



## 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:** -

**Type of learning:** Classroom-based learning / Online

**Languages in which it is taught:** Spanish

**Lecturer/-s:**

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



Year 2023/2024

1160303 - Teaching of Natural Sciences

142BD	<u>Esther Moreno Latorre (Responsible Lecturer)</u>	esther.moreno@ucv.es
142CD	<u>Esther Moreno Latorre (Responsible Lecturer)</u>	esther.moreno@ucv.es
142DA	<u>Maria Inmaculada Hernando Mora (Responsible Lecturer)</u>	mi.hernando@ucv.es
PR2AFD	<u>Jose Martinez Fernandez (Responsible Lecturer)</u>	jose.martinez@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 Understand the curricular areas of Primary Education, the interdisciplinary relationship between them, the evaluation criteria, and the body of didactic knowledge around the respective teaching and learning procedures.				x
CG2 Design, plan, and evaluate teaching and learning processes, both individually and in collaboration with other teachers and professionals from the school.				x
CG4 Design and regulate learning spaces in diverse contexts that address gender equality, equity, and respect for human rights, which form the values of citizenship education.				x
CG8 Maintain a critical and autonomous relationship with knowledge, values, and public and private social institutions.			x	
CG9 Value individual and collective responsibility in the attainment of a sustainable future.			x	
CG10 Reflect on classroom practices to innovate and improve teaching work. Acquire habits and skills for autonomous and cooperative learning and promote it among students.				x
SPECIFIC	Weighting			
	1	2	3	4
CE23 Comprehend the basic principles and fundamental laws of experimental sciences (Physics, Chemistry, Biology, and Geology).			x	
CE24 Know the school curriculum of these sciences.				x
CE25 Pose and solve problems associated with sciences in daily life.		x		
CE26 Value sciences as a cultural fact.			x	



Year 2023/2024

1160303 - Teaching of Natural Sciences

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

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.

### 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)



Year 2023/2024

1160303 - Teaching of Natural Sciences

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:

As a sign of academic exceptionality, the Honour's Degree will be awarded to the student who, in addition to obtaining a maximum mark in the above criteria, is considered by the teacher to be worthy of such a distinction. And, in accordance with the general regulations which indicate that only one matriculation of honour can be awarded for every 20 students, not per fraction of 20, with the exception of the case of groups of less than 20 students in total, in which one matriculation can be awarded.

## 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            |



Year 2023/2024

1160303 - Teaching of Natural Sciences

- 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





Year 2023/2024

1160303 - Teaching of Natural Sciences

## 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
<b>TOTAL</b>		<b>60,00</b>	<b>2,40</b>

### 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
<b>TOTAL</b>		<b>90,00</b>	<b>3,60</b>



Year 2023/2024

1160303 - Teaching of Natural Sciences

## 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
<b>TOTAL</b>		<b>50,00</b>	<b>2,00</b>

### 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
<b>TOTAL</b>		<b>100,00</b>	<b>4,00</b>



## 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.
- Vilchez, 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). Aprendre ciències: Connectar l'experiència, el pensament i la parla a través de models

[http://actE354.campus.acte.cat/essersvius/sessions/3\\_maneresdemirar/aprendre\\_ciencies.pdf](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. Aguaclara

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 infroutilizada. Alambique. Didáctica de las Ciencias Experimentales 69, 73-79.

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



## Addendum to the Course Guide of the Subject

Due to the exceptional situation caused by the health crisis of the COVID-19 and taking into account the security measures related to the development of the educational activity in the Higher Education Institution teaching area, the following changes have been made in the guide of the subject to ensure that Students achieve their learning outcomes of the Subject.

**Situation 1: Teaching without limited capacity (when the number of enrolled students is lower than the allowed capacity in classroom, according to the security measures taken).**

In this case, no changes are made in the guide of the subject.

**Situation 2: Teaching with limited capacity (when the number of enrolled students is higher than the allowed capacity in classroom, according to the security measures taken).**

In this case, the following changes are made:

### 1. Educational Activities of Onsite Work:

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject will be made through a simultaneous teaching method combining onsite teaching in the classroom and synchronous online teaching. Students will be able to attend classes onsite or to attend them online through the telematic tools provided by the university (videoconferences). In any case, students who attend classes onsite and who attend them by videoconference will rotate periodically.

In the particular case of this subject, these videoconferences will be made through:



Microsoft Teams



Kaltura



### **Situation 3: Confinement due to a new State of Alarm.**

In this case, the following changes are made:

#### **1. Educational Activities of Onsite Work:**

All the foreseen activities to be developed in the classroom as indicated in this field of the guide of the subject, as well as the group and personalized tutoring, will be done with the telematic tools provided by the University, through:

- Microsoft Teams
- Kaltura

Explanation about the practical sessions:



## 2. System for Assessing the Acquisition of the competences and Assessment System

### ONSITE WORK

#### Regarding the Assessment Tools:



The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus.



The following changes will be made to adapt the subject's assessment to the online teaching.

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

#### Comments to the Assessment System:

Adaptation from a face-to-face format to an online format, according to the specifications provided by the faculty and the university, without affecting the assessment method of the learning outcomes of the subject. Under no circumstances does this imply an increase in student workload requirements.



## ONLINE WORK

### Regarding the Assessment Tools:

- |                                     |  |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | The Assessment Tools will not be modified. If onsite assessment is not possible, it will be done online through the UCVnet Campus. |
| <input type="checkbox"/>            | The following changes will be made to adapt the subject's assessment to the online teaching.                                       |

Course guide		Adaptation	
Assessment tool	Allocated percentage	Description of the suggested changes	Platform to be used

The other Assessment Tools will not be modified with regards to what is indicated in the Course Guide.

### Comments to the Assessment System: