

As Per NEP 2020

University of Mumbai



**Syllabus for
Basket of OE
Vertical 3**

Faculty of Science

Board of Studies in Biotechnology

Second Year Programme

Semester

IV

Title of Paper

Credits

I) Ecosystem organization and anthropogenic impacts

2

From the Academic Year

2025-26

SEMESTER IV

Syllabus
B.Sc. (Biotechnology)

OPEN ELECTIVES

OPEN ELECTIVE-I

Course I

Name of the Paper : Ecosystem organization and anthropogenic impacts

Sr.No	Heading	Particulars
1	Description the course : Including but Not limited to:	The course introduces the natural ecosystems with emphasis on its participants and interactions. It encourages the learner to experience the ecosystem functioning through field visits and case studies. Further, it explores the multifaceted ways in which human activities influence ecosystems worldwide. It aims to provide students with a comprehensive understanding of the anthropogenic pressures on natural environments, their ecological consequences, and potential strategies for mitigation and sustainable management.
2	Vertical :	OE
3	Type :	Theory
4	Credits :	2 credits
5	Hours Allotted :	30 Hours
6	Marks Allotted:	50 Marks
7	Course Objectives(CO): CO 1: Define ecology and its importance in understanding interactions between organisms and their environment and understand the components of ecosystems, including biotic and abiotic factors. CO 2: The flow of energy and cycling of matter within ecosystems, define population ecology and describe factors influencing population dynamics. CO 3: Understand the concept of ecosystems and their functionality. CO 4: Evaluate the consequences of human-induced changes on biodiversity, climate, and ecosystem services. CO 5: To explore drivers of climate change and mitigation strategies and sustainable practices to reduce anthropogenic impacts.	

8	Course Outcomes (OC): Learner will be able to - OC 1: Analyze case studies highlighting ecological challenges and solutions at local, regional, and global scales. OC 2: Develop critical thinking skills to evaluate ecological issues, analyze data, and propose solutions. OC 3: Critically evaluate the effects of anthropogenic activities on ecosystems OC 4: Objectively assess and develop awareness on global issues of climate change. OC 5: Explore real-world applications of ecological principles in areas such as conservation biology, restoration ecology, and environmental policy.
9	Modules:- Module 1: ECOSYSTEM ORGANIZATION, STRUCTURE AND SERVICES Types of ecosystems: Terrestrial-Forests Grassland, Deserts, Tundra; Aquatic ecosystem-Freshwater, Marine (wetlands/benthic/coral) (3 lectures) Role of organisms and population in an ecosystem(1 lectures) Introduction to microbial ecology. Ecological succession. Biotic/abiotic components of an ecosystem. Producers, consumers, decomposers(4 lectures) Niche, Habitat, diversity; Food chains, Food webs, trophic levels etc. and their Pyramids.(3 lectures) Services like habitat, protection, enrichment, soil conservation, carbon sequestration, nutrient cycling etc. (4 lectures) Visit to ecosystems and museums in vicinity. Module 2: ANTHROPOGENIC IMPACTS & CLIMATE CHANGE Pollution and its types(2 lectures) Deforestation and habitat destruction; Ecosystem loss; Urbanization and land-use change(2 lectures) Alteration of biogeochemical cycles (carbon, nitrogen, and phosphorus), Socioeconomic impacts on indigenous and local communities(4 lectures) Climate change and its drivers (GHG emissions, fossil fuel use) & Climate change mitigation strategies, International treaties and agreements (e.g., Kyoto Protocol, Paris Agreement etc.).(5 lectures) Introduction to Environmental Impact Assessment (EIA).(2 lectures)
10	Text Books-
11	Reference Books 1. Odum, E.P. (1971) Fundamentals of Ecology. Third Edition, W.B. Saunders Co., Philadelphia, 1-574. 2. Odum, E. P., & Barrett, G. W. (2005). <i>Fundamentals of Ecology</i> (5th ed.). Cengage Learning. 3. Chapin, F. S., Matson, P. A., & Vitousek, P. (2011). <i>Principles of Terrestrial Ecosystem Ecology</i> (2nd ed.). Springer. 4. Wetzel, R. G. (2001). <i>Limnology: Lake and River Ecosystems</i> (3rd ed.). Academic Press. 5. Nybakken, J. W., & Bertness, M. D. (2005). <i>Marine Biology: An Ecological Approach</i> (6th ed.). Pearson. 6. Ricklefs, R. E., & Miller, G. L. (2000). <i>Ecology</i>. W.H. Freeman. 7. Explains population dynamics and species roles in ecosystems.

	8. Begon, M., Townsend, C. R., & Harper, J. L. (2006). <i>Ecology: From Individuals to Ecosystems</i> (4th ed.). Wiley-Blackwell. 9. Connell, J. H., & Slatyer, R. O. (1977). <i>Mechanisms of Succession in Natural Communities and Their Role in Community Stability and Organization</i>. The American Naturalist, 111(982), 1119–1144. 10. Costanza, R., d'Arge, R., de Groot, R., et al. (1997). <i>The Value of the World's Ecosystem Services and Natural Capital</i>. Nature, 387(6630), 253–260. 11. Daily, G. C. (1997). <i>Nature's Services: Societal Dependence on Natural Ecosystems</i>. Island Press.	
12	Internal Continuous Assessment: 40%	Semester End Examination: 60% (Refer format of Question paper Below) (Refer format of Question paper)
13	Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc.(at least 3)	

Evaluation Pattern

OE

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Continuous Evaluation through: Quizzes, Class Tests, presentation, project, role play, creative writing, assignment etc. (at least 3)	As per paper pattern	1h 30 minutes

QUESTION PAPER PATTERN (External and Internal)

Paper pattern as per scheme 1

Theory

Internal

Internal Continuous Assessment =20

Quizzes/MCQ/ Class tests/

Project/ Assignments/ oral presentation (poster /powerpoint (any three)

External

Format of Question Paper: 30 marks			
Q. No.	Description	Module	Marks
1	MCQ/Do as directed (Any 5 of 10)	1 and 2	05
2	Answer in Brief/ Long Answer Questions/Justify/Discuss /Long answer question -Any 2 of 4	1	10
3	Answer in Brief/ Long Answer Questions/Justify/Discuss /Long answer question - Any 2 of 4	2	10
4	Application Based Question (Can be divided in sub questions with internal options)	1 & 2	5
	Total		30

Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 -100	O (Outstanding)	10
8.00 - < 9.00	80.0 <90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 < 60.0	B(Above Average)	6
5.00 - < 5.50	50.0 < 55.0	C (Average)	5
4.00 - < 5.00	40.0 <50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Sd/-
Sign of the BOS
Chairman
Dr. Varsha Kelkar-
Mane
BOS in
Biotechnology

Sd/-
Sign of the
Offg. Associate Dean
Dr. Madhav R. Rajwade
Faculty of Science &
Technology

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Sign of the Offg. Dean
Prof. Shivram S. Garje
Faculty of Science &
Technology