**COURSE OUTLINE**

# GENERAL

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| **SCHOOL** | HEALTH SCIENCES | | | | |
| **ACADEMIC UNIT** | DEPARTMENT OF BIOLOGICAL APPLICATIONS AND TECHNOLOGY | | | | |
| **LEVEL OF STUDIES** | UNDERGRADUATE COURSE | | | | |
| **COURSE CODE** | **ΒEE722** | **SEMESTER** | | **7th** | |
| **COURSE TITLE** | LARGE LAND MAMMAL BIOLOGY | | | | |
| **INDEPENDENT TEACHING ACTIVITIES** | | | **WEEKLY TEACHING HOURS** | | **CREDITS** |
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| **COURSE TYPE** | GENERAL BACKGROUND | | | | |
| **PREREQUISITE COURSES:** | - | | | | |
| **LANGUAGE OF INSTRUCTION and EXAMINATIONS:** | GREEK | | | | |
| **IS THE COURSE OFFERED TO ERASMUS STUDENTS** |  | | | | |
| **COURSE WEBSITE (URL)** | http://ecourse.uoi.gr/enrol/index.php?id=1776 | | | | |

# LEARNING OUTCOMES

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| **Learning outcomes** |
| The main objective of the course is to introduce students to the urgent issue of conservation and management of the large land mammals in Greece. Large mammals have similarities and analogies with human beings (physiology, social organization), they are recognizable animal organisms by symbolism, trigger intense feelings or often have conflictual character, large distributions to influence a significant portion of the human population both in mountainous and rural to sub-urban areas, they are elements of the natural environment with high aesthetic value, have a strong and obvious interaction with human activities and formability of the environment within a short time scale (grazing, hunting). During the lectures, students will have the opportunity to synthesize / interconnect different approaches that are often interdisciplinary in order to integrate and successfully manage a species, tackle a conflict or implement a successful conservation practice.  Further objective of the course is the acquaintance of students with the most basic field and data analysis methods used worldwide for the study of these species.  After the end of the course each student is expected to be able to:  A. THEORY (LECTURES)  o Is aware of large mammal biodiversity in Greece (families, species)  o Understands the complexity of their conservation and management and the multidisciplinary approach often required.  o Know the basic elements regarding their physiology, morphology, reproduction, social organization, behaviour, territoriality and habitat use of large mammals.  o Understands the mechanisms of interactions of large mammals with human activity, primary production, transport infrastructures and climate change.  o Updates for successful case studies addressing specific conservation issues of these species  o Know the basic techniques and methods for describing and analyzing habitat use, trophic sources and territoriality of large mammals  o Is informed and aware of the methods of coping with the conflict between human activities and large mammals.  B. LABORATORY EXCERSICES  o Manage to use analysis software (freeware) for analysis of habitat use of large mammals and wildlife in general  o Get familiarized with the use of geographic information systems to analyse spatial data on wildlife spatial distribution and presence.  o It is able to create a habitat suitability map in a GIS environment  o Understands results from trophic analysis and discuss food habits of large mammals  o Designate a trophic analysis survey and evaluate its results  o Familiarize with identifying different trophic items inside large mammal feces  o Edit data from photographic traps and interpret the results at a regional or bio-community level  o Uses a database in computational sheets (xls) for analysis and statistical data processing  o computes Shannon (H '), Simpson (E) diversity indexes based on photographic trap data and interprets results  o Calculates the level of selection of various trophic sources in the large mammal diet using Levin's index and Ivlev's selectivity index.  o Familiarize with biological material and laboratory techniques  C. STUDENT PROJECT  o uses international bibliographic databases  o develops critical thinking, evaluates, organizes, synthesizes existing scientific information  o produces a public presentation using T.P. (power point).   * communicates and supports its position to the public   D. PARTICIPATION IN FIELD EXCURSION  o Recognizes field evidence of large mammals presence.  o Uses data collection protocols of large mammals in the field  o Interprets the landscape and perceives those elements that affect the presence, distribution and abundance of those species. |
| **General Competences** |
| o Developing an interdisciplinary approach  o Empathy for social issues related to biodiversity conservation  o Development of critical thinking and analytical ability  o Presentation and support of scientific positions and concepts  o Extracting complex conclusions from simple data  o Linking ecological theories to everyday problems - practicality  o Familiarizing with field techniques and methods  o Revitalizing natural curiosity about the environment and wildlife |

1. **SYLLABUS**

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| o THEORY  A. Familiarize with big mammals of Greece and the world:  Lectures involve:  • the basic characteristics of large mammals and their ecological role,  • the interconnection of different fields of research, management, protection and conflict reliief with human activities in terms of physiology, morphology, reproduction, social organization, territoriality, inter and intra specific competition and habitat use.  • Distribution of mammal species in Greece, their habitat characteristics, population sizes, population measurement methodologies, case studies on conservation and conflict issues.  o Large herbivores - family Cervidae. (red deer, roe deer, fallow deer)  o Large herbivores - family Bovidae. (Rupicapra genera, Capra)  o Large carnivores - Canidae family. Canidae (wolf, jackal)  o Large carnivores - family Ursidae and Felidae family.  o Omnivorous- family Suidae.  B. Methodologies and techniques  • Presentation on the concepts of territoriality and selected methodologies for collecting relevant data (VHF telemetry, GPS telemetry). MCP, Concave Polygons, Probability estimators, Resource Selection Analysis (e.g. logistic regression), GIS analysis  • Camera trapping, data analysis techniques: "Capture-mark-recapture ", Occupancy modelling, activity overlap analysis, biodiversity indexes (e.g. Shannon, Simpson).  • Trophic analysis: Basic concepts and techniques (food competition, seasonal variations, DNA analyses, parasitological surveys, stress surveys).  LABORATORY EXCERISES.  Habitat use Analysis:  o Using QGIS to display Eco-geographical variable (georeferencing, overlay, layer processing, colour rendering, project creation)  o Analysis of real satellite telemetry real data from Greece and creation of habitat suitability analysis with the MAXENT statistical program.  o Presentation of results on the GIS environment (QGIS) and interpretation of MAXENT habitat suitability maps and model diagnostics.  Camera trapping:  o Familiarization with photographic trap equipment and principles of operating the devices,  o Processing presence data from real data sets. Calculation of RAI index and diversity indices (e.g. Shannon, Simpson) per sampling station.  o Creating a multiple linear regression model in to interpret the results based on eco-geographical variable variation and combination per station.  Trophic analyses:  o Familiarization with biological material (large mammal faeces)  o Detection of hair at a species level based on electron microscopy and the use of reference keys.  o Analysis of trophic analysis real data: Frequency of occurrence, percentage of volume in excrements, Ivlev's index, Diet niche-Levin's index.  STUDENT PROJECT  Assignment of work (bibliographic research and synthesis) at individual level (different subject per student) based on the thematic units of the course (ecology and conservation of large mammals) |

1. **TEACHING and LEARNING METHODS - EVALUATION**

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| **DELIVERY***.* | Face-to-face |
| **USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY** | Use of power point with audio-visual material  Use of genuine audio-visual material from relevant field surveys in Greece (video, photographic material)  Use of ICT in laboratory education: xls, power point and free statistical data processing and GIS software (MAXENT, QGIS).  Use of ICT to communicate with students:  o Communication through the e-course platform  o communicate questions, material, and sources for each lecture.  o Laboratory: laboratory brochure, databases, software  o Project assignment: posting instructions  o Additional option to communicate at a personalized level to resolve questions (e-mail, personal e-course messages) |
| **TEACHING METHODS** | |  |  | | --- | --- | | ***Activity*** | ***Semester workload*** | | Lectures | 30 | | Laboratory practice | 14 | | Interactive teaching | 20 | | Project | 50 | |  |  | |  |  | | **Total** | **114** | |
| **STUDENT PERFORMANCE EVALUATION** | **Student information**: Process evaluation criteria during lectures.  A. **Based on the elaboration of a specific project** at an individual level from an available list - 60% of the grade  Evaluation criteria (equally):  o Degree of project understanding and the main issues it deals with  o Wording of the basic concepts related  o Selection and use of bibliographic references (suitability, type)  o Depth of information interpretation provided by bibliographic references  o Clarity of the conclusions.  B. **Based on project presentation** (40% of the grade):  o Slides content  o Layout quality  o Timing  o Use of vocabulary  o Text-technical details  o Transmissibility  o Answering questions  o Speech usage during presentation  C. Participation in laboratory exercises:  It is not counted in the final score, but laboratory exercises are compulsory and but each student in the exercises must complete all procedures at all levels of exercises. |

1. **ATTACHED BIBLIOGRAPHY**

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| • Red Data Book- Το κόκκινο βιβλίο των απειλούμενων θηλαστικών της Ελλάδας. http://www.ypeka.gr/LinkClick.aspx?fileticket=ZW%2biyGxKzAo%3d&tabid=518&language=el-GR  • Chapron, G, P Kaczensky, JDC. Linnell, et al 2014."Recovery of large carnivores in Europe's modern human-dominated landscapes." Science 346, no. 6216 (2014): 1517-1519. http://www.sciencemag.org/content/346/6216/1517.short  • Hair of west European mammals (Teerink 1991)  • Kenward RE, Clarke RT, Hoder KH & Walls SS (2001) Density and linkage estimators of home range: nearest-neighbor clustering defines multinuclear cores. Ecology 82(7): 1905-20.  • Kernohan BJ, Gitzen RA & Millspaugh JJ (2001) Analysis of animal space use and movements, pp125-166 in Millspaugh JJ & Marzluff JM (Eds) Radio-tracking and animal populations. Academic Press, San Diego, USA  • O’Connell A.F., Nichols J.D. and Karanth K. U. 2011. Camera traps in animal ecology – methods and analyses. Springer.  • Robin Steenweg, Jesse Whittington, Mark Hebblewhite, Anne Forshner, Barb Johnston, Derek Petersen, Brenda Shepherd and Paul M. Lukacs, Camera-based occupancy monitoring at large scales: Power to detect trends in grizzly bears across the Canadian Rockies, Biological Conservation, 10.1016/j.biocon.2016.06.020, 201, (192-200), (2016).  • Linnell, J., Andersen, R., Andersone, Z., Balciauskas, L., Blanco, J. C., Boitani, L., Brainerd, S., Breitenmoser, U., Kojola, I., and Liberg, O. (2002). The fear of wolves: A review of wolf attacks on humans. Oppdragsmelding Norwegian Institute of Nature Research, Technical Report (Trondheim, Norway.)  • Iliopoulos, Y., Sgardelis, S., Koutis, V., Savvaris, D., 2009. Wolf depredation on livestock in Central Greece. Acta Theriologica 54 (1): 11-22.  • Eklund, A., López-Bao, J. V., Tourani, M., Chapron, G., and Frank, J. (2017). Limited evidence on the effectiveness of interventions to reduce livestock predation by large carnivores. Scientific Reports 7, 2017. |