JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

DEPARTMENT OF BIOLOGICAL SCIENCES

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES

2ND YEAR 1ST SEMESTER 2022/2023 ACADEMIC YEAR

MAIN CAMPUS - REGULAR

COURSE CODE:	**SBB 1208**
COURSE TITLE:	**PRINCIPLES OF ECOLOGY 1**
EXAM VENUE:	**STREAM: (BSC BIO)**
DATE:	**EXAM SESSION:**
TIME: 2 HOURS	

Instructions:

1. **Answer ALL questions in Section A and ANY TWO questions in Section B**
2. **Candidates are advised not to write on the question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECTION A: SHORT ANSWER QUESTIONS (30 MARKS)

1. Explain the following ecological terms.
   a) Habitat
   b) Ecosystem
   c) Biosphere (3 marks)
2. Use a diagram to illustrate how ecology is an interdisciplinary science (3 marks)
3. Explain three symbiotic relationships in nature. (3 marks)
4. Differentiate between Synecology and Autecology. (3 marks)
5. Explain three models of population dispersion. (3 marks)
6. Using diagrams, differentiate between exponential and logistic population growth models. (3 marks)
7. Explain why trees in Kakamega forest have shallow roots (3 marks)
8. Illustrate three mathematical methods of measuring species diversity (3 marks)
9. Explain the hypothesis of island biogeography. (3 marks)
10. Explain three reasons why species diversity declines from the equator to polar-regions. (3 marks)

SECTION B: ESSAY QUESTIONS (40 MARKS)

11. Write an essay on five ecological principles/concepts (20 marks)
12. Describe five abiotic factors that affect the distribution and abundance of organisms in nature. (20 marks)

12. Describe the concept of ecological succession and processes of hydrosere (20 marks)

14. Using diagrams, describe the process of nitrogen and carbon cycling in four spheres. (20 marks)

DEPARTMENT OF BIOLOGICAL SCIENCES
DEGREE OF BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES
YEAR 2 SEMESTER 1
COURSE OUTLINE

CODE SBB 1208: TITLE: PRINCIPLES OF ECOLOGY 1

Instructor: DR NYONGESAH MAINA
Mobile: 0702469532
Email: jnyongesah@joust.ac.ke
Contact hours 42 hours , As per the time table
Venue: BotLab1
Consultation: Online (Tueday 8-10am) /School staffroom (Thur 9-11am)

Background

The course deals with the definition of ecological terms, description, and discussion of ecological parameters at the level of population, community, and ecosystems. It also covers topics on the effect of biotic and abiotic factors on organisms and their adaptive response to such challenges. The course deals with the different biomes of the world and also the different ecosystems of Ethiopia. At the end of the theoretical part, students will visit a selected natural environment and will engage themselves in a mini-project of field observation for few days that will reinforce understanding the concepts and principle they discussed in theory.

The course is an introduction to the factors determining the distribution and patterns of abundance of organisms, and which relate plant and animal populations to their environment. It includes the physiological ecology of plants and animals, the life history strategies by which organisms adapt to their environments, trophic ecology and the ecological significance of the niche, biodiversity and co-existence. The course provides a comprehensive treatment of the subject from the first principles of ecology to a reflection of our understanding of ecology in the 21st century.

On completion of this course, the student will be able to:

1. Demonstrate a broad knowledge of the defining principles of ecology and understand the factors controlling the abundance and distribution of organisms globally.
2. Demonstrate a broad knowledge of the ecological theory explaining patterns of spatial and temporal variations in species numbers in both terrestrial and marine environments.
3. Understand and use introductory statistics; hypothesis testing, basic experimental design and field sampling.
4. Carry out a scientific research project related to an ecological question: formulate clear, precise and potentially answerable questions, collect unbiased data and test hypotheses.
5. Communicate by a written scientific research report the basis of your research findings and through this critically analyse mainstream concepts within Ecological Science.

COURSE CONTENT

WEEK	TOPIC	REMARKS
1	Introduction to Ecology	General aspects of ecology
2	Ecological principles and Ecological concepts	Key concepts
3	The Physical Environment	
4	Population dynamics: Dispersion/density	Distribution/abundance

5-6	Dynamic interactions in plant and animal communities : Competition; Symbiosis	Practical aspects of interactions
7	Plant community Succession	Aquatic and terrestrial
8	CAT 1	10%
9	Biogeography: Species diversity and richness	Theories based on MacArthur & Wilson's (1967).
10	Ecosystems: Energy flow and Nutrient cycling	Laws of energy, N,C,P and S cycling
11	Conservation biology; Human effects on ecosystems	Past and present in relation to climate change
12	CAT 2	10%
12	REVISION	
13-14	FINAL EXAM	70%
	Final Score	Exam+1st Cat+2nd Cat +Pract

The following are generally useful as sources of first reference on many topics. You can obtain them from the University Physical and E-Library. Feel free to use any other materials available online.

A. Begon, M., Townsend, C. R. & Harper, J. L. (2006). Ecology (4th edn). Blackwell Science, Oxford. (The recommended text for this course).
B. Townsend, C.R., Begon, M. and Harper, J.L. (2014). Essentials of Ecology (2nd Edition). Wiley. (Highly recommended).
C. Prach, K., & Walker, L. R. (2020). Comparative Plant Succession Among Terrestrial Biomes of the World. Cambridge University Press.
D. Ingrouille M. (1995). Historical Ecology of the British Flora. Chapman and Hall.
E. Kaiser MJ et al. (2011) Marine Ecology. Oxford University Press. (Highly recommended for overview of marine ecology & ecosystems).
F. Krebs, C. J. (1994 & 2001). Ecology. (4th & 5th edns). Harper Collins, New York. (Good on animal populations).
G. Molles, M. (2015). Ecology: concepts and applications. McGraw-Hill Education.
H. Ricklefs, R. E. & Miller, G. L. (1999). Ecology. (4th edn). Freeman, New York.

Prepared by:
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