COURSE DATA

DATA SUBJECT

Code: 36846
Name: Ethology
Cycle: Undergraduate Studies
ECTS Credits: 4.5
Academic year: 2026-27

STUDY (S)

Degree	Center	Acad. year	Period
1106 - Degree in Biology	Facultat de Ciències Biològiques	4	First quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1106 - Degree in Biology	Optatividad	ELECTIVES

COORDINATION

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SUMMARY

Ethology is a scientific discipline that studies animal and human behavior from a naturalistic and evolutionary perspective. It is a biological discipline, traditionally linked to zoology, and its theoretical framework is based on the theory of evolution by natural selection. Ethologists are interested in the movements and postures, sounds, smells, and colors that animals use to interact with others of the same or different species, to move through their environment, to reproduce, to care for their offspring, to eat, and to avoid being eaten, etc. In short, ethologists study what animals do, how they do it, and why they do it. Behavior is one of the most important aspects of an animal's phenotype. Behavior, for example, plays a crucial role in biological adaptations, and its study has made significant contributions to evolutionary biology.

Ethology has undergone significant changes since it established itself within the behavioral sciences during the early decades of the 20th century, particularly through the classical approach articulated by Nobel laureates Konrad Lorenz and Niko Tinbergen, the two scientists credited with being the founders of the discipline. Despite being a relatively young discipline, ethology is currently thriving and holds even greater potential for future development. Ethologists use a multidisciplinary, integrative, and comparative approach in their research and are equally interested in the mechanisms, development, evolution, and function of behavior. The comparative approach fosters respect and admiration for biodiversity and allows ethologists to study human behavior from a perspective different from that which typically inspires other disciplines in which humans are the sole subject of study. Given the interdisciplinary nature of its content, the course is

closely related to many of the courses students will take throughout their degree program.

PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

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

COMPETENCES / LEARNING OUTCOMES

1106 - Degree in Biology

(CB5) Students must have developed the learning skills needed to undertake further study with a high degree of autonomy.

Interpret, analyse, evaluate, process and synthesise biological data and information by applying mathematical and statistical methods.

Organise, plan and manage information in a manner that allows the individual to analyse, synthesise and develop critical reasoning that can be applied to solve problems, make decisions and carry out work.

To appreciate the role of behavior as an essential aspect of the animal phenotype, to know the main characteristics of the ethological approach to the study of animal and human behavior, and to know the observations and results that have contributed to the advancement of ethology, as well as the controversies, debates and new research that are expanding the discipline.

DESCRIPTION OF CONTENTS

TOPIC 1. Introduction to Ethology: Definition and importance of ethology. A brief history of animal behavior studies. The empirical problem: What does ethology study? The ethological approach. The theoretical problem: The four "whys" of ethology. Elements of the ethological attitude. An example of research in ethology. Anthropomorphism and the study of animal behavior.

TOPIC 2. Sensory mechanisms and perception: Different types of causal explanations. The sensory capabilities of animals: implications for the study of behavior. Sensation and perception. The problem of pattern recognition: sign stimuli and triggers. Selectivity: central and peripheral filters. Supernormal stimuli. Complex stimuli.

TOPIC 3. Orientation and navigation mechanisms: Small-scale orientation and navigation: taxia and kinesis. Large-scale orientation and homing phenomena. Piloting. Directional orientation. Transversal orientation. Path integration. True navigation: the compass-and-map model.

TOPIC 4. Motivation and cognition: Two ways of understanding motivation. How is motivation measured?

Appetitive behavior and consummatory acts. Fixed action patterns (FAPs) and the spontaneity of behavior. Motivational models. Motivational systems. Goal-directed behavior: Representation and intentionality. Cognition. Consciousness and animal welfare.

TOPIC 5. Behavioral genetics: Genes and behavior. Exceptionality and the genetics of human behavior. Myths and metaphors in behavioral genetics. Behavioral differences due to alterations in a single gene: studies with mutants. Studies with hybrids. Polygenic inheritance. Artificial selection experiments. Twin studies. Heritability. From genes to behavior: mechanisms. The myth of genetic determinism.

TOPIC 6. The nature-nurture debate: The controversy between genes and environment. The nature-nurture debate. Two models of behavioral development: innate behavior and acquired behavior. Difficulties with the concept of innateness. What does it mean for a behavior to be innate? Experience deprivation experiments. Modification of innate behavior by experience. Nature and environment today: the interactive theory of development. What remains of the concept of innateness?

TOPIC 7. Behavioral development: Growth, differentiation, maturation, and experience. Definition and types of learning. Classical conditioning and operant conditioning. Biological limits and predispositions in associative learning. Learning as a biological phenomenon: costs and benefits of learning. Effects of early experience on behavioral development: sensitive periods, imprinting, and socialization.

TOPIC 8. The phylogeny of behavior: The fossil record: paleoethology. The comparative method: types of comparisons. Behavior-based phylogenies. Ethological series. Trait mapping. Reconstruction of ancestral behaviors.

TOPIC 9. The study of the adaptive value of behavior: The sociobiological debate. Sociobiology and behavioral ecology. The concept of function. Adaptation and natural selection. Criticisms of the adaptationist program. Direct and indirect methods for studying 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. Methodological problems in applying the comparative method. Reverse engineering and adaptive models.

TOPIC 10. Cooperation and altruism: The problem of cooperation. Manipulation. Direct benefits: byproduct mutualism, reciprocity, indirect reciprocity. Indirect benefits: W.D. Hamilton and kin selection. Inclusive fitness. How do animals recognize others with whom they share genes? The evolution of eusociality.

TOPIC 11. Communication: What do we mean by communication? The elements of communication. The communicative context. Message and meaning of signals. The concept of information. Tactical signaling and strategic signaling. Complex signals. The duality of signals. The evolution of communicative signals. Average honesty. Honest signaling theory: mechanisms that guarantee the honesty of signals. Overlapping interests: cooperative signals. Necessarily honest signals: indices. Strategic signals: condition-dependent signals, need signals, conventional signals. Unreliability and deception in communication.

PRACTICALS

1. Introduction to ethological methodology (I)
2. Introduction to ethological methodology (II)
3. Animal sounds
4. Sign stimuli and releasers: Sex pheromones in Tenebrio molitor
5. Structure and function of fish schools
6. Vigilance behavior in the barnacle goose, Branta leucopsis
7. The evolution of behavior
8. Computer simulations of animal contests
9. Human behavior: Sexual dimorphism in book-carrying behavior

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Tutorials	2,00
Theory	25,00
Laboratory	18,00
Total hours	**45,00**

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	3,00
Independent study and work	64,50
Preparation of lessons	0,00
Preparation for assessment activities	0,00
Resolution of case studies	0,00
Total hours	**67,50**

TEACHING METHODOLOGY

Teaching for this course will be carried out through the following activities:
- **Lectures/interactive classes.** Conducted in 1-hour sessions in which the most important points of each topic are identified and presented, serving as the focus of the student's learning activities.
- **Practical classes.** Conducted in 2-hour sessions. These will consist of a series of structured exercises that students will complete in the laboratory or in the field, always under appropriate instructor supervision.
- **Interactive class and/or discussion session.** Conducted in 2-hour sessions. These will be devoted to discussing conceptual difficulties in ethology and addressing questions raised by students.
- **Seminar and/or guest lecture.** Depending on availability, one or two seminars will be delivered by specialists.

Summary of teaching methodologies:

- Lectures and practical classes.

- Interactive classes and/or discussion sessions.
- Seminar and/or guest lecture.
- Information retrieval.
- Problem- and exercise-based learning.
- Case analysis and study.

EVALUATION

To assess the theoretical knowledge acquired by students, there will be a written exam consisting of short-answer questions requiring explanation combined with objective questions (6–10 questions in total). The assessment of theoretical knowledge will also take into account the scores obtained in assessment activities carried out in class (surprise quizzes, short written assignments). To assess the knowledge acquired during practical sessions, there will be a written exam consisting of short-answer questions requiring explanation combined with objective questions (4–6 questions in total). The grade for the written exam will be supplemented by the scores obtained in assessment activities carried out in the laboratory, as well as by a complementary grade based on the instructor's observations during the practical sessions. This complementary grade will assess the student's attendance at practical sessions, attitude and participation in the proposed activities, ability to work as part of a team, and skill in using observational and experimental techniques. Students must attend practical sessions in the groups and at the times in which they are enrolled. Changes of practical groups for justified reasons are not the responsibility of the course instructors and must be arranged with the Faculty's administrative office. When, exceptionally and always at the discretion of the instructors, a student is allowed to attend a practical session in a group other than the one in which they are enrolled, attendance at that session will not be counted. Theory and practical quizzes will be administered without prior notice and cannot be retaken. To pass the course, it is essential to obtain at least a passing grade in both the theory exam and the practical exam. The final grade will be calculated by weighting the previous components as follows: theory (70%) and practicals (30%).

Theory:

- Theory exam	60
- Theory quizzes	10

Practicals:

- Practical exam	15
- Complementary grade	10
- Practical quizzes	5

Attendance at in-person activities is mandatory.

REFERENCES

- BARNARD, C.J. 2004. Animal Behaviour: Mechanism, Development, Function and Evolution. Pearson/Prentice Hall.
- BATESON, M. & P. MARTIN. 2021. Measuring Behaviour: An Introductory Guide (4ª ed.). Cambridge University Press.

- BOLHUIS, J.J., L.-A. GIRALDEAU & J.A. HOGAN (Eds.). 2022. The Behavior of Animals: Mechanisms, Function and Evolution (2ª ed.). Wiley Blackwell.
- BREED, M.D. & J. MOORE. 2022. Animal Behavior (3ª ed.). Academic Press.
- DAVIES, N.B., J.R. KREBS & S.A. WEST. 2012. An Introduction to Behavioural Ecology (4ª ed.). Wiley-Blackwell.
- DUGATKIN, L.A. 2019. Principles of Animal Behavior (4ª ed.). Norton.
- GOODENOUGH, J., B. MCGUIRE & E. JAKOB. 2010. Perspectives on Animal Behavior (3ª ed.). John Wiley and Sons.
- KAPPELER. P.M. 2021. Animal Behaviour: An Evolutionary Perspective. Springer.
- LEHNER, P.N. 1996. Handbook of Ethological Methods (2ª ed.). Cambridge University Press.
- MANNING, A. & M.S. DAWKINS. 2012. An Introduction to Animal Behaviour (6ª ed.). Cambridge University Press.
- NORDELL, S. & T. VALONE. 2021. Animal Behavior: Concepts, Methods, and Applications (3ª ed.). Oxford University Press.
- RIDLEY, M. 1995. Animal Behavior: An Introduction to Behavioral Mechanisms, Development, and Ecology (2ª ed.). Blackwell Scientific Publications.
- RUBENSTEIN, D.R. 2023. Animal Behavior (12ª ed.). Sinauer.
- RUBENSTEIN, D.R. & J. ALCOCK. 2019. Animal Behavior (11ª ed.). Sinauer.
- RYAN, M.J. & W. WILCZYNSKI. 2011. An Introduction to Animal Behavior: An Integrative Approach. Cold Spring Harbor Laboratory Press.
- WYATT, T.D. 2017. Animal Behaviour: A Very Short Introduction. Oxford University Press.

Specific bibliography by topic: Each topic is accompanied by a specific bibliography, which will be detailed in the document **Bibliography by Topics** that the teaching staff will make available to students through the course's virtual classroom.