COURSE DATA

DATA SUBJECT

Code: 34226
Name: History of Chemistry
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1110 - Degree in Chemistry	Facultat de Química	4	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1110 - Degree in Chemistry	History of Chemistry	ELECTIVES

COORDINATION

BERTOMEU SANCHEZ JOSE RAMON

SUMMARY

This course provides an overview of the history of science and reviews the general concepts of science, technology and society. It also improves students' skills and techniques and encourages them to develop an appropriate attitude to working in chemistry-related areas in industry, research and education. Students review conclusions from the main studies conducted on the history of chemistry with regard to alchemy, the scientific revolution, the chemical revolution, the science professions, science and gender, atomic theory and the periodic system, environmental history, the social image of chemistry, science and religion, the chemical industry, and the relationship between science, technology and society (STS), with special attention given to chemistry in the 20th century. Students also learn about the connections between science education and the history of science in order to study the pedagogical uses of the history of science and its multiple advantages in science education. The topics are selected and arranged in accordance with a balanced mixture of chronological and thematic sequences based on major problems throughout the history of chemistry. While each chapter follows a chronological sequence, each also presents a particular perspective or selected topic (science and religion, science and gender, technology and society, scientific terminology, scientific revolutions, disciplines and professions, science-teaching practices) that transcends the chronological boundaries of each period. Regarding the Sustainable Development Goals (SDGs), it is expected that students will be able to acquire a permanent sensitivity to quality, the environment, sustainable development, particularly on areas related to air quality and the sustainable management of water (SDG 6) and of raw materials and energy sources (SDG 7) as well as sustainable and environmentally-compatible development (SDG 11-15); acquire permanent sensitivity and commitment to high standards of quality and occupational risk prevention (GC10); acquire a permanent

sensitivity and commitment for the prevention of occupational hazards (CG10); demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional. (CG7), with the ability to think critically over the role of chemistry in addressing relevant issues related to poverty eradication (SDG 1), the fight against hunger and the path to food security (SDG 2) and the advancement of public and occupational health (SDG 3).
Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration. (CB3), on issues related to responsible consumption (SDG 12), climate change (SDG 13) and environmental conservation (SDG 14-15).

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

OTHER REQUIREMENTS

None

COMPETENCES / LEARNING OUTCOMES

1108 -

Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.

Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.

Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.

Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.

Demonstrate knowledge and understanding of essential facts, concepts, principles and theories related to the areas of chemistry.

Demonstrate knowledge of the main aspects of chemical terminology, nomenclature, conventions and units.

Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.

Demonstrate the ability to adapt to new situations.

Develop capacity for analysis, synthesis and critical thinking.

Develop sustainable and environmentally friendly methods.

Evaluate, interpret and synthesise chemical data and information.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Have basic skills in the use of information and communication technology and properly manage the information obtained.

Learn autonomously.

Recognise and evaluate chemical processes in daily life.

Relate chemistry with other disciplines.

Relate theory and experimentation.

Show inductive and deductive reasoning ability.

Students must be able to apply their knowledge to their work or vocation in a professional manner and have acquired the competences required for the preparation and defence of arguments and for problem solving in their field of study.

Students must be able to communicate information, ideas, problems and solutions to both expert and lay audiences.

Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Students must have the ability to gather and interpret relevant data (usually in their field of study) to make judgements that take relevant social, scientific or ethical issues into consideration.

Understand the qualitative and quantitative aspects of chemical problems.

1110 - Degree in Chemistry

Act autonomously in learning, making informed decisions in different contexts, forming judgements based on experimentation and analysis, and transferring knowledge to new situations.

At the end of the course, the student will be able to distinguish between qualitative and quantitative aspects of chemical problems.

At the end of the course, the student will be able to identify chemical processes in everyday life.

At the end of the course, the student will be able to implement sustainable and environmentally friendly methodologies.

At the end of the course, the student will be able to relate theory and experimentation.

At the end of the course, the student will correctly use chemical terminology, nomenclature, conventions and units.

At the end of the course, the student will demonstrate inductive and deductive reasoning skills.

At the end of the course, the student will demonstrate the ability to analyse, synthesise and apply critical reasoning.

At the end of the course, the student will relate chemistry to other disciplines.

Collaborate effectively in teams, assuming responsibilities and leadership roles and contributing to collective improvement and development.

Communicate effectively, both orally and in writing, adapting to the characteristics of the situation and the audience.

Contribute to the design, development and implementation of solutions that address social needs, taking the Sustainable Development Goals as a reference.

Demonstrate critical and self-critical reasoning within the field of study, considering aspects such as professional ethics, moral values and the social implications of the different activities undertaken.

Evaluate, interpret and synthesise chemical data and information.

Express oneself correctly, both orally and in writing, in any of the official languages of the Valencian Community.

Propose creative and innovative solutions to complex situations or problems within the field of study, in order to respond to diverse professional and social needs.

Understand and recognise, from within the discipline, inequalities based on sex and gender in society; integrate different needs and preferences related to sex and gender into problem-solving and solution design.

DESCRIPTION OF CONTENTS

1. The History of Science

Introduction. The history of science. Methodology. Sources. Problems and approaches. Main periods.

2. Chemical technology

Technological systems. Concepts, definitions and classifications. Chemistry-related techniques in prehistory. Fire. Salt. Pottery and ceramics. Glassmaking. Making dyes. Mining and the origins of metallurgy. Metals in antiquity.

3. Alchemy

The origins of alchemy. Sources and main traditions. The geographical and chronological framework. Alchemy in China and India. Classical Greek science. The origins of Greek science. Myths and rational explanation. Pre-Socratic philosophers and theories on the constitution of matter. Hellenistic alchemy. Arabic alchemy. Alchemy in the Middle Ages.

4. The Scientific Revolution

Scientific revolutions. Concept and debates. Spaces, problems, methods and protagonists of the scientific revolution. Science and religion. Alchemy and the origins of modern science.

5. The Chemical Revolution

Eighteenth-century chemistry. Pneumatic chemistry. Antoine Lavoisier and the crucial year (1772). The "discovery" of oxygen. The table of simple substances and the notion of chemical composition. The new chemical terminology. Chemistry, medicine and industry. The spread of chemical revolution. Chemistry in late 18th-century Spain.

6. Atomic Theory and the Periodic System

John Dalton's atomic theory. Origin and general characteristics. Atoms and chemical equivalents. Atomic models and quantum mechanics. Periodic classification of the chemical elements. General characteristics of the first classifications of elements. The problems of atomic weights. The Periodic Table: an example of multiple discovery. The explanation of the periodic system.

7. Disciplines and Professions

Scientific disciplines and school disciplines. The origin of chemistry and its relationship to other disciplines. Chemistry in classrooms throughout history. Chemical sub-fields. Science as a profession. Science and gender. The literature of chemistry. The popularization of chemistry.

8. The Chemical Industry

The main chemical industries: history and overview. The industrial revolutions and chemistry. Environmental problems and the chemical industry. The pharmaceutical industry. Patents and the chemical industry.

Using history in science education. Scientific biographies. The history of science in science textbooks.

9. History and Science Education

Classic experiments in the classroom. The history of science education.

10. Twentieth-Century Chemistry

The main features of big science. Science and technology in the 20th century. Technoscience. Science and the military industry: chemical weapons and atomic energy. New sub-fields. The social image of chemistry. Environmental problems. The new molecular sciences at the beginning of the 21st century.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	7,00
Theory	38,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	3,00
Individual or group project	30,00
Independent study and work	7,50
Preparation of lessons	6,00
Preparation for assessment activities	15,00
Resolution of case studies	6,00
Total hours	**67,50**

TEACHING METHODOLOGY

The course includes lectures, practical sessions, seminars and tutorial activities.The lectures introduce the outlinesof thementioned topics Practical activities are complements to the lectures introducing new perspectives(biographical, thematic, methodological, etc..) and new views of the main topics included inthe syllabus. Students are encouraged toadopt an active and meaningful learning through the frequent use of the recommended bibliography and the development of practical activities in the classroom.The seminars include several activities such as summary and discussion of selected papers, presentations and discussions ontopics covered in previous lectures, so students can develop some of the skills which had been previously described.

EVALUATION

• Written examinations [30 %] . Minimum score required: 4 (out of 10).

• Evaluation of tutorial sessions and group seminars (participation and work submitted), papers and oral presentations . [40 %].

• Evaluation of student activities based on regular class attendance and classroom activities, participation in debates and the student's degree of involvement in the teaching-learning process [30 %].

Final warning

Copying or plagiarism of any assignment that is part of the evaluation will make it impossible to pass the course, and the student will be subject to the appropriate disciplinary procedures.

Please note that, according to Article 13 d) of the University Student Statute (RD 1791/2010, December 30), "*it is the duty of a student to refrain from using or cooperating in fraudulent procedures in evaluation tests, in the work performed or in official University documents*".

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