Teaching Guide				
Identifying Data				2018/19
Subject (*)	Selection and validation of Analytical methodologies		Code	610509101
Study programme	Mestrado Universitario en Investigación Química e Química Industrial (Plan 2017)			
Descriptors				
Cycle	Period	Year	Type	Credits
Official Master's Degree	Yearly	First	Obligatory	3
Language	Spanish			
Teaching method	Face-to-face			
Prerequisites				
Department	Química			
Coordinador	Muniategui Lorenzo, Soledad	E-mail	soledad.muniategui@udc.es	
Lecturers	Carlosena Zubieta, Alatzne Muniategui Lorenzo, Soledad	E-mail	alatzne.carlosena@udc.es soledad.muniategui@udc.es	
Web	http://www.usc.es/gl/centros/quimica/curso/master.html			
General description	This subject aims to provide students with the knowledge of the basic principles for good practice in analytical measurement, emphasizing the importance of using validated methods. Provide guidance on the evaluation of analytical methods in their suitability for use with different validation guidelines, general or specific. Introduce students to innovative analysis techniques, interest in the industrial field and research. Develop in students the ability to solve real problems of practical cases of clinical analysis, environmental interest, among others.			

Study programme competences	
Code	Study programme competences
A1	Define concepts, principles, theories and specialized facts of different areas of chemistry.
A3	Innovate in the methods of synthesis and chemical analysis related to the different areas of chemistry
A5	Properly assess risks and environmental and socioeconomic impacts associated with special chemicals
A6	Design processes involving the treatment or disposal of hazardous chemicals
A7	Operate with advanced instrumentation for chemical analysis and structural determination.
A8	Analyze and use the data obtained independently in complex laboratory experiments and relating them with the chemical, physical or biological appropriate techniques, including the use of primary literature sources
A9	Promote innovation and entrepreneurship in the chemical industry and in research.
B2	Students should apply their knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to their field of study.
B3	Students should be able to integrate knowledge and handle complexity, and formulate judgments based on information that was incomplete or limited, include reflecting on social and ethical responsibilities linked to the application of their knowledge and judgments.
B4	Students should be able to communicate their conclusions, and the knowledge and the reasons that support them to specialists and non-specialists in a clear and unambiguous manner
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.
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.

Learning outcomes	
Learning outcomes	Study programme competences

To know how to select and implement best practice measurement and analytical experimentation, ensuring the quality of the chemical data through the validation of the analytical methodologies.	AC8 AC9	BC3 BC4 BC5	CC1 CC4
To know advanced techniques of sampling, sample treatment and instrumental determination in environmental analysis	AC5 AC6 AC7 AC9		CC1
To know how to analyze and solve chemical problems related to the environment based on analytical criteria. Planning and implementation of the stages of an analytical process	AC1 AC3	BC2 BC10 BC11 BC12	CC2 CC3

Contents	
Topic	**Sub-topic**
Item 1. Selection of analytical methodologies	
Item 2. Implementation, validation and verification of chemical analysis methods.	
Item 3. Innovative Technologies in Analytical Chemistry.	
Case Studies	

Planning				
Methodologies / tests	**Competencies**	**Ordinary class hours**	**Student?s personal work hours**	**Total hours**
Seminar	A9 B2 B11 C2 C4	3	9	12
Supervised projects	A5 B3 B4 B5 B10 B12 C1 C3	2	18	20
Mixed objective/subjective test	A1 A8 B2 C1	3	0	3
Laboratory practice	A3 A5 A6 A7 A8 A9	5	5	10
Guest lecture / keynote speech	A9 B3 B12 C4	10	20	30
Personalized attention		0	0	0
(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.				

Methodologies	
Methodologies	**Description**
Seminar	Seminars clarify and extend some aspects covered in lectures and laboratory practice, especially related to the practical application of the studied methodologies. Students participate and discuss possible strategies to solve industrial and environmental problems under the teacher guidance
Supervised projects	Supervised projects will include finding information from different sources, presentation and oral defense of a topic proposed by the teacher related to any environmental, industrial, etc problem
Mixed objective/subjective test	A final exam will be done to assess the degree of learning both the theoretical and practica
Laboratory practice	In the lab sessions the student will perform the application of theoretical concepts studied throughout the course and will also it will contact advanced technical and analytical instrumentation.
Guest lecture / keynote speech	Teacher explains the fundamental concepts and the most important contents of each subject. It also proposes different issues that should be discussed and resolved by the students, encouraging participation

Personalized attention	
Methodologies	**Description**

Seminar Supervised projects	Throughout the course the teacher resolves any doubts on the subject that the student needs. In seminars and supervised projects, the teacher supervises the methodology used to solve the proposed problems, solves the student´s doubts and guides the learning process. Students with recognition of part-time dedication and academic assistance waiver regime will be treated in tutoring (by appointment)

Assessment			
Methodologies	**Competencies**	**Description**	**Qualification**
Seminar	A9 B2 B11 C2 C4	Work and active participation of students will be evaluated	5
Supervised projects	A5 B3 B4 B5 B10 B12 C1 C3	The academic activities will be evaluated by performing and oral defense of the supervised activities	30
Mixed objective/subjective test	A1 A8 B2 C1	Learning degree for the course contents and skill acquisition by students will be assessed through an objective test. It will consist of theoretical questions and applied problems	60
Laboratory practice	A3 A5 A6 A7 A8 A9	Practice work and active participation of students will be evaluated on a continuing process.	5

Assessment comments
To pass the subject, students must regulary attendance at all evaluable activities and to attain a minimum cualification in each of them. The student will obtain the qualification of No Presented they do not perform the mentored work and not present the final exam. The scores for the activities will remain in the July, except for the mixed test which shall be repeated in case of being suspended. The following academic courses, the teaching-learning process, including all evaluable activities, return to start a new course.For students with a part-time dedication and academic assistance waiver regime, in the event that they can not perform all activities or continuous assessment test, the teacher will take appropriate action to avoid prejudicing their qualification.

Sources of information	
Basic	- R. Kellner, J. M. Mermet, M. Otto, M. Valcarcel y H. M. Widmer, (2004). Básica. Eds. ?Analytical Chemistry: A Modern Approach to Analytical Science. Wiley-VCH - Eurolab España. P.P. Morillas y colaboradores (2016). Guía Eurachem: La adecuación al uso de los métodos analíticos ? Una Guía de laboratorio para la validación de métodos y temas relacionados . Disponible en www.eurachem.org - M. Valcárcel (1999). Principios de Química Analítica. Springer, Barcelona
Complementary	- Ramis Ramos G., García Álvarez-Coque M.C (2001). Quimiometría. Síntesis. Madrid. - Compañó Beltrán R., Rios Castro A (2002). Garantía de calidad en los laboratorios analíticos. Síntesis. Madrid. - Valcárcel M., Cárdenas M.S (2000.). Automatización y Miniat urización en Química Analítica. Ed. Springer. - I. Rodríguez, E. Trullos, X. Rius (2003). Validación de Métodos Analíticos Cualitativos. Técnicas de Laboratorio, 281 (2003) 328-335. http:/www.quimica.urv.es/quimio - Kruve A. et al. (2015). Tutorial review on validation of liquid chromato graphy?mass spectrometry methods: Part I. Analytica Chimica Act a 870 (2015) 8?28 - Kruve A. et al. (). Tutorial review on validation of liquid chromato graphy?mass spectrometry methods: Part II. Analytica Chimica Act a 870 (2015) 29?44

Recommendations
Subjects that it is recommended to have taken before

Subjects that are recommended to be taken simultaneously
Subjects that continue the syllabus
Other comments
Students must review the theoretical concepts introduced in different topics using the recommended bibliography. Those students who encounter significant difficulties in working the proposed activities must go in the tutorial hours of teachers, in order to be able to analyze the problem and try to solve those difficulties.

(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.