDUCATION - MISSCONCEPTIONS - SCIENTIFIC LEARNING IN CHILDREN AND INFLUENCING FACTORS - SELF-REGULATION OF SCIENTIFIC LEARNING
TEACHING NATURAL SCIENCES IN PRIMARY EDUCATION	METHODOLOGICAL PROPOSALS FOR TEACHING SCIENCES IN PRIMARY EDUCATION - TEACHING RESOURCES - EVALUATION OF SCIENTIFIC COMPETENCE

Temporary organization of learning:

Block of content	Number of sessions	Hours
SCIENTIFIC LITERACY. THE NATURAL SCIENCES CURRICULUM IN THE VALENCIAN COMMUNITY IN PRIMARY EDUCATION	8,00	16,00
LEARNING NATURAL SCIENCES IN PRIMARY EDUCATION	10,00	20,00
TEACHING NATURAL SCIENCES IN PRIMARY EDUCATION	12,00	24,00



References

Bibliografía básica

- Cañas, A., Martín-Díaz, M.J. y Nieda, J. (2007). Competencia en el conocimiento y la interacción con el medio físico. Alianza Editorial.
- De Pro, A. (Dir.) (2010). Competencia en el conocimiento e interacción con el mundo físico: la comprensión del entorno próximo. Ministerio de Educación.
- Decreto 108/2014, de 4 de julio, del Consell, por el que establece el currículo y desarrolla la ordenación general de la educación primaria en la Comunitat Valenciana”
- DECRETO 106/2022, de 5 de agosto, del Consell, de ordenación y currículo de la etapa de Educación Primaria. [2022/7572]
- Fernández, R. y Bravo, M. (2015). Las Ciencias de la Naturaleza en la Educación Infantil. Pirámide.
- García, J. y Nando, J. (2000). Estrategias didácticas en Educación Ambiental. Aljibe.
- González, D., Cuetos, M.J. y Serna, A.I. (2015). Didáctica de las Ciencias Naturales en Educación Primaria. Unir.
- González, F. (Coord.) (2015). Didáctica de las Ciencias para Educación Primaria. II. Ciencias de la vida. Pirámide.
- Izquierdo, M. (Coord.) (2012). Química en Infantil y Primaria. Una nueva mirada. Graó.
- Izquierdo, M. y Aliberas, J. (2004) Pensar, actuar i parlar a la classe de ciències. Per un ensenyament de les ciències racional i raonable. Universitat Autònoma de Barcelona.
- Jiménez, M.P. (2007). Enseñar ciencias. Graó.
- Liguori, L. y Noste, M.I. (2007). Didáctica de las Ciencias Naturales. Enseñar Ciencias Naturales. Eduforma.
- Lozano, O.R. y Solbes, J. (2014). 85 experimentos de Física cotidiana. Graó.
- Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Primaria
- Novo, M. (2003). La educación ambiental. Bases éticas, conceptuales y metodológicas. Universitas.
- Perales, F.J. (Coord.) (2000). Resolución de problemas. Síntesis.
- Perales, F. J. y Cañal, P. (Directores) (2000). Didáctica de las Ciencias experimentales. Marfil.
- Pozo, J.I. y Flores, F. (2007). Cambio conceptual y representacional en el aprendizaje y la enseñanza de la ciencia. Antonio Machado Libros.
- Pujol, R. M. (2007). Didáctica de las ciencias en la educación primaria. Síntesis.
- Ramiro, E. (2010). La maleta de la ciencia: 60 experimentos de aire y agua y centenares de recursos para todos. Graó.
- Sanmartí, N. (2002). Didáctica de las ciencias en la educación secundaria. Síntesis.
- Vílchez, J.M. (Coord.) (2015). Didáctica de las Ciencias para Educación Primaria. I. Ciencias del espacio y de la Tierra. Pirámide.
- VV.AA. (2000). Valores y temas transversales en el currículum. Graó.
- VV.AA. (2002). Las ciencias en la escuela. Teoría y prácticas. Graó.



VV.AA. (2009). Hacemos ciencia en la escuela. Graó.

Bibliografía complementaria

Cañal, P (Coord.) (2011). Didáctica de la Biología y la Geología. Graó.

Carbó, V., Pigrau, T. y Tarín, R.M. (2010). Qué entemen per treballar el tema dels essers vius avui, i dels animals en particular, a Educació Infantil i primària? *Perspectiva escolar* 343.

Carbó, V., Pigrau, T. y Tarín, R.M. (2010) Competències i ciència escolar. Què fem amb el que sabem? *Guix* 364, 65-72.

Carrascosa, J. (2005). El problema de las concepciones alternativas en la actualidad (parte I). Análisis sobre las causas que las originan y/o mantienen *Revista Eureka sobre Enseñanza y Divulgación de las Ciencias* 2(2), 183-208.

Gallego, A.P., Castro, J.E. y Rey, J.M. (2008). El pensamiento científico en los niños y las niñas: algunas consideraciones e implicaciones *IIEC* 3(2), 22-29.

Garrido, J.M., Perales, F.J. y Galdón, M. (2009). *Ciencia para educadores*. Pearson.

Gavidia, V., Aguilar, R. y Carratalá, A. (2011). ¿Desaparecen las transversales con la aparición de las competencias? *Didáctica de las Ciencias Experimentales y Sociales* 25, 131-148.

Gil, D. y Vilches, A. (2006). Educación ciudadana y alfabetización científica: Mitos y realidades *Revista Iberoamericana de educación* 42, 31-53.

González, M.P. (Coord.) (2003). *Prácticas de laboratorio y de aula*. Biología, Ecología, Genética y Geología. Narcea-MEC.

Prieto, T., Blanco, A. y González, F. (2000). *La materia y los materiales*. Síntesis.

Pujol, R.M. (2008). Pensar en la escuela primaria para pensar en la formación de su profesorado, desde la Didáctica de las Ciencias Experimentales, en el marco del nuevo grado. XXIII Encuentros de Didáctica de las Ciencias Experimentales. Universidad de Almería.

Rojo, A. (2010). *La física en la vida cotidiana*. RBA.

Sabariego, J.M. y Manzanares, M. (2006). Alfabetización científica. I Congreso Iberoamericano de Ciencia, Tecnología, Sociedad e Innovación CTS+I.

Sanmartí, N. (2004). *Aprender ciencias: Conectar l'experiència, el pensament i la parla a través de models*

http://actE354.campus.acte.cat/essersvius/sessions/3_maneresdemirar/aprendre_ciencies.pdf

Sanmartí, N., Burgoa, B. y Nuño, T. (2011). ¿Por qué el alumnado tiene dificultad para utilizar sus conocimientos científico escolares en situaciones cotidianas? *Alambique. Didáctica de las Ciencias Experimentales* 67, 62-69.

Tomás, A. (Coord.). (2008). *Física y Química enlatadas*. Aguacilara

Tonucci, F. (1995). El niño y la ciencia. En *Con ojos de maestro*. Troquel, 85-107

Vilches, A. y Gil, D. (2011). El trabajo cooperativo en las clases de ciencias. Una estrategia imprescindible pero aún infrutilizada. *Alambique. Didáctica de las Ciencias Experimentales* 69, 73-79.

VV. AA. (2000). *El gran libro de los experimentos*. San Pablo.