Main course information	
Academic Subject	Animal Physiology
Degree course	Bachelor's degree in Natural Science
Degree class	L-32
ECTS Credits (CFU)	6
Compulsory attendance	Strongly reccommended
Teaching language	Italian
Academic Year	2019/2020

Professor/Lecturer	
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Tutorial time/day	16-18 / Monday and Wednesday

Course details	Pass-fail exam/Exam with mark out of 30	SSD code	Type of class
	Exam with mark out of 30	BIO/09	Lectures

Teaching schedule	Year	Semester
	II	II

Lesson type	CFU/ECTS	Lessons (hour)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	tutorial/work-shop hours	CFU/ECTS field trip	Field trip hours
	5	40	1	15	0	0	0	0

Time management	Total hours	Teaching hours	Self study hours
	150	55	95

Academic calendar	First lesson	Last lesson
	1/3/2020	5/6/2020

Syllabus	
Course entry requirements	No requirement
Expected learning outcomes(according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	
Knowledge and understanding	Acquisition of skills on specific physiological mechanisms in response to changes in environmental parameters. These skills are necessary to set up future discussions and to provide solutions to environmental problems. Such a knowledge, also useful for dissemination and educational purposes, will be acquired through theoretical lessons.
Applying knowledge and understanding	In general, the student will have to apply the knowledge of physiological mechanisms in a global view of ecosystems and in relation to specific environmental problems. The student will be invited to compare the different interpretative proposals related to specific topics developed during the lesson. In particular, the student will learn solving simple numerical exercises and reproducing in graphical form the dependence of physiological parameters on time or on environmental variables.
Making informed judgements and choices	The student learn how to find the solution to a simple calculation problem using an autonomous logical process. The student will be invited first individually and then collegially to discuss case studies proposed during the lesson.
Communicating knowledge and understanding	The student should practice a way to speak language that is sufficiently correct to expose complex problems; moreover the

	student should learn writing in a precise, concise and clear but at the same time argued and not dogmatic way. In particular, he should learn hot to present the topics regarding the needs of the organisms in response to environmental parameters with the same characteristics highlighted above. The student will be invited to express himself on the topics learned during the lessons.
Capacities to continue learning	The student should acquire the ability to understand the relationships between form and function and their dependence on the environment. The student must be able to update the information acquired and acquire the ability to investigate environmental issues.

Syllabus	
Course content	**Lectures are given in Italian**. **Essential elements in chemistry.** General information on the properties of acids and bases; pH; preparation of aqueous solutions and buffer solutions. Generalities on carbohydrates, amino acids, proteins and lipids with particular focus on the phospholipid molecule. **Functional characteristics of animal cells.** Internal environment. Body fluids (intracellular, extracellular and blood). Main biological molecules. Cellular components. Cytoplasm. The plasma membrane and its functions. Osmosis. Diffusion. Diffusion through membrane channels. Mediated transport. Facilitated diffusion. Active transport. Vesicular transport. The membrane potential. Communication between cells. Surface receptors (extracellular). AMPc and phospholipase C/ inositol triphosphate pathway. Intracellular receptors. **The nervous system.** Action potential. Propagation of action potential. Energy cost of action potential. Synaptic transmission. Electric synapse. Chemical synapse. Synaptic integration. EPSP and IPSP. Trigger and propagation of action potential. Neurotransmitters and their receptors. Acetylcholine. GABA and glycine. **The perception of the environment.** Characteristics of sensory receptors. Classification of sensory receptors. Tactile receptors. Lateral line system. Electroreceptors. Thermoreceptors. Nocireceptors. Chemoreceptors. Taste. Smell. **The endocrine system.** Organization of the endocrine system. Integrations and complexity in the endocrine system. Hormones and their mechanisms of action. Intracellular receptors. Intercellular receptors. Endocrine glands **Muscles and movement.** Muscle movement. Striated muscles. Striated muscle cell. Structure of myofilaments. Muscle excitability and motor plaque. Muscle contraction. Contraction regulation (excitation-contraction coupling). Mechanical properties of skeletal muscle. Simple muscle shock. Muscle tetanus. The swim bladder **Laboratory.** 11 MetaNeuron exercises. Computer study of the Hodgkin-Katz equation. Simulation of incomplete and complete tetanus. Diffusion. Osmosis. Measurement of blood pressure, oxygen saturation and heart rate before and after exercise. Muscular fatigue. Cell counting. Calibration curve in photometry. Experimental checking of the Nernst equation.
Course books/Bibliography	"Fisiologia Animale" by Poli *et al*., 2014 - EdiSes, Napoli.
Notes	Because of the the complexity of the subject, the student should use a textbook. The one I recommend is also the cheapest of those currently available and is available at university libraries. However the student could use a different textbook, upon agreement with the Professor. The images projected and studied during the lessons are for the most part contained in the recommended textbook (and therefore subject to copyright). The contents not present in the textbook are available on the Internet in an open source format which is compatible with a simple use and dissemination.
Teaching methods	Lessons are integrated with image projection. These images are collegially discussed. Written calculations of the numerical relations gradually presented, whose solution is discussed collectively.
Assessment methods	Oral examination.

(indicate at least the type written, oral, other)	
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are	It is considered necessary for the student to pursue the following learning objectives. **Learning capacity.** The student must demonstrate to know the contents of the whole course. He must also be able to make connections between the various topics that make up the teaching program. The details of other disciplines are not required, but the ability to link them with the course issues is positively evaluated. Knowledge of only the notions is not considered sufficient. **Ability to apply knowledge and understanding**. The ability to apply knowledge and understanding will be verified by solving simple problems put in an extemporaneous way. **Autonomy of judgment.** The student during the examination must be able to independently develop possible links with other disciplines of the course of study. This ability will lead to a very positive evaluation. **Communication skills**. The ability to express concepts and make interpretations with language properties and clarity will be assessed very positively making use of the specific terminology learned during the course attendance. The student must also demonstrate the ability to apply the acquired knowledge in educational or educational contexts. **Capacities to continue learning.** The student should demonstrate to know how to independently gain further knowledge on the basis of an interdisciplinary preparation. The demonstration of such an ability will increase the final evaluation up to the maximum.
Further information	