COURSE DATA

Data Subject	
Code	34216
Name	Quality and risk prevention
Cycle	Grade
ECTS Credits	4.5
Academic year	2015 - 2016

Study (s)

Degree	Center	Acad. year	Period
1108 - Degree in Chemistry	Faculty of Chemistry	4	First term

Subject-matter

Degree	Subject-matter	Character
1108 - Degree in Chemistry	14 - Applied analytical chemistry	Optional

Coordination

Name	Department
SAGRADO VIVES, SALVADOR	310 - Analytical Chemistry

SUMMARY

Quality and Risk Prevention falls within the area of applied Analytical Chemistry, along with two other subjects: Industrial Chemical Analysis and Environment Analysis and Applied Instrumental Analysis Laboratory. What they have in common is that they address, based on the knowledge students have acquired in the previous semesters, applied and practical scientific and technical aspects that future chemists and particularly analytical chemists may need in their future professional, educational or research activities. They also serve as the basis for taking postgraduate courses and masters such as the Master in the Prevention of Occupational Risks.

Quality and risk prevention are current requirements in many of the above areas. For example, from an analytical point of view, testing laboratories in which chemical analysis is conducted must adopt accreditation systems if they are to survive in an increasingly globalised market and satisfy the demands of an increasingly technically trained customer. Like all industrial companies, they must respect the environment and adopt risk prevention standards to ensure safety and hygiene when conducting their activities.

The course begins with an introduction to legislation and standards (systems) regarding quality, the environment and risk prevention. It continues by developing the general concept of chemical risk before specifically dealing with chemical agents (emissions, discharges and waste), placing special emphasis on how to evaluate them, and on control tools. It then discusses the general concept of quality and quality systems (standards) before discussing the accreditation of testing laboratories. Finally, technical aspects of accreditation are discussed and special attention is paid to the validation of methods and other accreditation requirements.

The general objectives of the course are to:

• provide students with an overview of the elements and approaches and the laws and regulations that influence aspects of quality, the environment and risk prevention through in-depth study of the impact of pollutants and the accreditation of technical requirements in a modern testing laboratory, and

• teach students the roles and responsibilities the chemist may have to develop in the chemical industry and laboratory with regard to the above aspects.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

To successfully complete the course, students should have acquired the knowledge imparted on the various courses in Analytic Chemistry and related laboratory courses, especially with regard to analytical problems and processes, the significant analytical characteristics of analytical methods, the main analytical and separation techniques, and statistics applied to chemical analysis.

OUTCOMES

1108 - Degree in Chemistry

- Develop capacity for analysis, synthesis and critical thinking.
- Demonstrate leadership and management skills, entrepreneurship, initiative, creativity, organization, planning, control, leadership, decision making and negotiation.
- Solve problems effectively.
- Demonstrate ability to work in teams both in interdisciplinary teams and in an international context.
- Demonstrate ability to communicate information, ideas, problems and solutions to both specialist and non-specialist audiences and using information technology, as appropriate.
- Demonstrate a commitment to ethics, equality values and social responsibility as a citizen and as a professional.

- Learn autonomously.
- Acquire a permanent sensitivity to quality, the environment, sustainable development and the prevention of occupational hazards.
- Demonstrate knowledge of the main types of chemical reaction and their main characteristics.
- Ability to recognise chemical elements and their compounds: preparation, structure, reactivity, properties and applications.
- Demonstrate knowledge of the principles, procedures and techniques for the determination, separation, identification and characterisation of chemical compounds.
- Show knowledge of the metrology of chemical processes including quality management.
- Recognise and analyse new problems and plan strategies to solve them.
- Handle chemicals safely.
- Carry out standard experimental procedures involved in synthetic and analytical work, in relation to organic and inorganic systems.
- Handle the instrumentation used in the different areas of chemistry.
- Interpret data from observations and measurements in the laboratory in terms of their significance and the theories that underpin them.
- Evaluate the risks in the use of chemicals and laboratory procedures.
- Relate theory and experimentation.
- Understand the qualitative and quantitative aspects of chemical problems.
- Develop sustainable and environmentally friendly methods.
- 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 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.
- 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.
- 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.

LEARNING OUTCOMES

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The learning outcomes for this course, which are contained in the Degree document under Applied Analytical Chemistry, are:

1. To know the theory and skills needed to plan, implement and manage the most suitable analytical method for addressing problems of an industrial and environmental nature. (CG6, CG8, CG10, CE4, CE8, CE15, CE22, CE24, CE25)

2. To understand and use bibliographical and technical information relating to analytical chemical processes. (CG7, CT1, CT2)

3. To take decisions with rigour. (CG3, CG4)

4. To know the tools and principles of sustainable chemistry. (CG10, CE25)

5. To understand the chemical parameters of environmental quality. (CG10)

6. To reason critically. (CG1)

7. To demonstrate the ability to manage information. (CG7)

8. To demonstrate a commitment to ethics and an understanding of the gender perspective. (CG6)

9. To develop experimental procedures for analysing industrial and environmental samples. (CG5, CE7, CE18)

10. To know the theoretical and practical aspects needed to deal with the quality systems of a chemical company. (CG10, CE10)

11. To know the tools needed to perform an audit in a chemical company. (CG10, CE10)

12. To assess the risks involved in the use of chemicals and chemical company procedures. (CE17, CE19, CE20, CE21)

DESCRIPTION OF CONTENTS

1. prevention.Legislative and Standardized Aspects on Quality, the Environment and Risk Prevention

Legislative and standardized aspects on quality. The environment and risk prevention. Concepts. Current legislation. Applicable standards: quality, environmental and prevention systems.

2. Chemical Risk, Evaluation and Control

Legislation on occupational risk prevention. Safety and industrial hygiene. Classification of chemical agents. Risks from exposure to chemical agents. Labels and safety data sheets. Chemical risk assessment: exposure limit values and exposure indices. Control of chemical risk: actions on focus, the environment and the individual. Fire and explosions. Emergency plans.

3. Emissions, Discharges and Residues

Environmental legislation: prevention and control of pollution. Control of air emissions. Control of discharges: urban and industrial wastewater. Management and treatment of residues. Environmental management systems.

4. Quality

Quality. The concept of quality. Quality management and technical quality. Quality systems in the chemical industry, control laboratories and testing laboratories. Case study: documentation, audits, structure and the computerised management of a laboratory.

5. Accreditation

Accreditation. Concepts of accreditation, certification and homologation. The national body for accreditation. Case study: the accreditation process and regulations on accreditation for testing laboratories.

6. Internal Method Validation

Internal method validation. The concept of validation. Internal and external validation. The process of internal method validation. Characteristics, requirements and validation criteria. Validation strategies. Case studies: validation reports.

7. Internal Quality Assurance

Internal Quality Assurance. Standardized aspects. Auditable aspects. Repetition of samples. Method Verification. Quality control and control charts. Case studies.

8. External Quality Assurance: Proficiency Testing

External quality assurance. Proficiency testing. Concepts: assigned values. Process. Case study.

9. Estimation of Uncertainty

Estimation of uncertainty. The concept of uncertainty. Uncertainty of the results of chemical assays. Standardized aspects for test reports. Sources of uncertainty. Case studies: approaches and trends for the estimation.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	38,00	100
Tutorials	7,00	100
Attendance at events and external activities	2,00	0
Development of group work	5,00	0
Development of individual work	5,00	0
Study and independent work	12,50	0
Readings supplementary material	10,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	9,00	0
Preparation of practical classes and problem	7,00	0
Resolution of case studies	7,00	0
TOTAL	**112,50**	

TEACHING METHODOLOGY

This course consists of theoretical classes, practical classes, case studies, group tutorials and seminars.

The theoretical classes will comprise an overview of the concepts of quality and risk prevention with an emphasis on the technical component. The practical classes will provide the foundations for answering questions and solving problems related to the technical aspects of the subject. Case studies will provide an overall view of the aspects studied and serve as a guide for course evaluation.

In the group tutorials the ability of the students to solve the case studies will be evaluated. The tutorials will also serve to answer any queries the students may have regarding the issues or problems raised.

In the seminars the practical aspects of the course will be discussed and cross-disciplinary competences will be developed through discussions of student-produced reports on visits to an accredited laboratory, presentations, and discussions of case studies (e.g. work on labels and safety data sheets, risk prevention scenarios and technical quality), and the recovery of qualimetric (statistical) information involved in decision-making.

During the course, the lecturer may request students to submit critical reports and standardized records that will also be used for the evaluation process.

EVALUATION

Learning will be evaluated by taking into account all the aspects outlined in the methodology section of this teaching guide.

FIRST CALL

Final grade:

Activities proposed in the seminars	Activities proposed in the tutorials	Examination
20%	15%	65%

The score on each of these three parts must be at least 4.5 in order to apply the average. The minimum overall grade to pass the course is 5.0.

Note:

Students may submit a request in writing to be evaluated only by examination. In this case, the examination will consist of three parts. One part will be identical to the examination taken by the other students and will count for 65% of the overall score. The other two parts will consist of a series of questions that will evaluate the skills demonstrated by the other students when completing the activities set during their seminars and tutorials.

SECOND CALL

In the second call the grade is obtained by applying the same criteria as in the first call.

REFERENCES

Basic

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Additional

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