

**1. General information****Course:** THE NATURAL ENVIRONMENT I: TEACHING PHYSICS AND CHEMISTRY**Code:** 46323**Type:** CORE COURSE**ECTS credits:** 6**Degree:** 392 - BACHELOR'S DEGREE IN PRIMARY EDUCATION (AB)**Academic year:** 2021-22**Center:** 101 - FACULTY OF EDUCATION IN ALBACETE**Group(s):** 10 11 17 18 19 12 13 15 14**Year:** 3**Duration:** C2**Main language:** Spanish**Second language:** English**Use of additional languages:****English Friendly:** N**Web site:****Bilingual:** Y

Lecturer: JOSE MANUEL CORTES SIMARRO - Group(s): 10 17 15				
Building/Office	Department	Phone number	Email	Office hours
Facultad de Educación.	QUÍMICA FÍSICA	926053282	josemanuel.cortes@uclm.es	
Lecturer: ROSA MARIA TOLEDANO TORRES - Group(s): 11 18 19 14				
Building/Office	Department	Phone number	Email	Office hours
Facultad de Educación	QUÍMICA FÍSICA	2451	RosaM.Toledano@uclm.es	

2. Pre-Requisites

Not established

3. Justification in the curriculum, relation to other subjects and to the profession

This is the only course unit in the syllabus of Degree in Primary Education dedicated to two of the most important Natural Sciences (Physics and Chemistry). Physics and Chemistry are the key to understanding and advancing in the scientific-technological world in which we live. The working method of Experimental Sciences, called scientific method, has great potentialities and characteristics that make it particularly suitable from the educational point of view. This method has even been an inspiration for teaching methodologies in the last few decades of the twentieth century as heuristic or experimental method. Although as time went by these methodologies have become obsolete, there is no doubt that the study of scientific method itself contributes to comprising a set of skills that can be very useful both in everyday life and in the academic life of Education students. From among them, we can point out the following:

- Understanding the role, possibilities and limits of education in today's society and core competencies that affect early childhood education, primary schools, and their professionals.
- The ability to master the area taught, the processes of knowledge construction and related teaching, plus the interdisciplinary relationship between them.
- The ability to use language appropriately in each communicative situation and critically analyse scientific and cultural texts.
- Acquiring basic scientific-cultural and technological knowledge.

In addition, we can add the following considerations:

1. Physics and Chemistry are subjects of knowledge. As such, they fulfil three functions:

- Instructive function. They provide the knowledge that allows us to make decisions in freedom from many current issues
- Humanist function. They seek to respond to many human needs (related to health, energy production, pollution, etc.)
- Educational function. They develop a series of attitudes and values characteristic of Science (curiosity, scepticism, logical reasoning, empirical testing of hypotheses, etc.)

2. The complexity of the phenomena that the teacher tries to understand and afterwards to teach his/her students is satisfied with the contribution of all experimental sciences (called integrated science) in an interdisciplinary framework (i.e., studying reality with collaboration of the social sciences)

3. In the teaching career, physics and chemistry help to satisfy the questions raised by children in contact with the reality around them. It helps to answer questions arising from the manipulation of a toy or the observation of a phenomenon

4. Degree competences achieved in this course

Course competences	
Code	Description
1.2.1.II.01	Understand the basic principles and fundamental laws of experimental sciences (Physics, Chemistry, Biology and Geology).
1.2.1.II.02	Know the curriculum of Primary Education concerning these sciences.
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CG09	Value individual and collective responsibility for a sustainable future.

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Plan strategies for developing learning activities in the fields of Physics and Chemistry.

Solve questions, exercises and problems related to the principles, laws and most important physicochemical theories.

Interpret the physicochemical phenomena that surround us in such a way to facilitate their future work as teachers.

Develop units and syllabi based on contents of the field of knowledge

Be able to develop and evaluate curriculum contents through appropriate teaching resources and promote relevant skills in students.

Recognize the historical Science-Technology-Society influence, assessing their importance and cultural significance

Assimilate the language and terminology of Physics and Chemistry, which would allow students to understand the main theoretical and practical paradigms of these experimental sciences.

Manage operations of physical quantities, units, and conversion systems.

Appreciate physics and chemistry as areas that help to preserve the environment and to improve living human conditions.

6. Units / Contents

Unit 1: Physics and chemistry as experimental sciences

Unit 2: Fundamental principles for teaching Physics in Primary Education

Unit 3: Fundamental principles for teaching Chemistry in Primary Education

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	1.2.1.II.02 CG09	1.2	30	Y	N	Development of lectures, with support of new technologies and participation of students through group discussions
Class Attendance (practical) [ON-SITE]	Problem solving and exercises	1.2.1.II.01 CB01	0.56	14	Y	N	Application of the theoretical contents through practical exercises. Students and teacher will share and resolve doubts
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	1.2.1.II.01 CB01	0.16	4	Y	N	Internship in the laboratory
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	1.2.1.II.01 CB01	0.24	6	Y	N	Application of the theoretical contents through practical exercises based on what they have learned.
Problem solving and/or case studies [ON-SITE]	Cooperative / Collaborative Learning	1.2.1.II.01 CB01	0.16	4	Y	N	Students' doubts will be solved either in individual or group tutoring session
Final test [ON-SITE]	Assessment tests	CB01	0.08	2	Y	Y	A final test will assessed the knowledge students have acquired. It is compulsory to get a minimum rate of 4
Writing of reports or projects [OFF-SITE]	Cooperative / Collaborative Learning	1.2.1.II.01 CB01	0.4	10	Y	N	Students will write internship memories corresponding to lab sessions
Writing of reports or projects [OFF-SITE]	Self-study	1.2.1.II.01 CB01	0.8	20	Y	N	Workgroups will search for information related to experimental sciences
Writing of reports or projects [OFF-SITE]	Cooperative / Collaborative Learning	CB01	0.6	15	Y	N	Workgroups will bring together the theoretical contents previously explained, in order to be able to elaborate the corresponding project.
Study and Exam Preparation [OFF-SITE]	Problem solving and exercises	1.2.1.II.01 CB01	0.56	14	Y	N	Application of the theoretical contents through practical exercises based on what they have learned.
Study and Exam Preparation [OFF-SITE]	Self-study	1.2.1.II.01 1.2.1.II.02 CB01 CG09	1.24	31	Y	N	Organization, preparation and study of the contents taught in the classroom.
Total:			6	150			
Total credits of in-class work: 2.4			Total class time hours: 60				
Total credits of out of class work: 3.6			Total hours of out of class work: 90				

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Assessment of active participation	10.00%	10.00%	Students will have to perform a theoretical group work on the contents of Unit 1. ***Plagiarism policy: See article 9 of Students Evaluation Rules.
			Students will have to complete a practical project related to Unit

Assessment of active participation	10.00%	10.00%	3, as well as a compulsory presentation in class. ***Plagiarism policy: See article 9 of Students Evaluation Rules.
Final test	70.00%	70.00%	Two final tests corresponding to the part of Physics and to the part of Chemistry will be taken. These will have a maximum weight of 70%. Students must obtain a minimum rating of 4 out of 10 in each
Laboratory sessions	10.00%	10.00%	Students will do a training report on Unit 2 (separation of substances). Student attendance at the laboratory or workshop sessions will be mandatory. ***Plagiarism policy: See article 9 of Students Evaluation Rules.
Total:	100.00%	100.00%	

According to art. 4 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 12.2) to be globally graded, in 2 annual calls per subject, an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

Students must:

1. Assimilate the language and terminology of physics and chemistry. It would allow students to know the main theoretical and practical paradigms of these two experimental sciences.
2. Know the principles of physics and chemistry that are part of the syllabus of Primary Education.
3. Solve questions, exercises and problems related to the principles, laws and most important physico chemical theories related to Primary Education curriculum.
4. Know how to operate and use physical quantities, units, and conversion systems.
5. Interpret the physicochemical phenomena in the world around us so as to facilitate their future work as teachers.

In the ordinary exam session, two final tests corresponding to the part of Physics and to the part of Chemistry will be taken. Students must obtain a minimum rating of 4 out of 10 in each part. These will have a maximum weight of 70%. The remaining 30 % will correspond to the group works.

Students will get their qualification with:

70% of the mark obtained in the final exams of Physics and Chemistry. Students must obtain a minimum rating of 4 out of 10 in each.

30% of the mark obtained in an exam related to the group works and laboratory sessions. Students must take this exam just in case they do not do the corresponding group works and/or if they do not attend the laboratory sessions

For every mistake of those included in the "List of mistakes to avoid" (see Moodle), the student will miss 0.2 marks in the corresponding activity/test/presentation/exam up to a maximum of 1.6 marks (8 mistakes). If the mistake is repeated, the repetition(s) will be also penalized.

**If applicable, any modifications or adaptations needed in the teaching guides as a result of a change in the teaching or evaluation model derived from the evolution of the pandemic will be documented in a later addendum

Non-continuous evaluation:

Students will get their qualification with:

70% of the mark obtained in the final exams of Physics and Chemistry. Students must obtain a minimum rating of 4 out of 10 in each.

30% of the mark obtained in an exam related to the group works and laboratory sessions. Students must take this exam just in case they do not do the corresponding group works and/or if they do not attend the laboratory sessions

For every mistake of those included in the "List of mistakes to avoid" (see Moodle), the student will miss 0.2 marks in the corresponding activity/test/presentation/exam up to a maximum of 1.6 marks (8 mistakes). If the mistake is repeated, the repetition(s) will be also penalized.

**If applicable, any modifications or adaptations needed in the teaching guides as a result of a change in the teaching or evaluation model derived from the evolution of the pandemic will be documented in a later addendum

***Plagiarism policy: See article 9 of Students Evaluation Rules.

Specifications for the resit/retake exam:

In the extra exam session, two final tests corresponding to the part of Physics and to the part of Chemistry will be taken. Students must obtain a minimum rating of 4 out of 10 in each part. These will have a maximum weight of 70%. The remaining 30 % will correspond to the group works or to the exam related to the group works and laboratory sessions.

For every mistake of those included in the "List of mistakes to avoid" (see Moodle), the student will miss 0.2 marks in the corresponding activity/test/presentation/exam up to a maximum of 1.6 marks (8 mistakes). If the mistake is repeated, the repetition(s) will be also penalized.

Students will get their qualification with:

70% of the mark obtained in the final exams of Physics and Chemistry. Students must obtain a minimum rating of 4 out of 10 in each.

30% of the mark obtained in an exam related to the group works and laboratory sessions. Students must take this exam just in case they do not do the corresponding group works and/or if they do not attend the laboratory sessions.

**If applicable, any modifications or adaptations needed in the teaching guides as a result of a change in the teaching or evaluation model derived from the evolution of the pandemic will be documented in a later addendum

Specifications for the second resit / retake exam:

Students who opt for the second resit/retake exam will have to take an exam of the two parts of the subject (Physics and Chemistry), each of the parts will have a maximum weight of 50% of the grade, and students must obtain a minimum grade of 4 out of 10 in each.

For every mistake of those included in the "List of mistakes to avoid" (see Moodle), the student will miss 0.2 marks in the corresponding activity/test/presentation/exam up to a maximum of 1.6 marks (8 mistakes). If the mistake is repeated, the repetition(s) will be also penalized.

**If applicable, any modifications or adaptations needed in the teaching guides as a result of a change in the teaching or evaluation model derived from the evolution of the pandemic will be documented in a later addendum

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
Hours	hours

Unit 1 (de 3): Physics and chemistry as experimental sciences	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	10
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	10
Study and Exam Preparation [AUTÓNOMA][Self-study]	5
Group 12:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 13:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 10:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 11:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 14:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 15:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 16:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 17:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 18:	
Initial date: 31-01-2022	End date: 04-02-2022
Group 19:	
Initial date: 31-01-2022	End date: 04-02-2022
Unit 2 (de 3): Fundamental principles for teaching Physics in Primary Education	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	14
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	7
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning]	2
Final test [PRESENCIAL][Assessment tests]	1
Writing of reports or projects [AUTÓNOMA][Self-study]	20
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	7
Study and Exam Preparation [AUTÓNOMA][Self-study]	13
Group 12:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 13:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 10:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 11:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 14:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 15:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 16:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 17:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 18:	
Initial date: 07-02-2022	End date: 18-03-2022
Group 19:	
Initial date: 07-02-2022	End date: 18-03-2022
Unit 3 (de 3): Fundamental principles for teaching Chemistry in Primary Education	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	14
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	7
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	3
Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning]	2
Final test [PRESENCIAL][Assessment tests]	1
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	2.5
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	7
Study and Exam Preparation [AUTÓNOMA][Self-study]	13
Group 12:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 13:	
Initial date: 21-03-2022	End date: 18-05-2022

Group 10:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 11:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 14:	
Initial date: 21-03-2022	End date: 13-05-2022
Group 15:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 16:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 17:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 18:	
Initial date: 21-03-2022	End date: 18-05-2022
Group 19:	
Initial date: 21-03-2022	End date: 18-05-2022
Global activity	
Activities	hours
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	6
Problem solving and/or case studies [PRESENCIAL][Cooperative / Collaborative Learning]	4
Final test [PRESENCIAL][Assessment tests]	2
Writing of reports or projects [AUTÓNOMA][Self-study]	20
Study and Exam Preparation [AUTÓNOMA][Problem solving and exercises]	14
Study and Exam Preparation [AUTÓNOMA][Self-study]	31
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	12.5
Writing of reports or projects [AUTÓNOMA][Cooperative / Collaborative Learning]	12.5
Class Attendance (theory) [PRESENCIAL][Lectures]	30
Class Attendance (practical) [PRESENCIAL][Problem solving and exercises]	14
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	City	ISBN	Year	Description
Burbano de Ercilla, S.	Física General	Librería General S.A.		9788470783760	1979	
Esteban Santos, S	Introducción a la historia de la química	UNED		9788436261905	2001	
Gerald Holton	Introduction to Concepts and Theories in Physical Science	Princeton University Press		9780691083841	1985	
Isaac Asimov	A short history of Chemistry	Doubleday		9780313207693	1965	
Chris McMullen	Understand Basic Chemistry Concepts: The Periodic Table, Chemical Bonds, Naming Compounds, Balancing Equations, and More	Northwestern State. University of Louisiana		9781479134632	2013	
Babor, J.	Química General Moderna	Marin		9788471029973	1983	
Isaac Asimov	Enciclopedia biográfica de ciencia y tecnología	Alianza editorial		9788420602349	1973	
Isaac Asimov	Biographical Encyclopedia of Science and Technology	Doubleday		9780385177719	1964	
Isaac Asimov	The new intelligent man's guide to science	Basic Books		9781124018089	1965	
Carl Sagan	Cosmos	Random House		9780375508325	2002	
Isaac Asimov	Nueva guía de la ciencia	Plaza & Janés		9788401496738	1985	
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Izquierdo, M.C. y col	Evolución histórica de los principios de química	UNED		9788436268188	2003	
Linus Pauling	General Chemistry	Dover Publication, INC.		9780486656229	1970	
Karl F. Kuhn	Basic Physics. A self-teaching guide	John Wiley & Sons, Inc.		9780471134473	1996	
Abervuj, E.	Con el cielo en el bolsillo	Ediciones de la torre		9788486587710	1986	
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Galán García, J.L.	Sistemas de unidades físicas	Reverté		9788429143010	1987	
Gerald Holton	Introducción a los conceptos y teorías de las ciencias físicas	Reverté		9788429143232	1983	
Tipler, P.	Física	Reverté		9788429144291	1984	
Alsina, D y col.	Química. Conceptos fundamentales	Edicionesl UNL		9789876573948	2008	