

**COURSE DATA****Data Subject**

Code	43027
Name	Guided isolation and identification of bioactive natural products
Cycle	Master's degree
ECTS Credits	5.0
Academic year	2019 - 2020

Study (s)

Degree	Center	Acad. year	Period
2138 - M.D. in Research in and Rational Use of Medicines	Faculty of Pharmacy and Food Sciences	1	Annual

Subject-matter

Degree	Subject-matter	Character
2138 - M.D. in Research in and Rational Use of Medicines	5 - Guided isolation and identification of bioactive natural products	Optional
3103 - Biomedicine and Pharmacy	1 - Complementos Formación	Optional

Coordination

Name	Department
CABEDO ESCRIG, NURIA	135 - Pharmacology
GINER PONS, ROSA MARIA	135 - Pharmacology
MAÑEZ ALIÑO, SALVADOR	135 - Pharmacology

SUMMARY

Optional subject belonging to research itinerary of the “Master en Investigación y Uso Racional del Medicamento” focusses on the main aspects of the laboratory methodology used in the field of research on new natural molecules with pharmacology interest. It deals with the plant material selection, extraction, isolation and structural elucidation of active components.

Aims:



Knowledge of the scientific basis of extraction process, isolation of secondary metabolites which constitute the main active principles in plants as sources of potential natural drugs.

Provide solid criteria for the selection of a plant material, as well as the isolation and structural elucidation of metabolites with pharmacologic interest.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Its convenient students have passed Pharmacognosy, Organic Chemistry, Analytical Chemistry and Pharmacology in order to follow and understand the contents.

OUTCOMES

2138 - M.D. in Research in and Rational Use of Medicines

- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- Students should demonstrate self-directed learning skills for continued academic growth.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Be able to access to information tools in other areas of knowledge and use them properly.
- Be able to apply the research experience acquired to professional practice both in private companies and in public organisations.
- Capacidad de seleccionar y gestionar los recursos disponibles (instrumentales y humanos) para optimizar resultados en investigación.
- Dominar el método científico, el planteamiento de protocolos experimentales y la interpretación de resultados en la búsqueda, desarrollo y evaluación de nuevos fármacos.

LEARNING OUTCOMES

1. Knowledge of localization of different secondary metabolites in the nature.
2. Establish criteria to obtain natural compounds from different biological sources.
3. Knowledge of essential requirements for the active natural drugs.



4. Knowledge of spectroscopic methods for structural determination of natural drugs. Application of nuclear magnetic resonance (RMN).
5. Choose the adequate bioassays to evaluate pharmacologic activities

DESCRIPTION OF CONTENTS

1. Isolation and elucidation of bioactive natural molecules

Importance of living organisms as a source of new drugs. Criteria for investigation. Dereplication. Bases quimiotaxonómicas.

Chemical characteristics influencing the extraction and separation processes of organic molecules. Conventional methods and improved. Supercritical fluids.

Separation of macromolecules and other polymers.

Rationale and applications of chromatographic processes. The planar and column chromatography.

High resolution liquid chromatography.

Bioassays in vivo and in vitro.

Structural elucidation of terpenoids, alkaloids, phenolics and other smaller groups.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	35,00	100
Laboratory practices	15,00	100
TOTAL	50,00	

TEACHING METHODOLOGY

In this subject we will make use of different teaching methodologies such as lectures, workshops on structural elucidation and practical sessions focused on extraction, isolation and identification of natural products to understand the phytochemical methods.

Furthermore, a forum in a Virtual learning environment will be employed to promote active learning and to provide complementary materials.



EVALUATION

Attendance is compulsory to all teaching activities. Active participation of the students is encouraged and may positively evaluated.

Coursework consist on the structural elucidation of natural products, paper exam consist on answering three out of six questions covering all topics.

Formative Evaluation:

Attendance, engagement and active participation 30%

Workshops and assignment 30%

Paper exam 40%

REFERENCES

Basic

- Heinrich, M. , Barnes, J., Prieto, J.M., Gibbons, S., Williamson, E.M. Fundamentals of Phamacognosy and Phytotherapy, 3^a ed. 2018, Elsevier.
- Dewick, P.M. Medicinal Natural Products. A Biosynthetic Approach, 3^a ed. 2009, J. Wiley & Sons.
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Additional

- Andlauer, W. et al (1999): Determination of selected phytochemicals by reversed-phase high-performance liquid chromatography combined with ultraviolet and mass spectrometric detection. J. Chromatogr. A 849, 341-348.



- Bradshaw, J. et al. (2001): A rapid and facile method for the dereplication of purified natural products, J. Nat. Prod. 64, 1541-1544.
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- Bross-Walch, N., Kühn, T., Moskau, D., Zerbe, O. (2005): Strategies and tools for structure determination of natural products using modern methods of NMR spectroscopy (review). Chemistry and Biodiversity 2, 147-77.
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- Wickberg, B. (1993): Chemical methods in ethnopharmacology, J. Ethnopharmacol. 38, 159-165.
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- Teo CC, Tan SN, Yong JW, Hew CS, Ong ES. (2010): Pressurized hot water extraction (PHWE). J Chromatogr A. 1217(16):2484-94.
- Wohlgemuth. R. (2014). Chiral LC-MS/MS of D-and L-2-Hydroxyglutaric Acid Biomarkers. Reporter Appl Newsletter 56:11.

ADDENDUM COVID-19



This addendum will only be activated if the health situation requires so and with the prior agreement of the Governing Council

1. Contenidos

Se reducen los contenidos inequívocamente presenciales, como son las prácticas inicialmente recogidas en la guía docente, dado que su impartición es imposible.

Se priorizan los contenidos teóricos frente a los prácticos. Al porcentaje inicial de los contenidos teóricos se le añadirá el porcentaje de los contenidos prácticos. Con ello, creemos que se garantizará la consecución de los objetivos de aprendizaje esenciales en el ámbito de los fundamentos.

2. Volumen de trabajo y planificación temporal de la docencia

Se reduce el número de créditos asignados a las actividades prácticas, las cuales se sustituirán por otras actividades que representarán a la larga el mismo volumen de trabajo que marca la guía docente original. Estas nuevas actividades tendrán el carácter de seminarios, entendidos como tareas de elaboración, mínimamente grupales, y tuteladas.

La guía docente preveía un total de 50 horas de las que quedaban por impartir la mitad en el momento del inicio de la docencia no presencial.

Las sesiones programadas se impartirán en las mismas fechas y horario aunque con una menor duración formal.

3. Metodología docente

Se subirán los materiales al Aula Virtual. Las clases teóricas se impartirán mediante videoconferencia síncrona a través de Blackboard Collaborate.

Las tutorías se impartirán mediante videoconferencia, y en ellas se discutirán los ejercicios a resolver por los estudiantes.

4. Evaluación

El 50% de la asignatura ya ha sido impartida y evaluada. El 50% restante se evaluará mediante una prueba escrita abierta de un ejercicio a resolver por los estudiantes distribuido en el Aula Virtual, además de responder a una prueba objetiva de evaluación en la propia Aula Virtual.

5. Bibliografía

La bibliografía recomendada se mantiene accesible.