Semester II Major Theory (Revised-2025)

Level	Semester	Course Code	Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	Sem II Major Theory 3	114202	**Environment and Ecology**	2	30	2 Hrs	30 + 20

Course Objectives:	**1**.Impart knowledge on different ecological concept and disciplines of ecology. **2.** To develop competency in understanding the ecological principles governing t the biosphere. **3.** Explain the structure and function of Population Ecology. **4.** Demonstrate the ability to carry out ecological analysis in field conditions/laboratories and make appropriate judgements.
Course Outcomes:	As per Environment and Ecology **CO-1:** Analyse natural processes and resources that sustain life and govern economy. **CO-2:** Understand fundamental Concept in Ecology. **CO-3:** Analyze characteristics of Ecology **CO-4:** Understand fundamental Concepts in Population Ecology. **CO**-5: Demonstrate an entry level competence in understanding the ecological dynamics and their influence on humans and anthropogenic endeavors **CO-6:** Get the opportunities of employment in the sector of Ecology and ecological monitoring.

Unit System	Contents	Workload Allotted (Hrs)	Weightage of Marks Allotted	Incorporation of Pedagogies
Unit I	**1. Introduction to Ecology**	8	8	Chalk and talk, FW, Visits, use of ICT charts, models, problem based learning and collaborative learning. Theory, Self-study and Case studies .
	1.1: Definition, Principles and Scope of Ecology. Types of Ecology,			
	1.2: Biogeochemical Cycles- Definition and Types.: Gaseous as Carbon, Oxygen, and Nitrogen			
	1.3: Sedimentary Cycle as Phosphorous and Sulfur			
	1.4: Inter-specific relationship:- Positive-Mutualism and Commensalism, Negative – Parasitism and Predation			
Unit II	**2. Population & Community Ecology**	7	7	
	2.1: Definition and characteristic as Natality, Mortality and Age Structure			
	2.2: Dispersion, Size and Density, Biotic Potential			
	Community Ecology: 2.3: Definition, structure, Characters used in community study: Analytical- i)Qualitative Characters as sociability, vitality and abundance; ii)Quantitative Characteristic as Frequency, Density and Abundance			
	2.4 Methods for Community Study: Quadrate method			
Unit III	**3. Ecosystem I**	8	8	
	3.1: Ecosystem: - Definition, components and structure			

	3.2: Food chain and Food web			
	3.3: Ecological pyramids- Definition & Types			
	3.4: Types of Ecosystems: Terrestrial: forest, grassland; Aquatic: marine and fresh water.			
Unit IV	**4. Ecosystem II**	7	7	
	4.1: Energy flow in ecosystem: Y- shaped Energy flow Model			
	4.2: Productivity in ecosystem- Concept types and Measurement (Light & Dark Bottle)			
	4.3: Ecological succession: Concept, types, general mechanism and significance			
	4.4: Xerosere – Definition & Stages			

References:

1.Santra S. C. 2001 Environmental Sciences New Central Book Agency (P) Ltd. Calcutta.
2. M.P.Arora, 'Ecology' Himalaya Publishing company.
3. P.D.Sharma, Environmental Biology' Rastogi Publication
4. Ambasht R. S. and Ambasht, N. K. (2008) Text Book of Plant Ecology (15th edn.). CBS Publishers and Distributers, New Delhi.
5. Colbert, E.M. (1996) Evolution of the Vertebrates: A History of Backboned Animals through Times. Wiley Eastern Ltd., New Delhi.
6. Dobzhansky, T. (1973) Genetics and the Origin of Species. Oxford & IBH Publishing Co.
7. Gupta, P.K. (1990) Cytology, Genetics, Evolution and Ecology. Rastogi Publications, Meerut. 8. Kormondy, E. J. (1996) Concepts of Ecology (4th edn.). Prentice-Hall of India Pvt. Ltd.
9. Krebs, C. J. (1985) Ecology: The Experimental Analysis of Distribution and Abundance. Harper and Row, New York.
10. Odum, E.P. and Barrett, G.W. (2005) Fundamentals of Ecology (5th edn.). Thompson.
11. Singh, J.S; Singh, S.P. and Gupta S.R. (2014) Ecology, Environmental Science and Conservation. S.Chand & Company Pvt.Ltd. New Delhi.

Reference books:

1. Singh, J.S., S.P & Gupta, S.R. 2006. Ecology, Environment and Resource conservation. Anamaya Publ., New Delhi, 688 pp.
2. Miller. G.T. 2004. Environmental Science. Thomson, California. 538 pgs.
3. Chapman, J.L.& M.J. Reiss. 1998. Ecology: Principles and Applications. Cambridge Univ. press. 2 nd edition. 336 pgs.
4. Krebs, C.J. 2008. Ecology: The experimental Analysis of Distribution and Abundance (6th Edition), Benjamin Cummings Publ. 688pgs
5. Groom. B. & Jenkins. M. 2000.Global Biodiversity: Earth's Living Resources in the 21st Century. World Conservation Press, Cambridge, UK.
6. Gurevitch, J., Scheiner, S. M., & Fox, G. A. 2002. The Ecology of Plants. Sinauer associates incorporated.
7. Loreau, M. & Inchausti, P. 2002. Biodiversity and Ecosystem functioning: Synthesis and Perspectives. Oxford University Press, Oxford, UK.

MOOC on SWAYAM relevant:

1. Ecology and Environment By Prof. Abhijit P Deshpande, Prof. Ravi Krishna R | IIT Madras https://onlinecourses.nptel.ac.in/noc22_ge20/preview
2. Environment Natural resources and Sustainable Development By Prabhakar Rao Jandhyala | University of Hyderabad https://onlinecourses.swayam2.ac.in/aic19_ge05/preview
3. Environment and Development By Prof. NgamjahaoKipgen | IIT Guwahati https://onlinecourses.nptel.ac.in/noc22_hs126/preview
4. Environmental & Resource Economics By Prof. Sabuj Kumar Mandal | IIT Madras https://onlinecourses.nptel.ac.in/noc22_hs71/preview Weblink to Equivalent Virtual Lab if relevant: 1. https://vlab.amrita.edu/?sub=2&brch=294 2. https://ccnsb06-iiith.vlabs.ac.in/List%20of%20experiments.htt.

Short Questions:

1. Define Ecology.
2. What is difference between ecology and environment.

3. Define ecosystem.
4. What are the biogeochemical cycles.
5. What is the relation between oxygen and carbon cycle?
6. What is the difference between food web and food chain?
7. What are the producers of ecosystem?
8. What are biomes?

Long Questions:

1. Explain the role of producers, consumers and decomposers in an ecosystem.
2. Discuss ecology and its types with suitable example.
3. Discuss concept of ecological pyramid.
4. With the help of diagram explain nitrogen cycle.

Multiple choice questions:

1. Among, which are producers?
   a- Animals, b- birds, c- plants, d- fishes.
2. ------ is not a gaseous cycle.
   a- Sulphur, b- nitrogen, c- oxygen, d- carbon.
3. ------- is abiotic factors in aquatic ecosystem.
4. Trophic level refers to------.
   a- Area in trophic, b- an organism's position in food chain, c- an organism's position in ecosystem. d- an organism's position in biome.
5. Largest reservoir of nitrogen our planet is…….
   a- Oceans, b- atmosphere, c- biosphere, d- fossil fuels.
6. In aquatic ecosystem, phytoplankton are considered as------.
   a- Consumer, b- decomposer, c- producer, d-carnivore.
7. ----------ecosystem, is example of terrestrial ecosystem.
   a- Grassland, b- pond, c- river, d- marine.
8. The natural place of an organism or community is known as-
   a- Niche, b-Biome, c-Habitat, d-Habit

Rubric for Internal Assessment for Theory Paper

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI **Internal Assessment** B.Sc. I (Environmental Science) SEMESTER –II (NEP) Paper: Maj/Theo-3 Course			
	Course Code: 114202	Environment and Ecology	Max Marks: 20

Sr. No.	Assessment Criteria	Marks
1	Attendance	5
2	Class Assignments	5
3	Unit Test - MCQ	5
4	Participation in Activity/ Field visit	2
5	Overall Performance	3

Semester II Major Lab. (Revised-2025)

Level	Semester	Course Code		Course Name	Credits	Teaching Hours	Exam Duration	Max Marks
4.5	II	114203		Practical-Based on Environment and Ecology	2	60	4Hrs	50

Course Objectives:	• To gain hands-on experience in collecting ecological data. • To Studying ecological relationships between organisms and their environment. • To Understanding concepts like population dynamics, community structure, succession, and ecosystem function. • To understand the distribution and abundance of living things in the physical environment.
Course Outcomes:	1. Analyzes patterns in populations and communities. 2. Applies ecological theories to real-world scenarios, and developing skills to design and conduct field research projects to understand and assess the health of ecosystems. 3. Learns how to properly collect data on plant and animal populations using various sampling methods (e.g., transects, quadrats, mark-recapture). 4. Identifies species in the field. 5. Measuring environmental parameters like temperature, humidity, and light levels. 6. Provides services to survey, assess, manage, enhance and/or recreate indigenous vegetation and habitats to conserve indigenous biodiversity.
Experiments/ Activities:	
A. Community Ecology 1. Fixation of minimum size of Quadrates 2. Fixation of minimum number of Quadrates 3. Determination of Frequency 4. Determination of Density and Abundance 5. Determination of Dominance 6. Importance Value Index (IVI)	
B. Aquatic Ecology (Lake and Pond Ecosystems) 1. Study of Biotic & Abiotic Characteristics of a Lake Ecosystem. (pH, Temperature, Light Penetration, primary and secondary consumers) 2. Identification of Eutrophication Characteristics 3. To determine the primary productivity by light and dark bottle method.	
C. Terrestrial Ecology (Forest and Grassland Ecosystems) 1. Determination of abiotic factors in terrestrial ecosystems. (Temperature, Moisture & Wind Speed) 2. Ground mapping with prismatic compass. 3. Estimation of population size by quadrat method. 4. Estimation of patterns of distribution of species in a community 5. Estimation of canopy cover using spherical densiometer. 6. Studies of lichen community in different habitats.	

Rubric for Internal Assessment for Practical

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI **Internal Assessment** B.Sc. I (Environmental Science) SEMESTER –II (NEP) Lab/Practical-4		
Course Code: 114203	Environment and Ecology	Max Marks: 25

Sr. No.	Assessment Criteria	Marks
1	Attendance	5
2	Record / Assignments	5
3	Participation in Activity/ Field visit	5
4	Reports on field visit	5
5	Students' overall performance	5

Rubric for External Assessment for Practical

SANT GADGE BABA AMRAVATI UNIVERSITY, AMRAVATI **External Assessment** B.Sc. I (Environmental Science) SEMESTER –II (NEP) Lab/Practical-4		
Course Code: 114203	Environment and Ecology	Max Marks: 25, Time: 4Hours

Sr. No.	Assessment Criteria	Marks
1	Practical Based on Community Ecology	08
2	Practical Based on Aquatic Ecosystem	05
3	Practical Based on Terrestrial Ecosystem	07
4	Viva Voce	05