

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

Code	43242
Name	Systematics and ecology of marine invertebrates
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2148 - M.D. in Biodiversity: Conservation and Evolution	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
2148 - M.D. in Biodiversity: Conservation and Evolution	3 - Biodiversity and conservation of invertebrates	Optional

Coordination

Name	Department
LLUCH TARAZONA, JAVIER	355 - Zoology
NAVARRO GOMEZ, PILAR	355 - Zoology

SUMMARY

Ecology and Systematics of Marine Invertebrates is a required subject taught in the first semester of the Master in Biodiversity: Conservation and Evolution (Itinerary II) and consists of 3 ECTS credits.

The teachers of the subject assume that the students have basic knowledge about the main groups of marine invertebrates, so in this subject it is intended to deepen and complete biological and ecological aspects, focusing basically on their natural history, morphology and systematics. This subject also offers basic knowledge to tackle other electives of this same itinerary.

This subject has a mixed theoretical-practical nature that includes theoretical sessions and practical sessions for processing, observation and identification of marine fauna, which will allow exercising the concepts and techniques studied and familiarizing the student with the different groups of invertebrates and their main habitats.



PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

N o n e .

OUTCOMES

2148 - M.D. in Biodiversity: Conservation and Evolution

- Students should apply acquired knowledge to solve problems in unfamiliar contexts within their field of study, including multidisciplinary scenarios.
- 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.
- To acquire basic skills to develop laboratory work in biomedical research.
- Be able to access the information required (databases, scientific articles, etc.) and to interpret and use it sensibly.
- Stimulate the capacity for critical reasoning and for argumentation based on rational criteria.
- Awaken interest in the social and economic application of science.
- Encourage ethical commitment and environmental awareness.

LEARNING OUTCOMES

To:

- Recognize the organizational, morphological and anatomical models of the main marine invertebrate taxa and identify the main groups.
- Define the marine environments in which they live.
- Understand the main modes of feeding and nutrient acquisition.
- Relate the vital cycles and modes of reproduction of each group.
- Analyze the main ecological interactions between invertebrates.
- Discuss the evolutionary relationships between invertebrate taxa.



- Learn techniques for sampling and identification and ecological analysis of benthic invertebrates from different Mediterranean communities.

DESCRIPTION OF CONTENTS

1. Biodiversity of the Mediterranean Sea

Current state. Geomorphology / topography. Hydrology and History. Biodiversity Estimate: Total Biodiversity and by taxa. Diversity in depth. Endemic. New diversity. Description of models: spatial and bathymetric models. Spatial and temporal models. Threats to biodiversity.

Systematics, evolution and phylogenetic relationships between the different groups of marine invertebrates. Classification.

2. Conservation of the Mediterranean Sea.

Marine protected areas Types: AMP, ZEPIM and LICs.

Framework Directive on marine strategy (Dir. 2008/56 / CE).

Marine demarcations. Spanish Inventory of Habitats and Marine Species (IEHEM).

Standard list of marine species on the Mediterranean Spanish coast. Action Plans: habitats and species.

3. Systematic and ecological studies of Mediterranean marine invertebrates.

Diblastics: basal groups. Acoelomate Triblastics. Blastocoelomate Triblastics. Schizocoelomate Triblastics. Enterocoelomate Triblastics.

1. Diblastics: basal groups. Poriferous, Cnidarians and Ctenophores. Reproduction, life cycles and larval stages. Ecology (mobility, nutrition and habitat). Identification of the main groups.

2. Acoelomates. Flatworms, Nemertean and smaller groups. Reproduction, life cycles and larval stages. Ecology (mobility, nutrition and habitat).

3. Blastocoelomates of interest. Nematodes and Gastrotrichs. Biology and Ecology and its relationship with the meiobenthos. Observation and identification of free-living gastrotrich specimens of marine meiofauna.

4. Coelomate Protostomes I: Polychaete Annelids. Characters of taxonomic importance. Classification. Ways of life and ecology. Pollution indicator species. Exotic species. Species of commercial importance. Identification of families of errant and sedentary polychaetes.

5. Coelomate Protostomes II: Mollusks. Gastropods, Bivalves, Cephalopods and minor classes. Commercial interest. Aquaculture and fishing. Identification of Gastropods and Bivalves. Ecology.

6. Coelomate Protostomes III: Arthropods. Crustaceans, their role in the marine food chain. Economic, ecological and biological value. Characteristics and classification. Main groups. The Malacostraceans, the most representative species. Identification test of main groups of Malacostraceans.



7. Coelomate Deuterostomes: Echinoderms. Predators of benthos. Identification of Asteroids, Ophiuroids, Echinoids and Holothuroids. Ecology.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Laboratory practices	10,00	100
Development of individual work	20,00	0
Preparation of evaluation activities	10,00	0
Preparing lectures	5,00	0
Preparation of practical classes and problem	10,00	0
TOTAL	75,00	

TEACHING METHODOLOGY

The course will start with a theoretical session (3 h), full group, in which the basic general concepts will be introduced in order to develop the following activities: isolation and study of biota samples in several laboratory sessions, followed by the study of the different taxonomic groups in theoretical-practical sessions in the laboratory and complemented with triage sessions of the samples. The estimated number of sessions for each topic of the theoretical-practical sessions will be variable, between 1-2 sessions, each lasting 2.5 hours. Attendance to all the above mentioned activities will be mandatory.

In addition, a report on the results of the processing of the sample assigned to each student/group of students will be required, with a format that will be indicated at the beginning of the course and that will serve as a basis for the evaluation of the course.

EVALUATION

For the evaluation of the theoretical-practical contents of the course, a report of the processed samples will be made, with a mandatory format that will include the following aspects related to the course:

- 1.- Selection, justification and description the sampling methods.
- 2.- Sample processing. Methods of anesthesia, triage and fixation of specimens of different phyla.
- 3.- Observation and study techniques. Level and precision in the taxonomic identification of fauna. Species inventory.
- 4.- Ecological descriptors for the characterization of the sampled marine communities and numerical treatment of data: Abundance, Specific Richness, Diversity and Equitability indexes, Dominance, etc.



5.-Discussion of the results.

In order to pass the course, participation and attitude towards the course will be assessed and attendance to all theoretical and practical sessions will be essential. In addition, a grade of 5 or higher must be obtained in the qualification of the report.

REFERENCES

Basic

- BARNES, R. S. K.; CALOW, P.; OLIVE, P. J. W.; GODING, D. W. y SPICER, J. I. 2001. The Invertebrates. A synthesis. Third edition. Wiley-Blackwell, Oxford. 497 pp.
- BRUSCA, R.C. ; MOORE, V ; SHUSTER, S.M. (2016). Invertebrates. (3^a Edition). Ed. Sinauer Associates, Inc., Sunderland, Massachusetts, USA.
- NIELSEN, C. 2001. Animal evolution. Interrelationships of the living phyla. Second edition. Oxford University Press, Oxford. 563 pp.
- PEARSE, V., PEARSE, J., BUCHSBAUM, M. & BUSCHSBAUM, R. (1987). Living Invertebrates. Blackwell Scientific. Boston, Massachusetts.
- PECHENIK, J.A. (2005). Biology of Invertebrates. Mc Graw-Hill. Boston, Massachusetts.
- RUPPERT, E.E. & BARNES, R.D. (1995). Zoología de los Invertebrados. McGraw-Hill. Interamericana. Madrid.

Additional

- D'ANGELO, G. & GARGIULLO, S. (1978). Guida alle conchiglie mediterranee. Conocerle cercare collezionarle. Fabri. Milano.
- FALCIAI, L. & MINERVINI, R. (1995). Guía de los Crustáceos Decápodos de Europa. Omega. Barcelona.
- FOLCH, R. (1992). Història Natural dels Països Catalans. Enciclopèdia Catalana. Barcelona.
- GUERRA, A. (1992). Mollusca, Cephalopoda. En: Fauna Ibérica, vol. 1. Ramos, M.A. et al. (Eds.) Museo Nacional de Ciencias Naturales. CSIC. Madrid.
- HOFRICHTER, R. (Ed.) (2005). El Mar Mediterráneo. Fauna, flora, ecología. Vol II/1: Guía sistemática y de identificación (procariotas, protistas, hongos, algas, animales (hasta Nemertea). Omega. Barcelona.
- HOUSEMAN, J. (2002). Digital Zoology. Version 1.0. CD Rom and Student Workbook. McGraw-Hill. New York.
- RIEDL, R. (2000). Fauna y Flora del Mar Mediterráneo. Omega.



- SAIZ SALINAS, J.I. (1993). Sipuncula. En: Fauna Ibérica, vol. 4. Ramos, M.A. et al. (Eds.) Museo Nacional de Ciencias Naturales. CSIC. Madrid.
- SOUTHWARD, A.J. & D.J.C. ,CRISP (1963). Catalogue des Principales Salissures Marines. Balanes. Vol. 1. Centre de Recherche d'Études Oceanographiques. Paris.
- VIEITEZ, J.M., ALÓS, C., PARAPAR, J., BESTEIRO, C., MOREIRA, J., NÚÑEZ, J., LABORDA, J. & SAN MARTIN, G. (2004). Annelida Polychaeta I. En: Fauna Ibérica, vol. 25. Ramos, M.A. et al. (Eds.) Museo Nacional de Ciencias Naturales. CSIC. Madrid.

ADDENDUM COVID-19

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

English version is not available

1. Contenidos

Se mantienen inicialmente todos los contenidos inicialmente recogidos en la guía docente. Si no se pudieran realizar las salidas al campo para la extracción de material biológico ni la asistencia a las sesiones teórico-prácticas en el laboratorio, para la obtención de datos y realizar el informe a partir de sus propios datos de campo, ambas actividades serán sustituidas por sesiones de BBC para explicar la metodología de campo, complementadas con vídeos y bibliografía a disposición del estudiante y con CHAT para solucionar posibles dudas. Los datos para el informe se proporcionarán de años anteriores a cada uno de los grupos de trabajo y para cada una de las comunidades prevista de muestreo. Así podrán analizar la información de manera no presencial. Se realizarán tutorías personales electrónicas a lo largo de todos los días programados en el horario para la asignatura.

2. Volumen de trabajo y planificación temporal de la docencia

- Se mantiene la carga de trabajo total.
- Las 3 h exclusivamente teóricas se impartirán de forma síncrona por los dos profesores mediante BBC y/o ppt locutados.
- Las 6 h de salidas al campo se sustituirán por una sesión síncrona de BBC y por varios vídeos. Con CHAT para posibles dudas.
- Las 21 h de sesiones teórico-prácticas de laboratorio serán sustituidas por actividades no presenciales: exposición de contenidos de cada uno de los temas por BBC o/y ppt locutados síncronos por parte de los dos profesores. Además de CHAT para posibles dudas. Durante estas sesiones los alumnos también podrán realizar consultas sobre la elaboración del informe para su evaluación.



- Los alumnos deberán dedicar al menos 6 h para las lecturas recomendadas.
- Las actividades no presenciales se intentarán ajustar a las mismas fechas y horas con la misma duración. Ver programaciones semanales de la asignatura para más detalles.

3. Metodología docente

PLANIFICACIÓN SEMANAL

A través de Aula Virtual (AV): Entrega a los estudiantes de una ficha semanal con los ejercicios, actividades y tareas propuestos para conseguir los aprendizajes de forma autónoma y planificación de las sesiones” on line” con el profesor de sesiones de teoría, sesiones teóricoprácticas, tutorías, videos, foros, etc.

TEORÍA:

Para cada tema del programa se emplean PPT COMENTADOS CON VOZ y CHAT para resolver dudas. Además de los materiales habituales, se aportarán textos complementarios, enlaces a videos de TV, Mmedia, Vimeo, etc. y artículos no incluidos previamente.

TUTORÍAS:

Electrónicas y/o por VIDEOCONFERENCIA con empleo del CHAT.

SESIONES DE TEORÍA Y TEÓRICO-PRÁCTICAS:

BBC y/o PPT comentados. CHATpara dudas y debates.

La plataforma que utilizada para todo ello será AV. Ver detalles en la programación semanal.

4. Evaluación

Los criterios de evaluación se modifican respecto a la guía docente original. Se mantiene la elaboración del informe sobre la comunidad marina asignada realizado en grupos de 4-5 estudiantes que contribuirán a un 50% de la nota final y se incorpora en la evaluación un cuestionario desde aula virtual realizado de manera individual y *online* con un valor del 50% restante.

5. Bibliografía

A la bibliografía incluida en la guía docente se añadirán para cada uno de los temas y para la elaboración del informe, distintos manuales, artículos y libros que los profesores pondrán a disposición de los estudiantes.