| Teaching Guide | | | | |
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| Identifying Data | | | | 2021/22 |
| Subject (*) | Quality in Chemical Laboratories | | Code | 610509130 |
| Study programme | Mestrado Universitario en Investigación Química e Química Industrial (Plan 2020) | | | |
| Descriptors | | | | |
| Cycle | Period | Year | Type | Credits |
| Official Master's Degree | 1st four-month period | First | Optional | 3 |
| Language | Spanish | | | |
| Teaching method | Face-to-face | | | |
| Prerequisites | | | | |
| Department | Departamento profesorado másterQuímica | | | |
| Coordinador | Jimenez Gonzalez, Carlos | E-mail | carlos.jimenez@udc.es | |
| Lecturers | Jimenez Gonzalez, Carlos | E-mail | carlos.jimenez@udc.es | |
| Web | https://www.usc.gal/gl/estudos/masteres/ciencias/master-universitario-investigacion-quimica-quimica-industrial/20202021/calidade | | | |
| General description | The contents of the subject according to the memory of the master include: advanced notions of quality, general criteria for the accreditation of testing and calibration laboratories according to the UNE-EN-ISO / IEC 17025 standard, metrology: uncertainty and traceability, equipment management, quality assurance of test and calibration results, quality planning, control and management tools and techniques | | | |
| Contingency plan | 1. Modifications to the contents<br>There will be no changes<br>2. Methodologies<br>*Teaching methodologies that are maintained<br><br>All of them<br><br>*Teaching methodologies that are modified<br>The "magister classes and seminars" activities will maintain the same format and content with the only difference that they will be taught using Teams or the platform that the UDC makes available to the teaching community.<br><br>3. Mechanisms for personalized attention to students<br>Email: permanent.<br>Moodle: Daily. According to the need of the students.<br>Teams: Magister class, seminars, tutorials (2-6 h / week).<br><br>4. Modifications in the evaluation<br>There will be no changes in either the methodology or the percentages assigned to each of the methodologies.<br><br>*Evaluation observations:<br>The evaluation will be maintained as indicated in the teaching guide. The only difference will be in the channel used for the tests that will be carried out in Teams or Moodle or a combination of them.<br><br>5. Modifications to the bibliography or webgraphy<br>There are no changes in the bibliography. | | | |

| Study programme competences | |
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| Code | Study programme competences |
| A1 | Define concepts, principles, theories and specialized facts of different areas of chemistry. |
| A2 | Suggest alternatives for solving complex chemical problems related to the different areas of chemistry. |
| A5 | Properly assess risks and environmental and socioeconomic impacts associated with special chemicals |

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| A6 | Design processes involving the treatment or disposal of hazardous chemicals |
| A9 | Promote innovation and entrepreneurship in the chemical industry and in research. |
| B5 | Students must possess learning skills to allow them to continue studying in a way that will have to be largely self-directed or autonomous. |
| B6 | Innovate in the different areas of chemistry, demonstrating initiative and entrepreneurship |
| B8 | Evaluate responsibility in the management of information and knowledge in the field of Industrial Chemistry and Chemical Research |
| B9 | Demonstrate ability to analyze, describe, organize, plan and manage projects |
| B10 | Use of scientific terminology in English to explain the experimental results in the context of the chemical profession |
| B11 | Apply correctly the new technologies to gather and organize the information to solve problems in the professional activity. |
| B12 | Being able to work in a team and adapt to multidisciplinary teams. |
| C1 | CT1 - Elaborar, escribir e defender publicamente informes de carácter científico e técnico |
| C2 | CT2 - Traballar en equipo e adaptarse a equipos multidisciplinares. |
| C3 | CT3 - Traballar con autonomía e eficiencia na práctica diaria da investigación ou da actividade profesional. |
| C4 | CT4 - Apreciar o valor da calidade e mellora continua, actuando con rigor, responsabilidade e ética profesional. |
| C5 | CT5 - Demostrar unha actitude de respecto polas opinións, valores, comportamentos e prácticas doutros |

| Learning outcomes | | | |
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| Learning outcomes | Study programme competences | | |
| To acquire the aspects related to the quality management in testing and calibration laboratories under the UNE-EN-ISO / IEC 17025 standard, both from a theoretical and practical point of view, with the main objective of guaranteeing Technical competence and reliability of analytical results. To this end, both management requirements and technical requirements that affect quality improvement must be known. | AC1<br>AC6<br>AC9 | BC5<br>BC6<br>BC10<br>BC12 | CC1<br>CC2<br>CC4<br>CC5 |
| To train the students to establish a plan for equipment management, maintenance, verification and writing up the calibration procedures according to the requirements of the UNE-ENISO / IEC 17025 standard, with the corresponding calculation of uncertainties. | AC2<br>AC5 | BC8<br>BC9 | |
| To acquire the abilities and skills to validate physical-chemical testing procedures and to get to know the associated uncertainty, in accordance with the requirements of the standard UNE-EN-ISO/IEC 17025 | | BC11 | CC3 |

| Contents | |
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| Topic | Sub-topic |
| Unit 1. Introduction to quality | |
| Unit 2. Tools and techniques for quality control and risk management | |
| Unit 3. Accreditation of analytical laboratories. ISO/IEC 17025 | |
| Unit 4. Metrology and traceability | |
| Unit 5. Equipment management | |
| Unit 6. Analytical methodologies and quality | |
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| Planning | | | | |
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| Methodologies / tests | Competencies | Ordinary class hours | Student?s personal work hours | Total hours |
| Seminar | A2 A9 B6 B8 B9 B10 B11 B12 C1 C3 | 6 | 17.5 | 23.5 |
| Mixed objective/subjective test | B5 | 1.5 | 10 | 11.5 |
| Case study | A5 A6 C4 C5 | 0 | 1 | 1 |
| Oral presentation | B5 | 1 | 0 | 1 |
| Guest lecture / keynote speech | A1 A2 B10 | 12 | 24 | 36 |
| Personalized attention | | 2 | 0 | 2 |
| (*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students. | | | | |

| Methodologies | |
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| **Methodologies** | **Description** |
| Seminar | Seminars held with teachers of the Master, or with professionals invited by the company, the administration or other universities. Interactive sessions related to the different subjects with debates and exchange of opinions with students. |
| Mixed objective/subjective test | Carrying out the different tests for verifying the acquisition of both theoretical and practical knowledge and the acquisition of skills and attitudes |
| Case study | Resolution of practical exercises (problems, test questions, interpretation and processing of information, evaluation of scientific publications, etc.) |
| Oral presentation | Oral presentation of papers, reports, etc., including discussion with teachers and students. |
| Guest lecture / keynote speech | Theoretical classes. Lectures (use of blackboard, computer, cannon), complemented with the tools of virtual teaching |

| Personalized attention | |
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| **Methodologies** | **Description** |
| Seminar | As tutorías están programadas polo profesor e coordinadas polo Centro. En xeral, cada alumno dispondrá de dúas horas por semestre. As actividades de control como exercicios dirixidos, aclaración de dúbidas sobre a teoría ou dos problenas, exercicios, lecturas ou outras tarefas propostas; ea presentación, presentación, discusión ou comentario feito traballo individual ou en pequenos grupos. En moitos casos, o profesor pode esixir que os estudantes entreguen os exercicios antes da celebración das clases. Estas entregas virán incluído no calendario de actividades a seren desenvolvidas polos alumnos ao longo do curso na Guía docente da disciplina correspondente. Participación nestas clases é obrigatoria. |

| Assessment | | | |
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| **Methodologies** | **Competencies** | **Description** | **Qualification** |
| Seminar | A2 A9 B6 B8 B9 B10 B11 B12 C1 C3 | Resolución de problemas e casos prácticos, individuais, ou en grupo. Incluese equi también avaliación continua mediante preguntas e cuestións e traballo presencial durante o curso. | 20 |
| Mixed objective/subjective test | B5 | O exame final incluirá tanto elementos de tipo teórico como de tipo práctico (resolución de casos) asociados ás actividades desenvolvidas nas clases expositivas e nos seminarios. | 60 |
| Case study | A5 A6 C4 C5 | Realización de traballos e informes escritos | 10 |
| Oral presentation | B5 | Exposición oral | 10 |

| Assessment comments |
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A avaliación desta materia farase mediante avaliación continua combinada cun exame final.
O exame final, no escenario 1 terá carácter presencial, e no escenario 2 será preferentemente telemático e no escenario 3 será exclusivamente de carácter telemático. A data de realización do exame será a que determine o centro.
Para os casos de realización fraudulenta de exercicios o probas será de aplicación o recollido na ?Normativa de avaliación do rendemento académico dos estudantes e de revisión das cualificacións?
A cualificación do/a alumno/a consistirá en dúas partes:- Avaliación continua (40%), que poderá constar á súa vez de:. Seminario: Resolución de problemas e casos prácticos, individuais, ou en grupo 15% e avaliación continua mediante preguntas e cuestións e traballo presencial durante o curso: 5%
Competencias a avaliar: A2 A9 B6 B8 B9 B10 B11 B12 C1 C3 (CG1, CG3, CG4, CG5, CG6, CG8, CT1, CT3, CE2, CE9)
. Estudo de casos: Realización de traballos e informes escritos 10%Competencias a avaliar: A5 A6 C4 C5 (CG1, CG3, CG6, CG8, CT1, CE2)
. Exposición oral 10%Competencias a avaliar: B5 (CB10).
- Exame final (60%)Competencias a avaliar: B5 (CB10)
O exame final incluirá tanto elementos de tipo teórico como de tipo práctico (resolución de casos) asociados ás actividades desenvolvidas nas clases expositivas e nos seminarios.O criterio para a avaliación como "non presentado" é que o/a alumno/a non se presente ao exame final.Esixirase unha asistencia superior ao 80% do total das clases de carácter obrigatorio (expositivas, seminarios e titorías).
É posible que os escenarios cambien ao longo do curso e que se alternen. Sen embargo, o programa da materia e a estrutura dos contidos e actividades non teñen porque verse modificadas por elo, de maneira que a avaliación descrita é válida para calquera dos tres escenarios que se contemplan como posibles ao longo do curso.

| Sources of information | |
|---|---|
| Basic | - R. Compañó; , A. Ríos (2002). Garantía de la calidad en los laboratorios analíticos. Madrid, Síntesis<br>- D.H. Besterfield (2009). Control de calidad. México, Pearson-Prentice Hall<br>- J.R. Evans, W. M. Lindsay (2005). Administración y control de la calidad. México, Thomson<br>- Sagrado S., Bonet E., Medina M.J., Martín Y. (2004). Manual Práctico de calidad en los laboratorios. Enfoque ISO 17025. Ediciones AENOR |
| Complementary | - Pedro Pablo Morillas Bravo (2018). Guia para la aplicación de UNE-EN ISO/IEC 17025:2017. AENOR ediciones<br>- W. Funk, V. Dammann, G. Donnevert (2007). Quality Assurance in Analytical Chemistry. Wiley |

| Recommendations |
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| Subjects that it is recommended to have taken before |
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| Subjects that are recommended to be taken simultaneously |
| Management Systems in the Chemical Industry/610509132 |
| Subjects that continue the syllabus |
| Master Thesis/610509139 |
| Other comments |
| Basic knowledge of statistics is recommended.To pass the subject is necessary to understand and use the concepts properly.Recommendations for online teaching: ?It is necessary to have a computer with a microphone and camera to be able to follow the online activities programmed along the course. ?Improve the computer and digital competencies by means of the resources available in the UDC |