

Management of Animal Resources and Pests

Code: 100843
ECTS Credits: 6

Degree	Type	Year	Semester
2500251 Environmental Biology	OB	3	2

Contact

Name: Fernando García del Pino
Email: Fernando.Garcia@uab.cat

Use of languages

Principal working language: catalan (cat)
Some groups entirely in English: No
Some groups entirely in Catalan: Yes
Some groups entirely in Spanish: No

Teachers

Emilio Javier Valbuena Ureña
Anna Soler Membrives

Prerequisites

Although there are no specific prerequisites, it is advisable that students have passed the Zoology subjects.

Objectives and Contextualisation

The student must acquire the theoretical-practical knowledge that allows him/her to know and understand the effect that the exploitations of animal resources and animal pests have on the environment.

The student who has taken this course must have the training to analyze farms of renewable animal resources, and diagnose and manage the potential impacts generated. Likewise, the student must be able to participate in teams that implement strategies and pest management programs to reduce or suppress their populations, diagnosing the impact of these strategies on the human being and the environment.

The specific training objectives are:

- To understand the importance of the renewable resources that are exploited and its reality, as well as to assess the environmental impact of its exploitation, and to know the tools for its sustainable management.
- To know the problems of the cultivation and exploitation of certain animal resources and the importance of optimizing the conditions of growth, nutrition, reproduction and productive performance (with a special emphasis on aquaculture) for sustainable production and respectful of the environment.
- To know the ecological and biological bases of the origin of animal pests and their problems, as well as to have a current vision of the different strategies that are currently available for their control.
- To recognize the factors to consider designing a management strategy of a determined pest, with an environmental vision, that is respectful with humans and the environment.

Skills

- Adopt an ethical stance.
- Communicate efficiently, orally and in writing.
- Develop a sensibility towards environmental issues.
- Develop and apply biological control techniques.
- Develop planning and organisation skills.
- Focus on quality.
- Make decisions.
- Perform studies on animal and plant production and improvement.

Learning outcomes

1. Adopt an ethical stance.
2. Communicate efficiently, orally and in writing.
3. Develop a sensibility towards environmental issues.
4. Develop planning and organisation skills.
5. Diagnose and solve environmental problems related to animal resources (fishing and hunting) and pests.
6. Establish strategies for pest management.
7. Focus on quality.
8. Identify the problems caused by pests and the production and exploitation of certain natural animal resources (fishing and hunting).
9. Make decisions.

Content

THEORETICAL PROGRAM

INTRODUCTION

Unit 0.- Presentation of the subject. (0.5 hr)

Unit 1.- Introduction. The animals and the humans. Applications of the fauna. Animal resources and the environment. (0.5 hr)

PART I: PROBLEMATICS OF THE EXPLOITATION OF ANIMAL RESOURCES

I.1. Fishing resources and its management

Unit 2.- Fishing resources and fishing intensity: Definition of fishing resource. Fishing gears: types, classification and effects on the ecosystem. Fisheries intensity and resource depletion: basic strategies of exploitation, bio-economic models and programs of simulation of fishing intensity. (1 hr)

Unit 3.- Fisheries management. The three actors: administration, technicians or scientists and the fishermen. Technical and monitoring measures: regulation of capture, effort and selectivity. Monitoring and evaluation. (1 hr)

Unit 4.- Coastal fishing in the Mediterranean. Fishing within the framework of the European Union: the common fisheries policy. International fisheries: the case of the bluefin tuna. (1 hr).

Seminar 1.- Study case of fisheries co-management. (1 hr)

I.2. Aquaculture

Unit 5.- Introduction. Aquaculture past and present. Main systems of aquaculture production. Mollusks, crustaceans and fish production: main species of interest. (1 hr)

Unit 6.- An option for fishing? Research lines. Feeding: nutritional requirements, feeding in the different phases of production. Reproduction and growth. Pathological aspects. Ecological and environmental impacts. The problem of closing of life cycles. (1 hr)

Unit 7.- Sustainable aquaculture. (1 hr)

I.3. Hunting

Unit 8.- Hunting: exploitation of a natural resource? Major and minor hunting species. Hunting reserves, a form of protection? Hunting production (birds, mammals) for repopulation. Hunting activity in Catalonia and Spain. (1 hr)

Seminar 2.- Case studies: situation and problems of hunting in Catalonia. (1 hr)

I.4. Minor exploitation

Unit 9.- Minor exploitation. Introduction to beekeeping. Beekeeping in Catalonia and Spain. Heliciculture. Lumbriculture. (1 hr)

PART II: URBAN AND PERI-URBAN ANIMAL PESTS: PROBLEMATICS AND MANAGEMENT

II.1.- Introduction:

Unit 10.- The concept of animal pest, with a biological, ecological and anthropic perspective. (0.5 hr)

Unit 11.- Ecological bases that determine the occurrence of pests in urban and peri-urban environments. Disturbances that have generated pests. Invasive species triggering pests. Emerging pests. Globalization and pests. Global climate change and pests. (1 hr)

II.2.- Protocols for urban pest control programs

Unit 12.- Inspection and monitoring. Planning of the proceedings. Delivery to the user of the program proposal. Development of the actions. Delivery to the user of the performance report. Evaluation of the performances. Monitoring and continuous inspection. (1.5 hr)

II.3.- Strategies of pest management

Unit 13.- Preventive pest control strategies: Use of the environmental conditions that determine the appearance of animal pests in order to determine management practices that allow the implementation of preventive measures to control their populations. Examples of habitat management (removal of breeding sites, management of temperature and humidity, etc.). (1 hr)

Unit 14.- Active strategies: Mechanical and physical methods. (1 hr)

Unit 15.- Definition of pesticides and types according to their use. Pesticides of natural origin (botanists). Inorganic pesticides (minerals). Organic pesticides of synthesis (conventional chemical pesticides). Types of formulations. Problems and limitations of chemical pesticides of synthesis in pest control. Legal measures that regulate its use. Pesticides, health and the environment. (3 h)

Unit 16.- Biorational Pesticides: Insect growth regulators (IGRs) (hormones, inhibitors of the formation of the cuticle, etc.), food inhibitors. Use of pheromones: monitoring the density of the plague, mass capture and sexual confusion. Environmental implications of biorational pesticides. (1 hr)

Unit 17.- Equipment, techniques of application and types of treatments with pest control pesticides. (1h)

Unit 18.- Biological control agents: pathogens, predators and parasitoids. Types, characteristics and biological cycles (2 h)

Unit 19.- Biological control: Use of the ecological bases of predator / prey relations, parasitoid / host, pathogen / host for the use of natural enemies in pest control. Strategies for the use of natural enemies: classic biological control programs, augmentative strategies (inoculative and inundative biological control). Conservation biological control: strategies for the conservation of natural enemies. (1.5 hr)

Unit 20.- Integrated Pest Management (IPM). Principles: an ecological perspective to improve pest management. Towards a management strategy, that respects human health and the environment. (1.5 hr)

Seminar 3.- Conference about the urban pest control sector to be determined (2 h)

Seminars 4 - 7.- Seminars on the work carried out in practical studies of practical cases of pests. (4 h)

PRACTICAL PROGRAM

- EXPLOITATION OF ANIMAL RESOURCES:

Field Practice:

Practice 1: Visit to the Aquaculture Center (ICM-CSIC) (4 h)

Laboratory practice:

Practice 2: Study of a population of fish of fishing interest. (4 h)

- PEST MANAGEMENT:

Field and laboratory practices:

Practice 3: Study of practical cases of pest (14 h)

The students, in groups of 3-4 people, will develop the study of a case related to one of the pests proposed (for example: tiger mosquito (*Aedes albopictus*), termite (*Reticulitermes banyulensis*), cockroaches (*Blattella germanica*, *Periplaneta Americana*, *Blatta orientalis*), pests of libraries, birds (pigeons, parrots, gulls), rodents (*Rattus norvegicus*, *Rattus rattus*, *Mus musculus*), etc.

Methodology

The methodology used in this subject to achieve the learning process is based on making the student work the information that is put to his/her reach. The function of the teacher is to give the information or to indicate where the student can get it and help the student so that the learning process can be carried out effectively. To achieve this goal, the subject is based on the following activities:

Theoretical lectures:

With these classes the student acquires the basic scientific-technical knowledge of the subject that must complement with the personal study of the explained issues.

Seminars:

The seminars work on the scientific-technical knowledge exposed on the theoretical lectures to complete their comprehension and deepen them. It is characterized by the active work of the student. Practices recommended by the teacher are worked out, such as: analysis and discussion of videos and articles on issues related to the management of animal resources and pests, resolution of issues related to the topics covered, analysis of information on zoological management, etc.

The mission of the seminars is to promote the capacity for analysis and synthesis, critical reasoning and the ability to solve problems.

Practices:

The objective of the practical classes is to complete and reinforce the knowledge acquired in the theoretical classes and seminars. Practical sessions will be stimulated and developed in the student empirical skills such as the ability to observe, analyze and recognize problems related to the management of animal resources and pests.

The practices of management of animal resources will be dealt with the study of a population of fish undergoing overexploitation. They will include a visit to a fish market and an aquaculture research center.

During the practices of pest management the students will approach the study of the case of a certain pest. The student must identify and recognize one of the proposed pests, conduct an inspection to locate individuals and / or their evidences, establish mechanisms to evaluate their density, analyze the causes of their origin, evaluate their problems (damages caused) and design an integrated control strategy.

The practices have a professional profile where the student will work in direct contact with companies and professionals in the pest control sector.

In order to develop the study, a series of field and laboratory practices will be carried out.

Field practices will consist of practical activities of observation, inspection, diagnosis, sample collection, etc. That can be done inside or outside the campus (may require journeys to facilities or external fields). They can be both supervised and targeted and are geared towards the development of the case study.

Laboratory practices are a complement to the field practices and will consist of the observation and diagnosis of material collected in field practices. Laboratory practices can also be supervised.

The results of the study of the case will lead to the elaboration of a work that will be presented in the form of seminars. The work must have a field component (to do an inspection and to sample individuals found there by causing a pest), laboratory (analyze identifying the individuals and / or evidences collected) and theoretical (use the concepts studied in theory to design the strategy of integrated control).

Tutorials:

The purpose of these sessions is to solve doubts, to review basic concepts not explained in class and to guide the sources consulted by the students. Similarly, these tutorials allow the orientation of the work of the study of the case that will be carried out by the students. The tutorial hours will be specified with the teacher through the virtual campus.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Field work	17	0.68	2, 5, 6, 7, 8, 9, 3
Laboratory work	5	0.2	2, 5, 6, 7, 8, 9, 3
Lectures	24	0.96	5, 6, 8, 3
Seminars	7	0.28	2, 5, 6, 7, 8, 9, 3
Type: Supervised			
Tutorials	6	0.24	6, 7, 9
Type: Autonomous			
Prepare individual work and solving questions	51	2.04	5, 6, 8, 9, 3
Studing and solving problems	32	1.28	2, 5, 6, 7, 8, 9, 3

Evaluation

The evaluation of this subject is carried out throughout the course:

Evaluation of seminars:

Both the small issues and the evaluation tests (group and individual) that will be developed throughout the seminar will be evaluated.

The note corresponding to the seminars has a global weight of 10% of the final grade.

Evaluation of the exams:

Partial exams:

In these parts, the students' knowledge in the subject, as well as their capacity for analysis and synthesis, and critical reasoning, will be evaluated individually. The exam will have a part of test questions and another of conceptual questions, schemes, etc.

There will be 2 eliminatory partial examinations, the first partial (Management of animal resources) will have a weight of 20% and the second partial (Pest Management) 30% of the global note.

Final exam:

Students who do not pass one of the two partial examinations (minimum grade: 5 out of 10) can retrieve the exam not passed to the final exam. Likewise, the students who wish to improve the grade of one or both of the parts can do it by presenting themselves to the final exam, but the previously obtained note will be lost.

The mark corresponding to the two exams has a global weight of 50% of the final mark. However, in order to be able to do the average with the rest of the evaluable activities, it is necessary to obtain a final minimum mark of the exams of 4.

Evaluation of the practices:

Animal Resource Management:

After each practice, the student will carry out a written test that evaluates the use and achievement of the specific competences of each practice.

This evaluation has a global weight of 10% of the final grade.

Pest Management:

The practices will be taken into account in a case study that will lead to the elaboration of a work that will be presented and will defend orally in the form of seminars. Both oral presentation and written work will be assessed.

This evaluation has a global weight of 30% of the final mark.

Final Considerations:

The minimum global qualification required to pass the subject will be 5 out of 10.

It will be considered that a student will obtain the non-appraising qualification when the evaluation of all the assessment activities carried out does not allow him to achieve the overall grade of 5 in the event that he had obtained the maximum grade in all of them.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Exams	3.5	3.5	0.14	2, 5, 6, 8, 9
Practices assessment	3	3	0.12	1, 2, 4, 5, 6, 7, 8, 9, 3
Seminars assessment	1.5	1.5	0.06	1, 2, 4, 5, 6, 7, 8, 9, 3

Bibliography

Belles, X. 1988. Insecticidas Biorracionales. Consejo Superior de Investigaciones Científicas, Madrid .

Demestre, M., Lleó, J., Martín, P., Peix, J.A. y Sardà, F. 1986. L'Oceanografia. II. Recursos pesquers de la mar catalana. Diputació de Barcelona, Barcelona.

Gabarra R. i Avila, J. 2011. Guia dels enemics naturals en diferents cultius a Catalunya. Departament d'Agricultura Generalitat de Catalunya. Versió online:
http://www20.gencat.cat/docs/DAR/AL_Alimentacio/AL01_PAE/08_Publicacions_material_referencia/Fitxers_est

García del Pino, F. i Franco S. 2002.- Manual d'actuació de control integrat de plagues urbanes adreçat a les empreses usuàries dels serveis de control de plagues. Fundación Para la Prevención de Riesgos Laborales Ed. Barcelona. 226 pp. online:
<http://www.gencat.cat/salut/ctrlplagues/Du13/html/ca/dir1326/dn1326/manual%20usuaris%20control%20integrat>.

Hajek, A. 2007.- Natural enemies: An introduction to Biological Control. Cambridge University Press. London. 378 pp.

Hokkanen H. M. T. & Lynch J.M. (eds). 1995.- Biological Control: Benefits and Risks. Cambridge University Press. 304 pp.

Jacas, J.; Caballero, P. i Avila, J. (eds). 2005.- El control biológico de plagas y enfermedades : la sostenibilidad de la agricultura mediterránea. Castelló de la Plana Publicacions de la Universitat Jaume I. 223 pp.

Jacas, J. i Urbaneja, A. (eds). 2008.- Control biológico de plagas. Phytoma Ed. Valencia. 496 pp.

Robinson, W.H. 1996.- Urban entomology: Insect and mite pest in the human environment. Chapman & Hall. London. 430 pp.

Stickney, R. R. i McVey, J. P. (eds). 2002. Responsible marine aquaculture. England, CABI, 391 pp.

Vincent, C., M. Goettel and G. Lazarovits. (eds) 2007. Biological control, a global perspective. England, CABI, 440 pp.

Web sites:

Control Integrat de Plagues Urbanes. Generalitat de Catalunya:
<http://www.gencat.cat/salut/ctrlplagues/Du13/html/ca/Du13/index.html>

International Organisation for Biological Control: <http://www.iobc-wprs.org/index.html>

<http://www.mispecies.com/boletin> Información (noticias, agenda, legislación y novedades) sobre Pesquerías y Acuicultura en España y Europa.

<http://www.aquaflow.org> Proyecto de la Comisión Europea para la disseminación de la información de I+D en acuicultura.