COURSE DATA

Data Subject	
Code	43244
Name	Behavioral ecology
Cycle	Master's degree
ECTS Credits	3.0
Academic year	2021 - 2022

Study (s)

Degree	Center	Acad. year	Period
2148 - Master's degree in Biodiversity: Conservation and Evolution	Faculty of Biological Sciences	1	Second term

Subject-matter

Degree	Subject-matter	Character
2148 - Master's degree in Biodiversity: Conservation and Evolution	4 - Integral aspects of animal diversity	Optional

Coordination

Name	Department
FONT BISIER, ENRIQUE	355 - Zoology

SUMMARY

Behavioral ecology is the study of the function or adaptive value of behavior, one of the four areas into which the study of animal behavior is traditionally divided (Tinbergen 1963, Cuthill 2005). Behavioral ecology is heir to a long tradition of studying the adaptive value of behavior that has its roots in the work carried out by Central European ethologists during the first half of the 20th century. The interest of ethologists in the adaptive value of behavior has continued uninterrupted from the beginnings of ethology to the present day, and constitutes, together with the study of the mechanisms, development and evolution of behavior, an integral part of the modern study of animal behavior.

Behavioral ecology acquired its present name in the late 1970s and has been the dominant force in the study of animal behavior for the past 35-40 years. The discipline brings together the ethologists' traditional interest in the function of behavior with evolutionary biology and ecology (Krebs & Davies 1993, Barnard 2004). Other disciplines, such as evolutionary ecology or ecological morphology, share behavioral ecology's interest in the study of biological adaptations. However, behavioral ecology is

characterized by its emphasis on the study of the adaptive value of a specific and distinct aspect of the phenotype of animals: their behavior. Moreover, historical analysis reveals that behavioral ecology possesses distinctive hallmarks that clearly link it to ethology, which is widely viewed as the broader discipline within which behavioral ecology would be included (Barlow 1989, Dawkins 1989, Brown 2010, Bolduc 2012, Milinski 2014, Taborsky 2014).

The goal pursued by the behavioral ecologist is to understand why animals that behave in a certain way survive and reproduce better than those that behave differently, and to determine how selection pressures associated with survival and reproduction influence the design of the behaviors that animals exhibit (e.g. Krebs & Davies 1993, Gross 1994, Birkhead & Monaghan 2010). The discipline is termed behavioral ecology to emphasize that how behavior contributes to the survival and reproduction of animals depends on ecological conditions, i.e., their interaction with the environment, both abiotic and biotic non-social (prey and predators) and social (other individuals of the same species). Ecological factors, such as habitat structure, population size, gene flow between populations, quality of breeding territories, or feeding, set the stage where animals exhibit their behavior. They are also the setting where natural selection will favor individuals that adopt behavioral strategies that maximize their genetic contribution to future generations.

Behavioral ecology is a thriving discipline that enjoys great vitality: the International Society for Behavioral Ecology (ISBE) holds international congresses every two years and there are numerous courses, master's and doctoral programs, and university departments with this name. The scientific and academic consolidation of the discipline is also supported by the publication of a growing number of textbooks (see the bibliography below), as well as by the existence of prestigious scientific journals that publish papers on behavioral ecology (e.g. Behavioral Ecology, Behavioral Ecology and Sociobiology).

Behavioral Ecology is an optional course offered as part of the curriculum of the master's degree in Biodiversity: Conservation and Evolution. The course is included in the biodiversity and animal conservation track in recognition of the importance and interest of this aspect of the animal phenotype, which is not normally covered in other zoology classes except, of course, for Ethology. Moreover, behavior is of crucial importance when designing strategies for the conservation of animal populations, and there is a growing consensus on the need to conserve behavior as an aspect of animal biodiversity (Curio 1996, Caro 1998, Sutherland 1998, Cassini 1999, Gosling & Sutherland 2000). It is also worth noting the interdependence that has traditionally existed between evolutionary biology and the study of animal behavior. The study of behavior has benefited from the incorporation of ideas from evolutionary biology (e.g. G.C. Williams, W.D. Hamilton, R. Dawkins, J. Maynard Smith, R. Trivers, G.A. Parker), such as inclusive fitness, evolutionary stable strategies, and economic models applied to decision making, which have allowed the adoption of a quantitative approach to the study of behavior, often based on genetic models. On the other hand, animal behavior has made and continues to make important contributions to the study of the evolutionary process, as evidenced by the fact that many evolution textbooks use a large number of examples from the study of animal behavior (e.g. Stearns & Hoekstra 2005).

Similar courses: Ethology is included in the curriculum of the Degree in Biological Sciences at the University of Valencia. A part (approximately 20%) of Ethology is devoted to the study of the function or adaptive value of behavior. Ethology is therefore a natural introduction to the study of behavioral ecology. The overlap between Ethology and Behavioral Ecology is that to be expected between a general introductory course and a more specialized course. However, Behavioral Ecology will be taught with a depth and level of demand adapted to the master's degree.

References:

Barlow, G.W. (1989). Has sociobiology killed ethology or revitalized it? En P.P.G. Bateson & P.H. Klopfer (Eds.), Perspectives in Ethology, vol. 8: Whither Ethology? (pp. 1-45). New York: Plenum Press.

Barnard, C.J. (2004). Animal Behaviour: Mechanism, Development, Function and Evolution. Harlow, England: Pearson/Prentice Hall.

Birkhead, T.R., & Monaghan, P. (2010). Ingenious ideas: The history of behavioral ecology. En D.F. Westneat & C.W. Fox (Eds.), Evolutionary Behavioral Ecology (pp. 3-15). Oxford: Oxford University Press.

Bolduc, J.S. (2012). Behavioural ecology's ethological roots. Stud. Hist. Philos. Biol. Biomed. Sci. 43:674-683.

Brown, J.L. (2010). Behavioral ecology and sociobiology. En M. Breed & J. Moore (Eds.), Encyclopedia of Animal Behavior, vol. 2 (pp. 186-190). Amsterdam: Academic Press.

Caro, T. (Ed.). (1998). Behavioral Ecology and Conservation Biology. New York: Oxford University Press.

Cassini, M.H. (1999). Importancia de la etología en la conservación. Etología 7:69-75.

Curio, E. (1996). Conservation needs ethology. Trends Ecol. Evol. 11:260-263.

Cuthill, I.C. (2005). The study of function in behavioural ecology. Anim. Biol. 55:399-417.

Dawkins, M.S. (1989). The future of ethology: How many legs are we standing on? En P.P.G. Bateson & P.H. Klopfer (Eds.), Perspectives in Ethology, vol. 8: Whither Ethology? (pp. 47-54). New York: Plenum Press.

Gosling, L.M. & Sutherland, W.J. (Eds.). (2000). Behaviour and Conservation. Cambridge: Cambridge University Press.

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Krebs, J.R. & Davies, N.B. (1993). An Introduction to Behavioural Ecology, 3rd ed. Oxford: Blackwell.

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Milinski, M. (2014). The past and the future of Behavioral Ecology. Behavioral Ecology 25:680-684.

Stearns, S.C. & Hoekstra, R.F. (2005). Evolution: An Introduction, 2nd ed. Oxford: Oxford University Press.

Sutherland, W. J. (1998). The importance of behavioural studies in conservation biology. Anim. Behav. 56:801-809.

Taborsky, M. (2014). Tribute to Tinbergen: The Four Problems of Biology. A Critical Appraisal. Ethology 120:224-227.

Tinbergen, N. (1963). On aims and methods of ethology. Z. Tierpsychol. 20:410-433.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

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

Other requirements

Given the level of the course, it is advisable to have previously taken Ethology or other similar courses. If not, please check with the instructor, who will recommend some background readings in order to be able to take this course.

Knowledge of the English language with a medium-high reading comprehension level is required.

It is required to know how to write, synthesize and present a work in an orderly manner, as well as the use of basic computer tools (internet, word processing, databases, literature searches, audiovisual presentations...).

COMPETENCES (RD 1393/2007) // LEARNING OUTCOMES (RD 822/2021)

2148 - Master's degree in Biodiversity: Conservation and Evolution

- Students should communicate conclusions and underlying knowledge clearly and unambiguously to both specialized and non-specialized audiences.
- To acquire basic skills to develop laboratory work in biomedical research.
- Be able to make quick and effective decisions in professional or research practice.
- 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.
- Favour intellectual curiosity and encourage responsibility for one's own learning.
- Be able to communicate and disseminate scientific ideas.

LEARNING OUTCOMES (RD 1393/2007) // NO CONTENT (RD 822/2021)

Successful completion of Behavioral Ecology will allow the student to:

- Understand the nature and objectives of behavioral ecology and its relationship to other disciplines concerned with the study of behavior (e.g. ethology, sociobiology, evolutionary psychology).
- Know the history of behavioral ecology studies.
- Know and understand the most representative theories and hypotheses of behavioral ecology.
- Know the observations and results that have contributed to the advancement of the discipline, as well as the arguments, controversies and new research that are expanding the discipline.
- Know and use the language and conceptual system characteristic of behavioral ecology to be able to communicate with professionals in the discipline, understand their work and be able to consider initiating research in this field.
- Understand and use the methods and techniques that define the methodology of behavioral ecology.
- Apply the scientific method to the study of a real or imaginary problem in behavioral ecology.
- Know the basic techniques for locating and accessing sources of documentation on a behavioral ecology topic.

DESCRIPTION OF CONTENTS

1. Behavioral ecology: Concept, paradigms and controversies

The four "whys" of ethology. The concept of function. The sociobiological debate. Two ways of conceiving behavioral ecology. Adaptation, natural selection and behavior. Criticisms of the adaptationist program. The controversy over the levels of selection. The selfish gene. Evolutionary psychology.

2. Methods of study in behavioral ecology

Direct and indirect methods for the study of the adaptive value of behavior. Comparisons between individuals of the same species. Artificially produced variants: phenotypic engineering. The comparative method applied to the study of the adaptive value of behavior. Types of comparisons. Methodological problems in the application of the comparative method. Reverse engineering and adaptive models. Optimality models. Game theory models.

3. Cooperation and altruism

The problem of altruism. Direct benefits of altruism: by-product mutualism, pseudo-reciprocity, reciprocity (reciprocal altruism), indirect reciprocity, punishment. The evolution of reciprocity. Indirect benefits of altruism: W.D. Hamilton and kin selection. Hamilton's rule. Inclusive fitness. How do animals recognize their relatives? Examples of altruism among relatives. Haplodiploidy and the origins of eusociality.

4. Sexual selection and sexual conflict

Natural selection and sexual selection. Pre- and post-copulatory sexual selection. Intrasexual selection: male-male combat and sperm competition. Intersexual selection: mate choice and cryptic female choice. Models of the evolution of mate choice. Direct benefits. Fisher's runaway selection process. The handicap principle. Sexual conflict: conflicts of interest between males and females. Sensory exploitation. Chase-away sexual selection. Sexual selection and sexual conflict in the human species. Challenges to sexual selection theory: social selection and perceptual exploitation.

5. Communication

What do we mean by communication? The elements of communication. The communicative context. Message and meaning of signals. The concept of information. Tactical design and strategic design. Complex signals: multicomponent signals and multimodal signals. Paradigm shifts in the study of animal communication. The duality of signals. The evolution of communicative signals. Honesty on average. Theory of honest signals: mechanisms that guarantee the honesty of signals. Overlapping interests: cooperative signals. Necessarily honest signals: indexes. Strategic signals: condition-dependent signals, necessity signals, conventional signals. Social skepticism. Reliability and deception in communication.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	20,00	100
Laboratory practices	10,00	100
Development of group work	5,00	0
Study and independent work	22,00	0
Readings supplementary material	8,00	0
Preparation of evaluation activities	5,00	0
Preparing lectures	5,00	0
TOTAL	**75,00**	

TEACHING METHODOLOGY

The following activities will be carried out during the teaching of Behavioral Ecology:

Initial introductory class for instructors and students: during the first in-class session, the course syllabus, the teaching methodology and the assessment criteria will be explained. During this session the instructors will inform the students of their research and teaching interests. Students will also be asked to explain their interest in the track and in their chosen courses and to briefly explain their scientific and academic profile.

Participatory lectures: organized in 2-hour sessions during which the instructor will identify and present the most important points of each topic using a flexible scheme of lectures with the necessary audiovisual infrastructure. The topics selected for presentation in the second part of the course (Part II of the syllabus) may vary depending on the characteristics of the group, interest and opportunity. Students are encouraged to participate actively in the development of the classes, for which they will be asked to prepare the classes in advance using the materials recommended by the instructor (see the document Bibliography by Chapters). A substantial part of what is presented/discussed in the classroom is not directly transferable to the materials that the instructor will make available to the students, for which reason these materials in no case constitute a substitute for in-class sessions.

Laboratory exercises: depending on opportunity and availability of time and resources, the instructor may schedule a practical lab exercise to be conducted during one of the 2-hour lecture sessions.

Seminars given by students: students will prepare individually or, preferably in pairs, a seminar to be presented to the rest of the class in a classroom with the necessary audiovisual infrastructure. The seminar will be held in one of the two seminar sessions specified in the course schedule. The seminar will consist of a critical commentary of a research article in behavioral ecology. The subject matter is free and the choice of a suitable topic will be especially valued. In addition, students must submit a written summary of the main points of their presentation (2 pages maximum). Attendance to the seminars is mandatory.

We reserve the right to modify the syllabus to accommodate contingencies or special circumstances, to better facilitate class learning, or to delve more deeply into topics of interest to the class.

EVALUATION

Student assessment will be based on the fulfillment of the tasks assigned to them and on their level of assimilation of the knowledge imparted. 30% of the final grade will be based on an evaluation of the seminars given by the students. In general, the evaluation of the seminars will assess the choice of an appropriate and correctly sized topic, the use of updated and specialized literature, the ability to synthesize, the clarity and organization of the presentation (duration is a measure of organization), the use of audiovisual media, and the quality of the interventions in the debates that take place after the presentations. 50% of the final grade will correspond to the score obtained in a written exam. In order to pass the exam a minimum score of 4 points out of 10 is required. To pass Behavioral Ecology, it is essential to attend the classes given by the instructors, to attend the seminars, and to participate in the classes and seminars. Failure to fulfill these duties must be duly justified. The point breakdown will be as follows (may be subject to change due to point allocation for assignments):

- Seminars (30%): Critical commentary of a research article in behavioral ecology.

- Exam (50%): 6-8 multiple choice, true/false or short answer questions.

- Assignments, participation and attitude in class (20%): Assignments will be in-class activities, or occasional take-home questions relevant to lecture material.

For the second and successive calls the evaluation will be based on a written exam (70%), and the grades obtained in the seminars will also be taken into account (30%).

REFERENCES

Basic

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  Westneat, D.F. & Fox, C.W. (Eds.). (2010). Evolutionary Behavioral Ecology. Oxford: Oxford University Press.

Additional

- Alcock, J. (2001). The Triumph of Sociobiology. Oxford: Oxford University Press.
  Andersson, M. (1994). Sexual Selection. Princeton, New Jersey: Princeton University Press.
  Arnqvist, G. & Rowe, L. (2005). Sexual Conflict. Princeton, New Jersey: Princeton University Press.
  Axelrod, R. (1990). The Evolution of Co-operation. London: Penguin.
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  Birkhead, T.R. & Moller, A.P. (Eds.). (1998). Sperm Competition and Sexual Selection. London: Academic Press.
  Bolhuis, J.J. & Giraldeau, L.-A. (Eds.). (2004). The Behavior of Animals: Mechanisms, Function and Evolution. Oxford: Blackwell.
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- Artículos recientes, principalmente de las revistas Animal Behaviour, Behavioral Ecology, Behavioral Ecology and Sociobiology, Behaviour, Biology Letters, Ecology, Ethology, Evolution, Functional Ecology, Oecologia, Proceedings of the Royal Society B, Trends in Ecology and Evolution,...

Recent articles, mainly from the journals Animal Behaviour, Behavioral Ecology, Behavioral Ecology and Sociobiology, Behaviour, Biology Letters, Ecology, Ethology, Evolution, Functional Ecology, Oecologia, Proceedings of the Royal Society B, The American Naturalist, Trends in Ecology and Evolution, ...

- Bibliografía específica por temas: cada tema lleva asociadas lecturas específicas de ampliación de su contenido. Además el profesor pondrá a disposición de los estudiantes una selección de lecturas recomendadas para cada tema a través del aula virtual de la asignatura.

  Specific bibliography by chapter: each chapter in the syllabus has associated readings to complement its contents. In addition, the instructor will make available to the students a selection of recommended readings for each chapter through the virtual classroom of the course.

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 los contenidos inicialmente recogidos en la Guía Docente.

2. Volumen de trabajo y planificación temporal de la docencia

El volumen de trabajo no cambia. Las actividades a realizar son básicamente las especificadas en la Guía Docente de la asignatura. Se mantiene la programación temporal de materiales docentes puestos a disposición del alumnado, de acuerdo con el calendario académico, pero se les da libertad de estudiarlos según su propio criterio y posibilidades. Algunas tareas podrán tener plazo de presentación, para facilitar su evaluación.

3. Metodología docente

(a) Clases de teoría: En caso de no presencialidad, las clases teóricas convencionales serán sustituidas por archivos de vídeo, ppt locutados, o lecturas de materiales puestos a disposición del alumnado a través del Aula Virtual. Excepcionalmente, las sesiones de teoría se sustituirán por videoconferencias (BBC) para discutir cuestiones concretas y/o contestar las dudas de los estudiantes. Se realizarán ejercicios y cuestionarios on line, asistidos con la aplicación chat del Aula Virtual.

(b) Tutorías individuales: Por correo electrónico, ampliando la disponibilidad horaria del profesor. Excepcionalmente, por videoconferencia a través de conexión online con BBC.

(d) Prácticas de laboratorio: En caso de no presencialidad, se sustituirán por sesiones a distancia donde se analizarán datos similares a los que se habrían obtenido en el laboratorio. Se facilitarán guiones adaptados para las prácticas.

4. Evaluación

En caso de no presencialidad, se incrementará el peso en la nota final de las actividades de evaluación continua (de 10 a 40%). Los seminarios de los estudiantes se sustituirán por trabajos escritos (20% de la nota final). El examen escrito (con un peso del 40% de la calificación final) se realizará en línea con tiempo limitado a través del módulo cuestionarios del Aula Virtual, en función de las posibilidades técnicas. Si por causas técnicas, debidamente justificadas, algún estudiante no pudiera realizar algún examen, se estudiará la posibilidad de realizar una prueba alternativa.

5. Bibliografía

Se mantiene la bibliografía recogida inicialmente en la Guía Docente.