

**COURSE DATA****DATA SUBJECT****Code:** 33652**Name:** Science teaching: matter, energy and machines**Cycle:** Undergraduate Studies**ECTS Credits:** 4.5**Academic year:** 2025-26**STUDY (S)**

| Degree | Center | Acad. year | Period |
|---|--------------------------------------|------------|---------------|
| 1305 - Degree in Primary School Education | Facultat de Formació del Professorat | 3 | First quarter |

SUBJECT-MATTER

| Degree | Subject-matter | Character |
|---|--|------------|
| 1305 - Degree in Primary School Education | Teaching natural sciences in primary education | COMPULSORY |

COORDINATION

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SUMMARY

It is a subject that addresses the problem of how to ensure that boys and girls properly learn the physical-chemical and technological contents included in the Primary Education curriculum.

The objective of the subject is to ensure that teachers learn to teach science in a thoughtful and innovative way, so that they can make decisions, attending to the input of Science Didactics, around what and why to teach science and technology, and how to achieve childrens' learning in Primary Education.

It seeks to renew the usual expository method of teaching science so Primary teachers can increase the interest in the study of science and begin the scientific and technological literacy of new citizens that will allow them to address the risks and challenges of the world and prepare them to act for a sustainable future.

This subject is related to



- Natural Sciences for Teachers (2nd course)
- Science Teaching II: Environment, Biodiversity and Health (4th course)
- Practicum II (3rd course) and Practicum III (4th course)

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

It is recommended to have passed the subject Natural Sciences for Teachers from the second course.

COMPETENCES / LEARNING OUTCOMES

1305 - Degree in Primary School Education

Analyse critically the most relevant issues in today's society that affect family and school education: social and educational impact of audiovisual languages and of screens; changes in gender and inter-gender relations; multicultural and intercultural issues; discrimination and social inclusion, and sustainable development; Also, carry out educational actions aimed at preparing active and democratic citizens, committed to equality, especially between men and women.

Assume that teaching must be perfected and adapted to scientific, pedagogical and social changes throughout life.

Create teaching proposals in relation to the interaction between science, technology, society and sustainable development.

Design, plan and evaluate teaching and learning classroom activities in multicultural and co-educational contexts.

Develop and evaluate curriculum content through appropriate teaching resources and promote the corresponding basic competences in students.

Develop the ability to use scientific language, symbols, concepts and texts to maintain a dialogue with the natural world.

Encourage respectful attitudes towards the preservation of the environment and health.

Express oneself orally and in writing correctly and appropriately in the official languages of the autonomous region.



Identify and plan the resolution of educational situations that affect students with different abilities and different learning rates, and acquire resources to favour their integration.

Know and apply basic educational research methodologies and techniques and be able to design innovation projects identifying evaluation indicators.

Know how to work as a team with other professionals within and outside the school to attend to each student, to plan the learning sequences and to organise work in the classroom and in the play space.

Know the natural science school curriculum.

Know the processes of interaction and communication in the classroom.

Know the scientific methodology and promote scientific thinking and experimentation.

Promote cooperative work and individual work and effort.

Promote interest in and respect for the natural environment through appropriate educational projects.

Promote the competences proposed in the curriculum among students.

Raise and resolve issues of everyday life related to science by applying scientific reasoning.

Recognise the identity of each educational stage and their cognitive, psychomotor, communicative, social and affective characteristics.

Understand that systematic observation is a basic tool that can be used to reflect on practice and reality, and to contribute to innovation and improvement in education.

Understand the basic principles and fundamental theories of sciences: physics, chemistry, biology and geology.

Use information and communication technologies effectively as usual working tools.

DESCRIPTION OF CONTENTS

1. Science and Education

Science and Education. What science education contributes to the formation of citizens: scientific literacy; science education and values, CTSA relations.



2. Learning Science: children's ideas

2.1. The constructivist conception of learning and its comparison with other conceptions (innatism, associationism, cognitivism). How children learn science.

2.2. Children's ideas about the natural and technological environment. Preconceptions, alternative ideas, children's reasoning at different ages. Study of children's ideas in the subjects of matter, energy and machines in primary education such as: Earth, Sun and Moon; matter, solids, liquids and gases; light, sound, heat and temperature; electricity and magnets; simple machines and artifacts of everyday life. Importance of taking into account children's ideas for learning science.

3. Didactic analysis of school science content in Primary Education.

Didactic analysis of school science content in primary school. Analysis of school texts and other didactic materials. Extraction of Main Ideas and their relationship. Conceptual maps. Application to the subjects of matter, energy and machines in primary education.

4. Development of Science Procedural Skills

Science process skills and their development in children: observation, description, formulation of questions, formulation of conjectures and hypotheses, predictions, explanations, reasoning, measurements and records, etc. Relationship between procedural skills and conceptualization in elementary school children. Applications to primary school subjects of matter, energy and machines such as: Earth, Sun and Moon; matter, solids, liquids and gases; light, sound, heat and temperature; electricity and magnets; simple machines and everyday artifacts.

WORKLOAD

PRESENCIAL ACTIVITIES

| Activity | Hours |
|-----------------------------------|--------------|
| Theoretical and practical classes | 36,00 |
| Laboratory | 9,00 |
| Total hours | 45,00 |

**NON PRESENCIAL ACTIVITIES**

| Activity | Hours |
|---------------------------------------|--------------|
| Attendance at other activities | 0,00 |
| Individual or group project | 0,00 |
| Independent study and work | 67,00 |
| Preparation of lessons | 0,00 |
| Preparation for assessment activities | 0,00 |
| Resolution of case studies | 0,00 |
| Total hours | 67,00 |

TEACHING METHODOLOGY

The activities (face to face and outside the classroom) will be varied, some examples can be found below:

FACE TO FACE ACTIVITIES (40%):

· Theoretical-practical sessions (COMPETENCES 1-9): In these sessions the contents of the subjects will be worked on, debated, and different activities will be carried out, using different teaching resources: master classes, seminars, workshops, working groups, etc.

· Practical sessions (COMPETENCES 1-9): The group will split into two subgroups to put into practice the learning of the different contents of the subject. Students will develop experiences in the science laboratory linked to Primary Education teaching science procedural skills, the relationship of previous ideas and learning frameworks with different contexts of practical activity and other fundamental skills where science teaching is given through practical activity.

· GROUP WORK (COMPETENCES 1-9): The aim of working in groups is to highlight the importance of cooperative learning and to reinforce individual learning. The defense of these assignments may be individual or collective, and it may be done in front of the rest of the classmates or in tutorials and seminars with small audiences.

· Tutorials (COMPETENCES 1-9): Individual and collective tutorials can be used to coordinate and help students in individual and group assignments, as well as to evaluate both individual progress and teaching activities and methodology.

ACTIVITIES OUTSIDE THE CLASSROOM (60%):

Autonomous study and work (COMPETENCES 1-9): The model of the teacher as researcher in the classroom focuses the student's activity on formulating relevant questions, searching for information, analysis, preparation and subsequent communication. Individual and group assignments will be proposed, all of them guided, supervised and evaluated by teachers.



EVALUATION

Objectives and competences will be evaluated, both those common to all subjects of the degree and those specific to the subject.

The evaluation will be continuous and comprehensive, will be guiding and formative, and must analyze the individual and collective learning processes.

The qualification, the ultimate representation of the evaluation process, should be a reflection of the individual learning, understood not only as the acquisition of knowledge, but as a process related fundamentally with intellectual and personal changes of students when encountering new situations that require developing new understanding and reasoning skills.

The information to demonstrate learning will be collected, mainly, through tools like:

- Periodic monitoring of students' progress, both in the classroom and in individual and group tutorials. [Until 20%]
- Assessment of the tasks, including the analysis and evaluation of observations on works produced by third parties (Assessment of articles and teaching units prepared by people other than the student). [Until 20% (it can be used to prepare other tasks but not obtain a qualification in itself)].
- Assessment of individual and group participation, both in the classroom and in out of the classroom activities. [Until 40%].
- Oral and written tests. [Until 50%].
- Attendance, participation and submission of (individual) reports corresponding to laboratory sessions: 20%.

Total must be 100%.

The process of evaluating students may include a report of the degree of individual acquisition of learning.

Plagiarism or misuse of artificial intelligence tools may be sanctioned in accordance with the article 15 of the evaluation and qualification regulations of the University of Valencia.

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