

TEACHING GUIDE

DIDACTICS OF NATURAL SCIENCES I

GRADO EN EDUCACIÓN PRIMARIA (INGLÉS)

ACADEMIC YEAR 2026-27

Publication date: 30-06-2026



I.-Subject Identification

Type	OBLIGATORIA
Teaching period	3 course, 1Q semester
Nº of credits	6
Language in which the subject is taught	English

II.-Presentation

The promulgation of *Ley Orgánica 3/2020, de 29 de diciembre, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación* and its specific *Real Decreto 157/2022, de 1 de marzo, por el que se establecen la ordenación y las enseñanzas mínimas de la Educación Primaria* has established a new regulatory framework for Primary Education. The transposition of this national rule to the Community of Madrid legislation was done in *Decreto 61/2022, de 13 de julio, del Consejo de Gobierno, por el que se establece para la Comunidad de Madrid la ordenación y el currículo de la etapa de Educación Primaria*.

Didactics of Natural Science I is the first contact for URJC Degree in Primary Education students with the world of Natural Sciences, being understood in the word's traditional sense as comprising the scientific specialities of Physics, Chemistry, Biology, Geology or the younger Biochemistry or Environmental Sciences. Physics and Biology subjects will this year be deeply studied, whereas a major dealing in Chemistry will be done in the following **Didactics of Natural Science II**. In the Degree design, a third subject, **Experimental and Social Science in Primary Education** comes after both *Didactics*, its contents won't be exclusively didactic, but must partially combine the teaching of the scientific matters themselves. Furthermore, references to Primary Education official curriculum, through the subject called *Ciencias Naturales (Natural Science)*, and carrying out of inherent-to-experimental sciences practical activities must be continuous.

Objective:

Didactics of Natural Science I aim is giving future school teachers some didactic and scientific basics they will need for the professional teaching practice within the framework of Primary Education, in the field we could name Environment knowledge. Especially, Physics and Biology will be dealt in greater depth. For this subject, it is expected the students will be given proper expertise in the field of Experimental sciences, either theoretical or practical, that will contribute to preparing them as Primary Education school teachers, finding out, at the same time, its importance for understanding not only physical events but teaching job itself. Summarizing, **Didactics of Natural Science I** promotes developing a critical, thoughtful and active attitude for understanding Nature, natural phenomena and its didactics in Primary Education.

Guidelines:

- Nature and features of scientific knowledge.
 - Experimental sciences curriculum in Primary Education
 - Study of physic-natural subjects for scientific teaching in Primary Education
 - Teaching schedule: Biology and Physics greater depth dealing
- Scientific and practical activities according to Primary Education level.

III.-Learning outcomes



CGI01. Capacity for analysis and synthesis
 CGI06. Information management capability
 CGP01. Teamwork.
 CGP05. Critical reasoning.
 CGS05. Sensitivity to environmental issues
 CG01. Acquire and understand the necessary knowledge of the different areas of study that make up the title in such a way that they train for the profession of Teacher in Primary Education.
 CG05. Acquire the necessary learning skills to expand their studies autonomously.
 CE02 . Knowledge of contents to be taught, understanding their epistemological singularity and the specificity of their didactics.
 CE03 . Solid scientific and cultural and technological training
 CE06 . Design and development of educational projects and programming units for adapting the curriculum to the sociocultural context .
 CE01 . Know the different curricular areas of Primary Education (especially the subject that concerns us) with all the elements of the Teaching/Learning process and the interdisciplinary relationship between the areas.
 CE02 . Effectively address learning situations (in design, development and evaluation) between the ages of 6 and 12, from a globalizing and integrating perspective of the different cognitive, emotional, motor, linguistic and self-regulatory dimensions. (Globalizing perspective)
 CE03 . Create learning environments that encourage empathy , social behavior , autonomy and multicultural coexistence systematically observing the social , family and school environment. (Contextual and natural social perspective) .
 CE07 . Design didactic actions related to understanding space and time in schoolchildren. (Space-time perspective)
 CE11. Design experiences to know the natural world through sensory perception. (On sensory and experimental development)

- Key for degrees not adapted to RD 822/21: **CB** - basic competences, **CG** - generic competences, **CE** - specific competences, **CT** - transversal competences.
- Key for degrees adapted to RD 822/21: **CON** - knowledge, **COM** - competences, **HAB** - skills.



IV.-Contents

IV.A.-Syllabus

Unit 1 Experimental sciences curriculum in Primary Education

- Content area of Awareness of the natural, social and cultural environment
- Curricular distribution by years and stages. Regulation
- Resources for teaching Experimental Sciences in Primary education

Unit 2 Nature and features of scientific knowledge

- The scientific method. Building the scientific knowledge
- Influence of previous ideas on sciences learning and teaching
- Natural phenomena quantification: mathematical tools
- Decimal metric system. International System of Units

Unit 3 Matter and its properties: contents and didactics

- Specific and general properties of matter. Matter aggregation states. State changes. Heat and temperature
- Kinetic molecular Theory: gaseous state. Gases laws
- Pure substances and mixtures. Separation methods

Unit 4 Life and living things. Contents and didactics

- Cell Theory: Prokaryotes and Eukaryotes
- Living things levels of organization
- Classification of Living things: Taxonomy and Cladistics

Unit 5 Monera, Protocista and Fungi: contents and didactics

- General features and functions
- Classification. Types
- Reproduction

Unit 6 Plants: contents and didactics

- General features and functions
- Classification: seedless and seed plants (Spermatophyte)
- Plants reproduction
- Plants, people and environment

Unit 7 Animals: contents and didactics

- General features and functions
- Classification: invertebrates and vertebrates
- Animals reproduction
- Animals, people and environment

Unit 8 Ecosystems and environmental conservation: contents and didactics

- Biodiversity and its importance
- Ecosystems and its classification
- Environmental conservation

Unit 9 Material bodies movement: contents and didactics

- Kinematic basics (space, time, velocity and acceleration)
- Dynamics: concept of Force. Practical and Fundamental forces in Nature
- Dynamic Laws
- Work and Power. Machines

- Energy. Classification. Principle of conservation of Energy

Unit 10 Electricity and magnetism. Contents and didactics

- Electricity, electric phenomena and electric current
- Magnets and magnetic phenomena. Electromagnetism
- Electric current production and transport: electric power plants
- The problem of Energy. Renewable and non-renewable sources of energy
- Energetic supply and sustainability

Unit 11 Waves and undulatory phenomena: Contents and didactics

- Wave types and undulatory movements
- Material waves. Sound. Nature and propagation



•Electromagnetic waves. Light and optics

IV.B.-Training activities

Type	Title
Other activities	Video and documentary screening
Theoretical sessions	Theoretical training in the classroom
Academic tutorials	Classroom solution of numerical problems
Group work	Presentation of joint works assigned by the professor on science didactics, mainly regarding educational innovation
Other activities	Voluntary field trips and visits to environmental education centres, museums, open field.



V.-Student workload	
Theoretical sessions	42
Resolution of exercises, problems, case studies, etc.	10
Practical sessions in experimental, technological and clinical laboratories, fieldwork, etc.	4
Tests and/or exams	4
Academic tutorials	14
Related activities: conferences, seminars, etc.	4
Preparation of theoretical sessions and self-study	20
Preparation of practical tasks, exercises, case studies, projects, etc.	20
Preparation for tests and/or exams	62
Total student workload	180

VI.-Methodology and academic programme		
Type	Period	Content
Experimental and/or technological laboratories	Week 7 to Week 14	Laboratory practices and reports delivery
Tests and/or exams	Week 7 to Week 14	Expository and questioning technique exercised by the teacher of the contents of the subject developed in the classroom. The main active agent is the teacher, .
Resolution of exercises, problems, case studies	Week 1 to Week 1	Solving numerical exercises in the classroom.
Group work	Week 14 to Week 14	Handing out tasks for the collaborative work
Theoretical sessions	Week 1 to Week 14	Theoretical training in the classroom
Active methodologies or innovative teaching	Week 1 to Week 1	Project-based Learning, Service-Learning

VII.-Assessment methods

The general assessment method is continuous as established in the *Regulation for the Assessment of Learning Outcomes* of Rey Juan Carlos University.

All the assessment systems established in the degree report must be employed, except for those that have a minimum weight of 0%, which can be used by professors in the academic years they consider relevant. Each assessment system may be applied through one or more assessment activities, consistent with the system. No assessment activity can exceed individually 60% of the overall grade for the subject.

The sum of non re-evaluable activities cannot exceed 40% of the overall grade for the subject and, in general, should not have an established minimum grade (except for practical activities in which, strictly speaking, the conditions of the ordinary call cannot be reproduced in the extraordinary call).

Those students who do not manage to pass the subject in the ordinary call, or do not attend this first call, may attend the extraordinary call only for failed re-evaluable assessment activities.

The distribution and characteristics of the assessment activities are described below.

VII.A.-Description and weight of the assessment activities



Continuous ordinary assessment

The evaluation system for this subject consists of two elements:

- Written assessment test of the contents: 60% of the grade
- Group and individual activities: 40% of the grade. The grade obtained in this block will always be taken into account only whether the written test has been passed independently

Written assessment test (60%): Students who wish to do so may divide the content of the assessment test into two parts:

- 40% Mid-term exam I (to be taken face-to-face in the middle of the term). It is a re-evaluable test and has a minimum mark of 5/10
- 20% Mid-term exam II (to be taken in person on the official evaluation date according to the university calendar). It is a re-evaluable test and has a minimum mark of 5 /10

Students who do not choose to take the written test in instalments may take the test as a whole on the official assessment date. This test will represent 60% of the grade, is re-evaluable and has a minimum mark of 5/10.

Group project (20%)

At the beginning of the course, a group project related to the contents of the subject will be proposed. This project is not re-assessable and has a minimum mark of 5/10.

Individual activities (20%)

Throughout the four-month period, individual activities related to the contents of the subject will be proposed. These activities are not re-assessable and have a minimum mark of 5/10.

To pass the subject in the ordinary exam, students must:

- Achieve a minimum mark of 5 /10 in the written assessment test
- Once the written test has been passed, the final grade will be calculated by adding the weighted average obtained in the group project and in the individual activities. This final grade must be 5 or higher
- Under no circumstances may the subject be passed without having passed the written test independently

Extraordinary assessment

Students who do not manage to pass the ordinary assessment, or who did not attend it, will be tied to completion of an extraordinary assessment to verify their acquisition of the skills established in the guide, only for re-assessable activities.

Advanced assessment

Students who meet the requirements to qualify for this exam may pass the subject by developing the following elements:

- *Written assessment test* of the subject contents (60% of the grade)
- *Individual project* proposed by the teaching staff (20%)
- *Individual activities* proposed by the teaching staff (20%)

Comments

- (1) Written exams can be test type, long answer, short answer, problems, or a combination of these types
- (2) It is essential to obtain a minimum mark of 5 points (on a scale from 0 to 10) in the partial written exams in order to pass the course; that is to say, the rest of the assessment activities are only included in the final grade when this requirement has been got
- (3) Groupwork exposition is mandatory
- (4) If material or sanitary circumstances do not allow for face-to-face laboratory practicals, the laboratory will be carried out by means of virtual practicals. If this is not possible either, the percentage of the laboratory grade will be added to that of the written tests
- (5) If other non-written, assessable exams items would not be done, because of timing, teaching and/or academic requirements, the corresponding assessment weight (up to 20%) would be added to written exams'. Anyway, this item also includes score got according to assessment criteria described below.

ASSESSMENT CRITERIA

- Every answer written in English
- Clear writing (good concepts comprehension and exposition)
- Organized composition and correct syntax
- Accuracy, amplitude and deeping in syllabus and concepts knowledge
- Knowledge of specific terminology: using scientific language according with the subject
- Reflection, analysis and synthesis capacity
- Mentioning authors and works related to asked questions
- Examples



- Giving ideas, personal feedback and acting proposals
- Good organization and structure of developed ideas
- Correct, ordered and complete global structure
- Clear exposition
- Correct spelling
- Clean appearance

VII.B. Assessment of students with academic exemption from class attendance

Having Academic Exemption from Class Attendance (DAAC) does not imply that students are automatically exempt from participating in the continuous assessment activities or in the training activities of compulsory attendance as established in the teaching guide. Once the exemption has been granted, students must contact the subject's teaching staff, who will propose the adaptations he/she may consider relevant, as long as they guarantee the acquisition and adequate assessment of the learning goals established. Students must maintain adequate communication with the teaching staff so that they may provide information on the dates for training and assessment activities, if these are not established in the programme and available for students at the time of achieving the exemption.

Subject with possibility of academic exemption: Yes.

VII.C. Review of assessment activities

In accordance with the Regulation for the Assessment of Learning Outcomes of Rey Juan Carlos University.

VII.D.-Students with a disability or special educational needs

In order to guarantee equal opportunities, non-discrimination, universal accessibility and academic success, students with disabilities or especial education needs may request curricular adaptations to follow their studies. These adaptations will be provided by the Unit of Attention to People with Disabilities of Rey Juan Carlos University, in accordance with the regulation which regulates the service for the Attention of People with Disabilities at the University. This Unit will issue a report for curricular adaptations, so that students with disabilities or special education needs must contact the service (at e-mail discapacidad.programa@urjc.es) in order to provide relevant information for different educational alternatives.

VII.E.-Academic behaviour, academic integrity and honesty

Rey Juan Carlos University is fully committed to the highest standards of academic integrity and honesty, so studying at the URJC means assuming and subscribing to the values of integrity and academic honesty set out in the University's Ethical Code. To support this process, the University has Rey Juan Carlos University's Academic Conduct Regulation as well as different tools (anti-plagiarism, supervision...) that offer a collective guarantee for the full development of these essential values.



VIII.-Teaching resources and materials

Basic bibliography

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IX.-Professors	
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E-mail address	miguel.portoles@urjc.es
Department	Ciencias de la Educación
Campus	Madrid - Vicálvaro
Category	Profesor/a Ayudante Doctor/a
Academic degree	Doctor
Person responsible for the subject	Yes
Tutorial timetable	Para consultar las tutorías póngase en contacto con el/la profesor/a a través de correo electrónico
Number of quinquennia	1
Number of sexennia	0
No. of positive evaluations by Docencia	1