Main course information	
Academic subject	Ecology
Degree course	Master's degree in Natural Science
Degree class	L/32
ECTS credits (CFU)	7
Compulsory attendance	Strongly recommended
Teaching language	Italian
Academic Year	2019/2020

Professor/Lecturer	
Name & SURNAME	Porzia MAIORANO
email	porzia.maiorano@uniba.it
Tel.	080-5442495
Tutorial time/day	Tuesday 11-13; Wednesday-Friday 11-12,30

Course details	Pass-fail exam/Exam with mark out of 30	SSD code	Type of class
	Exam with mark out of 30	BIO/07	Lecture/workshop/field trip

Teaching schedule	Year	Semester
	III	I

Lesson type	CFU/ECTS	Lessons (hours)	CFU/ECTS lab	Lab hours	CFU/ECTS tutorial/workshop	Tutorial/workshop hours	CFU/ECTS field trip	Field trip Hours
	6	48	0	0	0.5	7.5	0.5	10

Time management	Total hours	Teaching hours	Self-study hours
	175	65.5	109.5

Academic Calendar	First lesson	Final lesson
	October	January

Syllabus	
Course entry requirements	Basic knowledge in mathematics, physic, chemistry, geography, botanic, zoology.
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	To acquire basic knowledge on the ecosystems functioning as well as the relationships between the organisms and the environment. To acquire knowledge on the ecological systems (populations, communities and ecosystems) and to understand their changes over time also due to different impacts. Such knowledge and understanding, useful for informative and educational purposes, will be acquired through lectures and workshops.
Applying knowledge and understanding	Application of acquired knowledge aimed to the management of the ecological systems and to the conservation of the functions and services according to a sustainable development. During the lessons, the student will be encouraged to compare the different interpretations for the considered issues.
Making informed judgements and choices	Acquisition of autonomy in the evaluation and interpretation of experimental data as well as in the evaluation of the interactions between factors and components in the ecosystems. The students will be encouraged to discuss the case studies presented throughout the lecture.
Communicating knowledge and understanding	Acquisition of the scientific terminology related to the ecology and the structure and functioning of the ecosystems with the aim to be able to communicate the scientific knowledge.
Capacities to continue learning	Acquisition of the critical and speculative capacity in dealing with the topics and issues of the ecology. The students will be encouraged to acquire this ability through the

	lectures, the consultation of books and scientific publications as well as the participation to conferences and workshops.

Syllabus	
Course content	**Introduction to the ecology.** Self-organization of living systems: from cells to ecosystems. The systemic vision of the life and the interaction among different components. Stability of the ecological systems: resistance and resilience. **Ecosystem.** Components and factors. Energetic of ecosystem. Productivity. Primary productivity. Drivers of primary productivity in land and aquatic ecosystems. Secondary productivity and net production of the community. Food chains of grazing and food chains of dead organic matter. Dissipative processes in the food chains. Energy and length of food chains. Ecological pyramids. Ecological efficiencies. Terrestrial and aquatic trophic webs. Energetic classification of the ecosystems. **Biogeochemical cycles.** Decomposition and nutrient cycles. Drivers of the decomposition. Water cycle. Carbon cycle. Greenhouse effect. Nitrogen cycle. Phosphorus cycle. Eutrophication. Sulfur cycle and chemosynthesis. Oxygen cycle. **Autoecology.** Environmental factors. Adaptation of the organisms to the environment. Liebig law and Shelford law. Ecological valence. Ecological niche. **Populations (Demoecology).** Population structure: abundance and density. Organism distribution. Dispersion of the organisms over the habitat. Migration. Pyramids of age. Natality and mortality. Population dynamic. Exponential growth. Demographic factors. Survival and natality age-specific (fecundity). Survival and mortality curves. Life tables. Logistic growth. Life strategies: costs, benefits and trade-off. r-k strategy continuum. **Species interactions.** Types of species interactions. Interspecific competition. Principle of competitive exclusion. Ecological effect of the competition. Lotka-Volterra competition model. Predation. Prey-predator cycles. Lotka-Volterra predation model. Functional responses of predators. Strategies of the predators and strategies of the prey. Coevolution: Red Queen hypothesis. **Community (Sinecology).** Indices of species richness, dominance, diversity, evenness. Abundance-diversity curves. Key species and functional groups. Physical structure, stratification, zonation and borders of community. Ecotone and margin effect. Similarity index. Trophic web and direct and indirect interactions between the species. Bottom-up and top-down control in the trophic web. Trophic cascade. Dynamics of community. Ecological succession. Changes in the ecosystem characteristics during the succession. Intermediate disturbance hypothesis. **Landscape.** Environmental patches. Biogeography of the islands. Area-species curve. Rate of immigration and rate of extinction. Area and distance effects. Metapopulation. Rate of colonization and rate of extinction. **Biodiversity.** Distribution of the biological diversity. Goods and ecosystem services. Drivers of diversity increase and loss. Rate of extinction and species vulnerability. **Workshop 1:** Analysis of the distribution in the habitat: method of casual square, distance measures and first minor distance methods. Estimate of population abundance: method of capture-marking-recapture, swiping method and swept-area method. **Workshop 2:** Classification and representation of ecological data. Measure of position and measure of dispersion. Use of Excel for the descriptive analysis of the samples. **Workshop 3:** Analysis of alfa diversity. Measure of diversity indices. Measure of dominance using Simpson index. Diagrams rank-abundance. Use of Excel to measure the different indices. **Workshop 4:** Field activity as an exercise of studying and understanding environmental complexity in different ecosystems.
Course books/Bibliography	Smith T.M. & R.L. Smith. Elementi di Ecologia. PEARSON Benjamin Cummings. Odum P. & G.W. Barrett. Fondamenti di Ecologia. Piccin Nuova Libraria S.p.A.
Notes	The texts are available in the library of the Biology Department. The student is invited to deepen some topics by means of the available documents in electronic format. Moreover, it's strongly recommended to use the notes from lectures.
Teaching methods	Lectures and seminars by mean of Power Point; workshop and field activity. Teacher-student interactions will be encouraged during educational activities.

Assessment methods (indicate at least the type written, oral, other)	Oral examination. The student has to prove the knowledge of issues developed during lectures as well as the ability to link their contents. The final mark will be awarded on the basis of clarity of exposition, language property and educational capability. The constant and active participation to the lectures will contribute to a very positive evaluation.
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	Learning capacity. In addition to the acquisition of concepts, ability to make connections among the various ecological systems according to a holistic point of view is evaluated. Knowledge at exclusively notional levels is not evaluated above average values. Ability to apply knowledge and understanding. The knowledge of environmental data collection, experimental studies and ecological models shows maturity in the preparation and is an essential requirement to be positively evaluated during the examination. Autonomy of judgment. Knowing how to evaluate and interpret experimental data and case studies as well as trends in ecological models shows maturity in the preparation and is positively judged. Communication skills. Knowing how to communicate the contents of ecology in a clear and scientifically correct way is considered fundamental for the positive outcome of the examination.
Further information	