



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare		
ACADEMIC YEAR	2023/2024		
MASTER'S DEGREE (MSC)	ENVIRONMENTAL ANALYSIS AND MANAGEMENT		
SUBJECT	ECOLOGY METHODS AND TECHNIQUES		
TYPE OF EDUCATIONAL ACTIVITY	B		
AMBIT	50574-Discipline ecologiche		
CODE	23400		
SCIENTIFIC SECTOR(S)	BIO/07		
HEAD PROFESSOR(S)	SARA' GIANLUCA	Professore Ordinario	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	86		
COURSE ACTIVITY (Hrs)	64		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	<p>SARA' GIANLUCA</p> <p>Tuesday 10:00 12:00 Per gli studenti del CdS in Biodiversità e Innovazione Tecnologica, presso le strutture del polo didattico di Trapani o della struttura "Principe di Napoli". I ricevimenti, su richiesta, possono essere svolti anche su piattaforma teams. Ulteriori o differenti incontri possono essere concordati con il docente</p> <p>Thursday 09:00 12:00 Dipartimento di Scienze della Terra e del Mare, Sezione di Ecologia, Plesso Edificio 16, STANZA 1</p>		

DOCENTE: Prof. GIANLUCA SARA'

PREREQUISITES	The student is expected to have basic knowledge of Chemistry, Biochemistry, Botany, Zoology.
LEARNING OUTCOMES	<p>Knowledge and comprehension Acquisition of theoretical and experimental skills related to abiotic and biotic features of ecosystems, interactions between organisms and between organisms and the physical environment, ecosystem functioning. Gaining basic knowledge at undergraduate level on ecological principles useful to investigate the ecosystem's response under anthropogenic pressure in order to increase skills when proposing impact analyses, multiscale monitoring protocols, mitigation and adaptation solutions in a context of global change and multiple stressors. Acquisition of a specialised scientific language.</p> <p>Applying knowledge and comprehension Acquisition of application skills to analyse ecological processes also in anthropogenic altered ecosystems.</p> <p>Autonomous thinking Acquisition of evaluation skills and competences for interpretation of experimental data, environmental state assessment and the effects of anthropogenic activities.</p> <p>Communication ability Acquisition of adequate skills and tools for communication, with regard to the presentation of the results of ecological studies, communication and dissemination of information on issues concerning the topics of the lessons.</p> <p>Learning ability Acquisition of appropriate skills for the independent achievement of additional competences, with reference to: literature consultation, access to database and other information on the internet, basic cognitive tools for the continuous updating of knowledge.</p>
ASSESSMENT METHODS	Coursework and final oral test. The student will be evaluated based on the level of knowledge of the subjects and the ability to link between them, the clarity and the use of a specialised scientific language.
EDUCATIONAL OBJECTIVES	The course aims to provide students with a cultural background and experimental and analytical bases to cope with the studies on the ecology of the functioning of ecosystems. In particular, we intend to highlight the role of the principles that regulate and control the ecosystem functioning in the interpretation of the processes that support the sustainability of human action on ecosystems, framing them in the most modern European frameworks. The objectives will also be reached through providing basic skills of analysis and elaboration in R to study some crucial macroecology topics need to improve the understanding of the concept of "scaling up".
TEACHING METHODS	Lectures, invited talks, and lab and classroom practice exercises
SUGGESTED BIBLIOGRAPHY	<p>Pusceddu, A., Sarà, G., Viaroli, P. 2020. Ecologia. UTET.</p> <p>Ricklefs R. (1999) L'economia della natura. Zanichelli</p> <p>Sarà G. e autori vari (20xx – in preparazione). Applicazioni di Ecologia</p> <p>Vellend M. 2020. The Theory of Ecological Communities. Monographs in Population Biology, Princeton U Press</p> <p>Ganston, K.J., and Blackburn, T. M. 2000. Pattern and Process in Macroecology. Blackwell Publishing</p>

SYLLABUS

Hrs	Frontal teaching
4	<p>Outline. Who we are, the objectives of our work, the role of bibliometric analysis with examples in defining the scientific value of ecological research; aims and structure of a graduate dissertation in Ecology.</p> <p>Ecology as a scientific discipline and the need of an ecology vision to read pattern and processes</p> <p>The cultural role of ecologists in the environmental sciences</p> <p>The scales of observation</p> <p>The concept of Variability</p>
4	<p>The concept of sustainability and related frameworks and strategies. The Sustainable Development Goals (SDGs). The role of the ecologists in defining sustainability. The social and economic implications of sustainable resource management. The Millenium Ecosystem Assessment as a context for the analysis of ecosystems and ecosystem services. The principles of Malawi. Conservation status of ecosystems. The European Green Deal. The Biodiversity Strategy 2030. The "Zero Pollution" strategy.</p>
8	<p>Ecology as a discipline at the basis of sustainability: the science of scales and patterns</p> <p>The importance of scale and scaling</p> <p>Patterns and scales through the ecological hierarchy:</p> <ol style="list-style-type: none"> 1.Intro to basic concepts in ecology 2.The ecosystem: structure, patterns and processes 3.What does "scaling up" mean? 4.Specific richness 5.Range size 6.Abundance 7.Body size

SYLLABUS

Hrs	Frontal teaching
6	The relationship between biodiversity and functioning. Ecosystem functions and functional diversity. Relationships between biodiversity and ecosystem functioning (BEF); The relationship between community assembly and functioning mechanisms (CAFE); Ecosystem approach.
6	Ecosystem functions, ecosystem goods and services. Ecosystem goods and services. The link between ecosystem services and the social and economic benefits and associated values, including monetary values. Socio-ecological systems. The link between ecosystem services, economic, environmental and spatial use policies and practices with emphasis on marine systems: models for predicting the influence of global factors on ecosystem management. Integrated ecosystem approach (Marine Integrated Ecosystem-Based Approach - MEBA). The ecological principles that govern the processes of efficient and sustainable planning and regulation of human activities at sea. Study of the processes of interaction and coexistence of human activities at sea, pattern analysis and selection of usable areas (siting) for the balancing of social and economic activities and the protection of marine ecosystems. Marine Spatial Planning (MSP). Marine Strategy Framework Directive (MSFD) and Good Environmental Status (GES). Ecosystem services and conservation, integrated use planning and sustainable management and restoration of ecosystems.
4	The effects of environmental change on the sustainability and well-being of present and future generations. The Anthropocene and planetary limits. The biophysical, social and political drivers of the dynamics of socio-ecological systems and those that influence resilience. The use of scenarios as a predictive tool of the effects of humans on ecosystems
Hrs	Practice
8	Practice exercise n. 1 - Introduction to the rudiments of R in ecology
6	Practice exercise n. 2 - The role of the systematic analysis of literature and evidence maps in Ecology; hints of meta-analysis and elaboration in R
6	Practice exercise n. 3 - Introduction to the use of COPERNICUS for the download of environmental data on an ecosystem scale, from local to global (scaling up), and to the use of QGIS.
2	Practice exercise n. 4 - Introduction to the use of correlative species distribution models on MAXENT.
4	Practice exercise n. 5 – Functional traits to feed mechanistic models of species distribution in R.
6	Practice exercise n. 6 – Case study on fisheries, ecological restoration, biodiversity and ecosystem functioning (BEF)