



### BIOACOUSTICS

<b>Enrollment year</b>	2017/2018
<b>Academic year</b>	2018/2019
<b>Regulations</b>	DM270
<b>Academic discipline</b>	BIO/05 (ZOOLOGY)
<b>Department</b>	DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES
<b>Course</b>	NATURAL SCIENCES
<b>Curriculum</b>	PERCORSO COMUNE
<b>Year of study</b>	2°
<b>Period</b>	2nd semester (04/03/2019 - 14/06/2019)
<b>ECTS</b>	6
<b>Lesson hours</b>	48 lesson hours
<b>Language</b>	Italian
<b>Activity type</b>	ORAL TEST
<b>Teacher</b>	PAVAN GIANNI (titolare) - 6 ECTS
<b>Prerequisites</b>	No prerequisites are necessary, however, as the matter is highly interdisciplinary with an important component related with technology and information technology, it is useful to have an open approach to information of different nature and have an interest to technological aspects. The course is also an opportunity for participation by students in other degree courses such as physics, mathematics, oceanography, and electronic engineering.
<b>Learning outcomes</b>	the course is aimed at providing knowledge about bioacoustics and ecoacoustics; both theory and practical applications. Communication and echolocation in animals, general and environmental acoustics, the impact of anthropogenic noise on animals, operational tools for research and environmental monitoring, issues relating acoustics with nature conservation and management
<b>Course contents</b>	The course aims to increase knowledge on animal behavior, on acoustic

communication and echolocation in both terrestrial and aquatic animals, as well as on environmental noise monitoring systems that can be used both for research purposes and for environmental protection, especially in the field of marine bioacoustics with the studies on marine mammals. We study the systems of acoustic communication in all zoological classes and the echolocation in mammals (bats and cetaceans), outlining the specific scientific problems and the most innovative lines of research. At the conclusion of a classical treatment of bioacoustics, the course examines aspects of acoustic ecology such as acoustic biodiversity, soundscape analysis and anthropogenic noise pollution. The course then addresses the technical issues related to the receipt, recording, analysis and measurement of sound (ranging from infrasound to ultrasound), with particular attention to the most modern digital systems, but without neglecting a historical view of the evolution of the recording and analysis tools. The course ends with the enforcement of bioacoustics such as zoological studies, surveys, environmental monitoring, human-animal interactions, ethofarmacology and neuroscience, robotics, sound pollution. In addition to the lectures, the students will also have the opportunity to use tools to record and analyze the sounds both in the laboratory and in the field. The course is supplemented by lectures and seminars made by external experts with demonstration of use of advanced tools, both hardware and software.

#### Teaching methods

lessons with support of slides in powerpoint  
demonstrations of use of software and tools  
access to specialist web sites  
references to the scientific literature in English

#### Reccomended or required readings

Obrist M.K., Pavan G., Sueur J., Riede K., Llusia D. & Márquez R., 2010. Bioacoustic approaches in biodiversity inventories. In: Manual on Field Recording Techniques and Protocols for All Taxa Biodiversity Inventories, Abc Taxa, Vol. 8: 68-99.  
The text can be downloaded here:  
<http://www.abctaxa.be/volumes/volume-8-manual-atbi/volumes/volume-8-manual-atbi/chapter-5/Chapter-5.pdf>

170) Pavan G., 2015. Bioacustica e Ecologia acustica. Cap. 18. Pag 803-828. In: Renato Spagnolo (a cura di), "ACUSTICA. Fondamenti e applicazioni", UTET Università, Torino 2015, 1-1582.

Bradley D.L., Stern R., 2008. Underwater sound and the marine mammal acoustic environment. Guide to fundamental principles. US MMC: 1-67.

The text can be downloaded here:  
[http://www.mmc.gov/reports/workshop/pdf/sound\\_bklet.pdf](http://www.mmc.gov/reports/workshop/pdf/sound_bklet.pdf)

Other lectures are suggested on the web page at  
[http://www.unipv.it/cibra/edu\\_book\\_uk.html](http://www.unipv.it/cibra/edu_book_uk.html)

#### Assessment methods

Oral examination.

#### Further information

The course deals with a highly interdisciplinary subject that can be of

great interest for other degrees students, such as engineers, physicists, oceanographers, mathematicians.  
Interdisciplinary these are offered.

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goals - Agenda 2030**

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