



Established Under Gujarat Private Universities Act No. 9 of 2016

Syllabus for Master of Science

Microbiology

Subject Code: 02MB1404

Subject Name: Ecology and Evolution

M.Sc. Semester-I

Objective: Students are expected to have the advanced learning of Evolution and ecology. The course also discusses application of Population Ecology, Community Ecology and Evolution Mechanisms.

Course Credits: 6 credits

Course Outcomes: After completion of this course, student will be able to

- Understand that evolution entails changes in the genetic composition of populations
- Understand the Concept of habitat and niche.
- Describe the structure and function of ecological systems and explain how ecological systems work at different spatial and temporal scales.
- Understand the List Abiotic and biotic factors that affect, the distribution, dispersal and behavior of organisms.
- Understand the source of genetic variation and how it is shaped in the absence of selection (Hardy -Weinberg; genetic drift)

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal(I)/(CSE)	Viva (V)	Termwork (TW) /Practicals (P)	
4	4	0	6	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1	The Environment: Physical environment; biotic environment; biotic and Abiotic interactions; Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; Character displacement.	10
2	Population Ecology: Characteristics of a population; population growth curves; population regulation; Types of interactions, interspecific competition; herbivory; carnivory; pollination; symbiosis. Community Ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones. Ecological Succession Types; mechanisms; changes involved in succession; concept of climax.	12
3	Emergence of evolutionary thoughts Lamarck; Darwin–concepts of variation; adaptation; struggle; fitness and natural selection; Mendelism; Spontaneity of mutations; The evolutionary synthesis; Origin of basic biological molecules; Abiotic synthesis of organic monomers and polymers; Concept of Oparin and Haldane; Experiment of Miller (1953); The first cell; Evolution of prokaryotes; Origin of eukaryotic cells; Evolution of unicellular eukaryotes.	20
4	Evolution Mechanisms Population genetics – Populations, Gene pool; Gene frequency; Hardy-Weinberg Law; concepts and rate of change in gene frequency through natural selection; migration and random genetic drift; Adaptive radiation; Isolating mechanisms; Speciation; Allopatricity and Sympatricity; Convergent evolution; Sexual selection; Co-evolution.	18
	Total	60

References:

1. Ecology, Mohan. P. Arora, 2004. Himalaya publishing House. New Delhi.
2. A text book of Organic Evolution; Mohan P. Arora, , Himalaya publishing House, Edition 2013



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3. Evolution Ecology, by Eric R. Pianka. 5th edition. 1993. Harpercollins College publishers, USA.
4. Ecology: Theories and Application, Peter D. Stiling, Prentice hall. 2001. Pearson Publishers.

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.
- c. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.