



DATOS DE LA ASIGNATURA

Denominación: FORENSIC ANALYTICAL CHEMISTRY

Código: 8711

Plan de estudios: MÁSTER UNIVERSITARIO ERASMUS MUNDUS EN CIENCIAS FORENSES **Curso:** 1

Créditos ECTS: 6

Horas de trabajo presencial: 60

Porcentaje de presencialidad: 40%

Horas de trabajo no presencial: 90

Plataforma virtual:

DATOS DEL PROFESORADO

Profesorado responsable de la asignatura

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DATOS ESPECÍFICOS DE LA ASIGNATURA

REQUISITOS Y RECOMENDACIONES

Requisitos previos establecidos en el plan de estudios

Ninguno.

Recomendaciones

Ninguna especificada.

OBJETIVOS

This module provides the students with a global overview of the steps involved in the development of a forensic analytical process, ranging from evidence collection to presentation of final results to be defended in court. The main aspects included in the module deal with crime scene processing, sample collection and handling, chemical and immunochemical presumptive and on-site tests and the application of different spectrochemical techniques in many forensic fields.

COMPETENCIAS

D1	Students should have demonstrated knowledge and understanding that is founded upon and extends and/or enhances that typically associated with Bachelor's level, and that provides a basis or opportunity for originality in developing and/or applying ideas, often within a research context.
S1	Students should be able to apply generic scientific principles related to Chemistry, Biology, Toxicology, Medicine, Physics, and Mathematics to solve forensic cases.
S2	Students should be able to document correctly evidence and results in an unambiguous way.
S3	Students should be able to use and select scientific methodologies to collect, classify and analyse forensic evidences and data that ensure the chain of custody and observe all the requirements of a quality assurance system, including the absence of contamination in the samples.
S4	Students should be able to show and apply their knowledge about analytical techniques and sample treatment in forensic analytical procedures.
S12	Students should be able to acquire skills in evidence sampling, preservation and identification for forensic purposes.
S13	Students should be able to acquire skills in the field for evidence sampling.

CONTENIDOS

1. Contenidos teóricos

GENERAL ASPECTS IN FORENSIC ANALYTICAL CHEMISTRY

The forensic analytical process: definition, features and steps

Key forensic and legal concepts

Professional organizations and bodies in forensic analysis

Crime scene processing

Evidence documentation

Relevance of chain of custody for court admission of analytical evidences

COLLECTION OF FORENSIC SAMPLES

Types of forensic samples

General guidelines for forensic sampling

Collection for the analysis of bulk and trace samples

Design of sampling protocol and documentation

HANDLING AND TREATMENT OF FORENSIC SAMPLES

Chemical separation techniques

Classical liquid-liquid and solid-liquid extraction techniques

Advanced applications of extraction techniques in forensic analysis: supercritical fluid extraction, microextraction techniques, microwave assisted extraction

PRESUMPTIVE, SCREENING AND ON-SITE TESTS

Screening methods in forensic analysis

Chemical spot tests

Immunochemical methods

Thin layer chromatography

Examples of applications to forensic analysis

SPECTROSCOPY/SPECTROMETRY IN FORENSIC SCIENCE

Molecular techniques: UV, IR and Raman spectroscopy. Micro-techniques

Atomic absorption spectroscopy

Microscopy techniques

Miscellaneous techniques used for forensic analysis.

2. Contenidos prácticos

Practical courses related to:

METODOLOGÍA

Aclaraciones

Lectures with a large student group

The presentation of theoretical contents will be done in 50-minute sessions. These lessons will provide students with the necessary background on a topic, which will be developed in more detail with activities involving their active participation.

Seminars and visits

This kind of activities will be proposed to enhance student problem solving skills and their contact with professional bodies. Spanish police forces belonging to Scientific Unit will develop some seminars dealing with evidence

sampling, documentation, presumptive test, among others.

Case studies

This activity will be developed individually and/or in groups. Different case studies will be posed to students to work from a practical point of view and a very detailed way some specific aspects on extraction techniques and implementation of analytical methods depending on the purpose they are developed for.

Laboratory practical courses

The practical skills will be developed by the performance of several experiments related to the main topics of the subject and following the workflow of a forensic analytical process when possible.

The teaching methodologies used are oriented to achieve the necessary knowledge and skills in forensic chemistry from an analytical point of view. The coherence of teaching methodology with the objectives is very clear. The use of lectures is needed in order to give the students the basic guidelines of the module and to place them in the real context of the module. With the foreseen seminars and visits, students will be given the opportunity to visit some installations in Cordoba, Seville and/or Madrid (it will be subjected to availability of Seville and Madrid units). They will be also asked to present as written work the answer to some specific question about the contents studied at each lesson group or after each visit to test the attention and the understanding of the main aspects related with this activity. This activity is close related with the two first learning outcomes, but also it is linked to the rest of the competences to be acquired with this module. This is a very interesting activity from a professional point of view, since it connects this Masters with a Professional bodie in this field.

The seminars will also focus on the discussion on the suitability of different techniques for a particular purpose will be discussed in groups in presence of the teacher and they will be asked to answer questions in a rationale and critical way, which is connected with learning outcomes 4 and 5 defined for this module.

Since one of the purposes is the training of highly qualified staff that could work in forensic the forensic field, practical courses are essential for the Masters students to be trained in the performance of forensic chemical analysis in a proper way in order to get valuable results to be defended as evidences in court. This is directly linked to

Actividades presenciales

Actividad	Total
<i>Actividades de evaluación</i>	3
<i>Estudio de casos</i>	3
<i>Laboratorio</i>	15
<i>Lección magistral</i>	30
<i>Salidas</i>	3
<i>Seminario</i>	6
Total horas:	60

Actividades no presenciales

Actividad	Total
Análisis	15
Búsqueda de información	10
Ejercicios	10
Estudio	50
Trabajo de grupo	5
Total horas:	90

MATERIAL DE TRABAJO PARA EL ALUMNADO

Casos y supuestos prácticos
Cuaderno de Prácticas
Dossier de documentación
Ejercicios y problemas
Manual de la asignatura

Aclaraciones:

All materials will be supplied in electronic and as hardcopy. They will be available in Moodle platform

EVALUACIÓN

Instrumentos	Porcentaje
Casos y supuestos prácticos	25%
Informes/memorias de prácticas	10%
Pruebas objetivas	50%
Trabajos en grupo	15%

Periodo de validez de las calificaciones parciales: *Marks will be valid until the period stipulated for resitting the subject*

Aclaraciones:

These adaptations will be considered upon the individual cases and attending to the regulations at the moment of the application of this regime

BIBLIOGRAFÍA

1. Bibliografía básica:

- Forensic Chemistry. Suzanne Bell. Prentice Hall. Pearson Education. 2006. ISBN 0-13-147835-4.
- Forensic Science: An introduction to Scientific and Investigative Techniques. CRC Press. 2009. ISBN 978-1-42000649-3-3.
- Forensic Science. A.R. Jackson, J.M. Jackson, Pearson Education limited. 2008. ISBN 978-013-1998003.

- Encyclopedia of Forensic Science. Jay A. Siegel, Geoffrey C. Knupfer and Pekka J. Saukko. Elsevier, 2000. 978-0-12-227215-8.

- Infrared spectroscopy : fundamentals and applications / Barbara H. Stuart.

Stuart, Barbara H. Chichester : John Wiley and Sons, 2008. 9780470854280.

- Introductory Raman Spectroscopy (Second Edition). John R. Ferraro, Kazuo Nakamoto and Chris W. Brown. Elsevier 2003. ISBN: 978-0-12-254105-6.

- Microscopy Techniques. Ed: Jens Rietdorf. Springer-Verlag GmbH., Berlin Heidelberg : 2005. From Advances in Biochemical Engineering/Biotechnology, 0724-6145 ; 95.

2. Bibliografía complementaria:

Forensic Science International

Journal of Forensic Science

Forensic Science Policy & Management: An International Journal

The Open Forensic Science Journal