Course title	**Ecology**				
Course code	**GALA1102**				
Course type	**Lectures**				
Level	Higher Diploma				
Year / Semester	1st Year / 1st Semester				
Teacher's name	Dr Demetrios Sarris				
ECTS	6	**Lectures / week**	2	**Laboratories / week**	1
Course purpose and objectives	The purpose of the **"Ecology"** course is to equip the students with the fundamental knowledge, skills, and competences necessary to understand ecological principles, study ecosystems, biodiversity, and the interactions between plants, animals, and the environment. Additionally, the course examines the impact of human activities on nature and promotes sustainable practices that enhance environmental balance and sustainability. The course also develops practical skills in ecological sampling, data analysis, and interpretation, preparing students to apply ecological knowledge to conservation, sustainable resource management, and real-world environmental challenges.				
Learning outcomes	Upon completion of the course, students are expected to: **Knowledge** 1. **Explain** the concept and structure of ecosystems, the abiotic and biotic environment, and the concept of matter recycling. 2. **Describe** energy flow and natural recycling processes in nature, as well as anthropogenic effects and disturbances. 3. **Comprehend** the impact of climate change on ecosystems and biodiversity. 4. **Identify** the factors responsible for ecological change and the phenomenon of ecological succession. **Skills** 5. **Justify** the importance of sustainability in ecosystem management. 6. **Apply** sustainable practices in landscaping, reducing environmental impacts, and enhancing sustainability. 7. Use ecological field techniques and laboratory tools to collect, analyze, and interpret ecological data. **Competencies** 8. **Examine** the general principles related to population dynamics, population changes, and the characteristics of basic life strategies. 9. Communicate ecological findings clearly through written reports integrating both theoretical knowledge and practical results.				
Prerequisites		**Required**			
Course content	**Week 1: The Science of Ecology** • **Lecture content:** ○ Definition, scope, and importance of ecology. ○ Historical overview: from natural history to modern systems ecology.				

- Relationship with other sciences (biology, geography, chemistry, environmental science).
- Key ecological principles and levels of organization (individuals, populations, communities, ecosystems, biosphere).

- **Lab 1: Introduction to Ecological Observation & Data Recording**
  - Basic field/lab safety and use of quadrats, transects, and sampling jars.
  - Students conduct a mini-survey of campus grounds to record abiotic and biotic features.

Week 2: Adaptation Strategies

- **Lecture content:**
  - Morphological, physiological, and behavioral adaptations.
  - Adaptations to climate (desert, tropical rainforest, polar).
  - Plant strategies: xerophytes, hydrophytes, halophytes.
  - Animal strategies: thermoregulation, camouflage, migration.
  - Co-evolutionary adaptations (pollination, predation).
- **Field Work- Identification of plant and animal strategy adaptations at different environments following relevant protocols.**

Week 3: Population Dynamics and Interactions

- Lecture content:
  - Population growth models (exponential, logistic).
  - Carrying capacity, limiting factors, density dependence.
  - Species interactions: competition, predation, mutualism, parasitism.

Week 4: The Concept of Ecosystems

- Lecture content:
  - Non-biotic and biotic drivers
  - Energy flow (food chains, webs, trophic levels).
  - Nutrient cycles (carbon, nitrogen, water).
  - Primary productivity and ecological efficiency.
  - Ecosystem boundaries and connectivity.

Week 5: Ecological Succession and Natural Selection

- Lecture content:
  - Primary vs. secondary succession.
  - Pioneer species, climax communities, disturbance regimes.
  - Natural selection as a driver of succession.
  - Case studies (volcanic islands, abandoned fields).

Week 6: Fieldwork: Succession Study

- Students compare ecological succession processes in different systems using relevant protocols

Week 7: Types of Biosystems & Human-Made Ecosystems

- Lecture content:
  - Bioclimate and vegetation belts
  - Major biomes (tundra, desert, rainforest, grassland, marine, freshwater).
  - Case studies of tropical vs. Mediterranean systems.
  - Human-made ecosystems: agricultural fields, urban ecosystems, aquaculture systems.
  - Differences/similarities between natural and artificial ecosystems (diversity, resilience, energy flow).

Week 8: Biodiversity & Conservation

- Lecture content:
  - Genetic, species, and ecosystem diversity.

	○ Global biodiversity hotspots and threats. ○ Conservation strategies (in-situ, ex-situ). ○ Management approaches in protected areas and urban settings. **Week 9: Fieldwork: Biodiversity Study within a Natura 2000 Site** ○ Collect field data on species presence/abundance. ○ Calculate and interpret species richness, Shannon (H′), and Simpson (1–D) diversity. **Week 10: Environmental Threats & Climate Change** • Lecture content: ○ Deforestation, desertification, overfishing, habitat fragmentation. ○ Climate change: greenhouse gases, global warming, shifting biomes. ○ Impacts on agriculture, water resources, and biodiversity. ○ Adaptation and mitigation strategies. ○ Human population dynamics and ecological footprint. **Week11: Laboratory : Climate & Pollution Data Analysis** ○ Calculation of ecological footprint and carbon footprint. ○ Assessment of future climate scenarios and projected climatic trends for selected regions of the Mediterranean. ○ Analysis of recent climatic trends. **Week 12: Environmental Pollution & Land Use Change** • Lecture content: ○ Types of pollution (air, water, soil, noise, light). ○ Eutrophication and pesticide accumulation. ○ Land-use change: urbanization, agriculture expansion, deforestation. ○ Sustainable land management practices. • Field work: Case study of pollution focusing on the gardening sector.
Teaching methodology	The teaching methodology for this **Ecology course** combines lectures, laboratory sessions, and fieldwork to ensure both theoretical understanding and practical application. Lectures provide core ecological concepts, case studies, and discussion of human–environment interactions, while laboratory sessions develop hands-on skills in observation, microscopy, sampling, and data analysis. Fieldwork allows students to apply ecological methods in real settings, conducting biodiversity surveys, succession studies, and ecosystem assessments. Active learning approaches such as group projects, data interpretation exercises, and problem-based tasks encourage critical thinking, teamwork, and the ability to connect ecological knowledge with sustainable management practices.
Bibliography	**Greek Bibliography** • Nentwig, W., Bacher, S., και Brandl, R. (2011). *Βασικές έννοιες οικολογίας*. Κλειδάριθμος. ISBN 978-960-461-458-5. • Κορφιάτης, Κ. (2010). *Γενικές αρχές οικολογίας και ελληνικά φυσικά συστήματα.* Δίσιγμα, ISBN 978-960-99048-2-7. • Βώκου, Δ. (2014). *Γενική οικολογία: Μια εισαγωγή*. 2η Έκδοση. University Studio Press. ISBN 978-960-12-1769-7. • Γεράκης, Π. Α. (2008). *Γεωργική οικολογία*. Σύγχρονη Παιδεία. ISBN 978- 960-357-084-4. • Χατζημπίρος, Κ. (2014). *Οικολογία, οικοσυστήματα και προστασία του περιβάλλοντος*. 3η Έκδοση. Συμμετρία. ISBN 978-960-266-121-5. • Campbell, Neil A. (2013). Βιολογία : Μορφή και λειτουργία στα φυτά - Μορφή και λειτουργία στα ζώα - Οικολογία (Πανεπιστημιακή βιβλιοθήκη θετικών επιστημών / Βιολογία). Πανεπιστημιακές Εκδόσεις Κρήτης. ISBN:

	9789605243289 **English Bibliography** • Ahluwalia, V. K. (2018). The Environment. Delhi : The Energy and Resources Institute. 2018. ISBN:9789386530127. **EBSCOHost**. • R. J. Berry (2011). Ecology and the Environment : The Mechanisms, Marrings, and Maintenance of Nature. West Conshohocken, PA : Templeton Press. 2011. ISBN: 9781599472522. **EBSCOHost**. • F Stuart Chapin (2012). *Principles of Terrestrial Ecosystem Ecology*. 2η Edition. pringer. ISBN: 978-1441995025. • Kaushik, A., and Kaushik, C. P. (2010). *Basics of Environment and Ecology. New Delhi: New Age International*. ISBN: 9788122427820. **EBSCOHost**. • Rosales, J. (2020). *Altered Ecosystems*. Oakville, ON: Delve Publishing. ISBN: 9781774074374. **EBSCOHost**. • Ågren, Go. I., and Andersson, F. (2012). *Terrestrial Ecosystem Ecology: Principles and Applications*. Cambridge: Cambridge University Press. ISBN: 9781107011076. **EBSCOHost**.
Assessment	• Attendance and class participation 10% • Individual Lab reports related to the nature of the Practical training 40% • Final written examination 50%
	Student performance in this course will be evaluated through a combination of continuous and summative assessments. Attendance and active participation in class will contribute **10%** to the final grade, reflecting the importance of consistent engagement. A **portfolio of individual lab reports** compiled from the various practical sessions will account for **40%**, assessing students' ability to document their work systematically, demonstrate applied skills, and reflect on their learning throughout the semester. The **final written examination**, weighted at **50%**, will include both closed-ended questions (e.g., multiple-choice, matching, true/false) and open-ended questions (e.g., short-answer, essay-type, case studies). The examination will have a duration of **two academic periods** and will evaluate students' overall understanding of the course content, their ability to synthesize theoretical and practical knowledge, and their critical thinking skills. Student performance is evaluated on a **scale of 0 to 100**, with a **minimum overall passing grade of 60**. The final grade is calculated as a **weighted average** of the assessment components described above.
Language	Greek or English