

COURSE DESCRIPTION

COURSE DETAILS

Title (of the course): **SISTEMAS DE LA CALIDAD EN LOS LABORATORIOS ANALÍTICOS**

Code: 100478

Degree/Master: **GRADO DE QUÍMICA**

Year: 4

Name of the module to which it belongs: APLICADO

Field: QUÍMICA (OPTATIVA 3)

Character: OPTATIVA

Duration: SECOND TERM

ECTS Credits: 3.0

Classroom hours: 30

Face-to-face classroom percentage: 40.0%

Study hours: 45

Online platform: <http://moodle.uco.es/moodlemap/>

LECTURER INFORMATION

Name: PRIEGO CAPOTE, FELICIANO (Coordinador)

Department: QUÍMICA ANALÍTICA

Area: QUÍMICA ANALÍTICA

Office location: DEPARTAMENTO DE QUÍMICA ANALÍTICA, PLANTA BAJA

E-Mail: feliciano.priego@uco.es

Phone: 957218615

URL web: <https://www.uco.es/fqm227/index.php>

PREREQUISITES AND RECOMMENDATIONS

Prerequisites established in the study plan

Students can matriculate in optative subjects once they have passed the 60 credits of basic formation and, at least, other 30 credits corresponding to obligatory subjects.

Recommendations

Students should certify at least B1 English level

INTENDED LEARNING OUTCOMES

- | | |
|------|---|
| CB4 | Knowledge of a foreign language. |
| CB5 | Capacity to manage data and generate information / knowledge. |
| CB6 | Resolution of problems. |
| CB9 | Critical thinking. |
| CE18 | Metrology of chemical processes including quality management. |
| CE19 | Capacity to organise, direct and execute chemical laboratory tasks and tasks related to the production of complex industrial facilities where chemical processes are developed. Moreover, to design the work method to be used. |
| CE24 | Capacity to recognise and exercise good practices in scientific work. |
| CE26 | Skilled in the handling and computer precessing of data and chemical information. |
| CU2 | Knowledge and perfection of user level in the area of ICTs. |

COURSE DESCRIPTION

OBJECTIVES

The main objectives of this module are:

- To introduce the students in all the aspects related with the Quality Systems in the analytical laboratories, thus showing them the key elements: regulations, documents, metrological tools and basic activities.
- To show the students the relevance of the correct application of the chemical metrology to ensure the quality of qualitative, quantitative and structural information generated in the analytical laboratories.
- To teach the students the statistical treatment of the data obtained by chemical measurements in order to assess metrological properties (traceability and uncertainty).
- To present the required activities for the validation of analytical processes and the control and evaluation of the quality in the analytical laboratories.

CONTENT

1. Theory contents

Theoretical contents

1. Introduction to Quality Systems. Normative references of Quality Systems. National Standard Developing Organizations (SDOs). Certification and Accreditation. ISO 9000 series and the UNE-EN-ISO/IEC 17025. Good Laboratory Practices (GLPs).
2. Documentation of Quality Systems. Types of documents. Quality Handbook. Procedures and working instructions.
3. Metrological properties in the analytical laboratory. Chemical metrology. Metrological properties: traceability and uncertainty.
4. Statistical tools for the analytical quality. Confidence limits. Demonstration of traceability. Parameters to express uncertainty. Calculations of uncertainty. Expression of analytical results.
5. Analytical tools. Quality of materials and methods. Metrological references: types. Certified Reference Materials (CRMs)/ Standard Reference Materials (SRMs).
6. Sample and equipment management. Sampling planning and validation. Maintenance, calibration and verification of equipment. Documentation related to sample and equipment management.
7. Validation and Internal Quality Control. The concept of validation. Internal and external validation. Control activities. Control charts.
8. Quality assessment. Internal and external assessment of quality. Intercomparison exercise, collaborative and certification trials. Audits.

2. Practical contents

Practical contents

1. Statistical tests of significance to demonstrate the traceability of analytical results.
2. Uncertainty calculations of a single step of the analytical process or the complete analytical process using bottom-up and top-down procedures.
3. Use of statistical software for data analysis.
4. Other activities related to the theoretical topics included in the syllabus.

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METHODOLOGY

Methodological adaptations for part-time students and students with disabilities and special educational needs

Teaching methodology will be adapted for part-time students according to the Faculty of Sciences regulations.

Teaching methodology will also be adapted for students with special educational needs according to the Faculty of Sciences regulations.

In both cases, individual situations will be considered.

Face-to-face activities

Activity	Large group	Medium group	Total
<i>Assessment activities</i>	-	3	3
<i>Group presentation</i>	-	5	5
<i>Lectures</i>	17	-	17
<i>Seminar</i>	-	5	5
Total hours:	17	13	30

Off-site activities

Activity	Total
<i>Activities</i>	5
<i>Exercises</i>	10
<i>Self-study</i>	30
Total hours	45

WORK MATERIALS FOR STUDENTS

Coursebook - <http://moodle.uco.es/moodlemap/>

Exercises and activities - <http://moodle.uco.es/moodlemap/>

Oral presentations - <http://moodle.uco.es/moodlemap/>

Clarifications

Material for practical activities and exercises will be provided to students at the beginning of each unit.

EVALUATION

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Intended learning	Exams	Oral Presentation	Problem solving
CB4		X	
CB5		X	X
CB6			X
CB9	X	X	X
CE18	X	X	X
CE19			X
CE24	X		
CE26		X	X
CU2		X	
Total (100%)	35%	35%	30%
Minimum grade	5	5	5

(*)Minimum grade necessary to pass the course

Method of assessment of attendance:

Attendance to a minimum of 70% of the independent activities will increase a 25% the final grade.

General clarifications on instruments for evaluation:

General clarifications on instruments for evaluation:

Exams will be based on questions related to theoretical contents of the module and will be carried out as homework. Bibliographic search will be positively recognized.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Evaluation will be adapted for part-time students according to the Faculty of Science regulations and will be individually considered.

Evaluation will be adapted for students with special educational needs according to the Faculty of Science regulations and will be individually considered.

Qualifying criteria for obtaining honors:

According to article 80.3 of the Academic Regulations of the University of Cordoba, the "Matricula de Honor" mention may be awarded to students who have obtained a grade equal to or greater than 9.0.

BIBLIOGRAPHY

1. Basic Bibliography

- ISO 9001:2015. Quality management systems – Requirements, ISO. Geneva. Switzerland.
- ISO 9000:2015: Quality management systems -- Fundamentals and vocabulary ISO. Geneva. Switzerland.



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INFORMACIÓN SOBRE TITULACIONES
DE LA UNIVERSIDAD DE CORDOBA

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- ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. ISO. Geneva. Switzerland.
- The Quality Toolbox, Second Edition, Nancy R. Tague, 2013.

2. Further reading

- La calidad en los laboratorios analíticos. Valcárcel M, Ríos A. Reverté, 1992.
- Quality in the Analytical Chemistry Laboratory. Prichard E. John Wiley & Sons, 2007.
- Analytical Measurement Terminology: Handbook of Terms used in Quality Assurance of Analytical Measurement (Valid Analytical Measurement) 1st Edition, Prichard E, Benson E, RSC Books, 2001.
- Quality Assurance in Analytical Chemistry. Funk W, Dammann V, Donnevert G, VCH, 1995.
- Quality Control in Analytical Chemistry. Kateman G, Piskers F W, Wiley, 1994.
- Handbook of Quality Assurance for the Analytical Laboratory. Dux JP, VanNostrand R, Reinhold, 1990.
- Quality Assurance Principles for Analytical Laboratories. Garfield FM, AOAC, 1991.
- Quality Assurance of Chemical Measurements. Taylor JK, Lewis Pub., 1987.
- Quality Management Handbook. Walsh L, Wurster R, Kimber RJ, Marcel Dekker, 1986

COORDINATION CRITERIA

Common evaluation criteria
Tasks performance

SCHEDULE

Period	Assessment activities	Group presentation	Lectures	Seminar
1# Week	0,0	0,0	2,0	0,0
2# Week	0,0	0,0	2,0	0,0
3# Week	0,0	0,0	2,0	0,0
4# Week	0,0	0,0	2,0	0,0
5# Week	0,0	0,0	2,0	0,0
6# Week	0,0	0,0	1,0	1,0
7# Week	0,0	0,0	1,0	1,0
8# Week	0,0	0,0	1,0	1,0
9# Week	0,0	0,0	1,0	1,0
10# Week	0,0	0,0	1,0	1,0
11# Week	0,0	0,0	1,0	0,0
12# Week	0,0	2,0	1,0	0,0
13# Week	0,0	3,0	0,0	0,0
14# Week	3,0	0,0	0,0	0,0

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Period	Assessment activities	Group presentation	Lectures	Seminar
Total hours:	3,0	5,0	17,0	5,0

The methodological strategies and the evaluation system contemplated in this Course Description will be adapted according to the needs presented by students with disabilities and special educational needs in the cases that are required.

CONTINGENCY PLAN: CASE SCENARIO A

Case scenario A will correspond to a diminished on-site academic activity due to social distancing measures affecting the permitted capacity of classrooms.

METHODOLOGY

General clarifications on the methodology on case scenario A

A multimodal (hybrid) teaching system will be adopted, combining both on-site and remote classes via videoconference (synchronous) that will be held in the timetable approved by the corresponding Faculty or School. The time distribution of teaching activities (both on-site and remote) will be decided by the aforementioned Faculties and Schools bearing in mind the permitted capacity of classrooms and social distancing measures as established at that time.

Lectures

The teacher will explain the contents indicated in the theoretical program. These contents will be taught with the aid of presentations and other support material that will be available in advance in the Moodle platform. During the lectures, students may raise any doubts or questions on topics related with the theoretical contents.

Seminars

The seminars will be based on solving numerical problems related to both basic and applied aspects of the contents exposed in the lectures. Students will be provided with the list of exercises in advance. These contents will be taught presentially in mid size groups with the aid of presentations and other support material that will be available in advance in the Moodle platform.

Oral presentation

Students will make an oral presentation on a topic proposed by the teacher previously. The theme will be related to some basic or applied aspect related to the theoretical content of the subject. This activity will be carried out in small groups cited by the teacher at different times.

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EVALUATION

Intended learnig	Exams	Oral Presentation	Problem solving
CB4		X	
CB5		X	X
CB6			X
CB9	X	X	X
CE18	X	X	X
CE19			X
CE24	X		
CE26		X	X
CU2		X	
Total (100%)	35%	35%	30%
Minimum grade	4	4	4

(*)Minimum grade necessary to pass the course

Method of assessment of attendance (Scenario A):

Attendance to a minimum of 70% of the independent activities will increase a 25% the final grade.

General clarifications on instruments for evaluation (Scenario A):

The exam will consist of a short questionnaire related to the theoretical content included in the program of the subject. This test will have a 35% weight in the final grade. The problems solving will consist of a test with numerical exercises related to the activities held in seminars. The weight of this test in the final grade will be 30%. The oral presentation will consist of a 15-minute presentation of a topic related to theoretical content of the subject and proposed by the teacher. It will be done in small groups and the additional bibliographic search will be positively valued. This activity will have a 35% weight in the final grade.

Extraordinary evaluation for students of second enrollment or higher. Grades will be maintained in the activities of seminars (problem solving) and oral presentation and students will only perform the exam of theoretical contents.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario A):

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Evaluation will be adapted for part-time students according to the Faculty of Science regulations and will be individually considered.

Evaluation will be adapted for students with special educational needs according to the Faculty of Science

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regulations and will be individually considered.

Qualifying criteria for obtaining honors (Scenario A):

According to article 80.3 of the Academic Regulations of the University of Cordoba, the

CONTINGENCY PLAN: CASE SCENARIO B

Case scenario B will bring about a suspension of all on-site academic activities as a consequence of health measures.

METHODOLOGY

General clarifications on the methodology on case scenario B

On-site teaching activities will be held via videoconference (synchronous) in the timetable approved by the corresponding Faculty or School. Alternative activities will be proposed for reduced groups in order to guarantee the acquisition of course competences.

Lectures

The teacher will explain the contents indicated in the theoretical program. These contents will be taught by videoconference with the aid of presentations and other support material that will be available in advance in the Moodle platform. During the lectures, students may raise any doubts or questions on topics related with the theoretical contents.

Seminars

The seminars will be based on solving numerical problems related to both basic and applied aspects of the contents exposed in the lectures. Students will be provided with the list of exercises in advance. These contents will be taught by videoconference with the aid of presentations and other support material that will be available in advance in the Moodle platform.

Document analysis

Students will make a written report on a topic proposed by the teacher previously. The theme will be related to some basic or applied aspect related to the theoretical content of the subject. This activity will be carried out in small groups that will be coordinated by videoconference to develop this task.

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EVALUATION

Intended learnig	Document Analysis	Exams	Problem solving
CB4	X		
CB5	X		X
CB6			X
CB9	X	X	X
CE18		X	X
CE19			X
CE24	X	X	
CE26	X		X
CU2	X		
Total (100%)	35%	35%	30%
Minimum grade	4	4	4

(*)Minimum grade necessary to pass the course

Moodle Tools	Análisis de documentos	Exámenes	Resolución de problemas
Cuestionario		X	X
Tarea	X	X	X
Videoconferencia		X	X

Method of assessment of attendance (Scenario B):

Attendance to a minimum of 70% of the independent activities will increase a 25% the final grade.

General clarifications on instruments for evaluation (Scenario B):

The exam will consist of a short questionnaire related to the theoretical content included in the program of the subject. This test will be carried out by videoconference. The questionnaire will be provided by the teacher and the students will submit the document through a task activated in the Moodle platform. This activity will have a 35% weight in the final grade.

The problems solving will consist of a test with numerical exercises related to the activities held in seminars. This test will be provided by the teacher and the students will submit the test through a task activated in the Moodle

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platform. The weight of this test in the final grade will be 30%.

The document analysis will consist of a written report related to a topic included in the theoretical program of the subject and proposed by the teacher. It will be done in small groups and the additional bibliographic search will be positively valued. This activity will have a 35% weight in the final grade. Students will submit the report through a task activated in the Moodle platform.

Extraordinary evaluation for students of second enrollment or higher. Grades will be maintained in the activities of seminars (problem solving) and oral presentation and students will only perform the exam of theoretical contents.

Clarifications on the methodology for part-time students and students with disabilities and special educational needs (Scenario B):

Clarifications on the methodology for part-time students and students with disabilities and special educational needs:

Evaluation will be adapted for part-time students according to the Faculty of Science regulations and will be individually considered.

Evaluation will be adapted for students with special educational needs according to the Faculty of Science regulations and will be individually considered.

Qualifying criteria for obtaining honors (Scenario B):

According to article 80.3 of the Academic Regulations of the University of Cordoba, the