Course Outcome:

Department of Microbiology

MB 501

Teachers: Dr. Manasi Tukdeo, Dr. Kirti Dahigaonkar

Class: M Sc Microbiology I

Pattern: 2013 Semester I

Course Outcome: Cos Microbial Diversity and Taxonomy

Students will be able to:

1. Explain Concept of speciation and species evolution
2. Explain Microbial diversity
3. Explain Taxonomy of Bacteria and Introduction to Bergey's Manuals
4. Explain Concept of 'unculturable' bacterial diversity.
5. Explain Strategies for culture of 'unculturable' bacteria.
6. Explain Culture independent molecular methods for identifying unculturable bacteria.
7. Explain Methods of extracting total bacterial DNA from a habitat and metagenome analysis
8. Explain Gene sequencing

MB 502

Teachers: Dr. Kirti Dahigaonkar, Dr. Manasi Tukdeo,

Class: M Sc Microbiology I

Pattern: 2013 Semester I

Course Outcome: Cos Quantitative Biology

Students will be able to:

1. Calculate Measures of central tendency, Measures of dispersion – Mean deviation Standard deviation and Variance, Measures of skewness; Measures of kurtosis, Regression and correlation
2. Explain the concepts of null hypothesis, alternate hypothesis, significance level, type I and type II errors, p-value, one tailed and two tailed tests
3. Calculate Distribution of sample means, standard error and confidence interval, Degrees of freedom
4. Calculate Equality of two population means, proportions by t-tests and z test
5. Perform chi square test - test for goodness of fit, independence and homogeneity;
6. Perform Non-parametric tests
7. Calculate Probability and describe Probability Distributions
8. Explain Modeling in Biology

MB 503

Teachers: Dr. Neelima Kulkarni, Mrs.Prajakta Taple.

Class: M.Sc I

Pattern: 2013 Semester I

Course Outcome: Cos Cell Organization and Biochemistry

Students will be able to:

1. Describe Structural features of amino acids and classify amino acids based on structure.
2. Describe preparation of amino acid buffers using Henderson Hasselbalch equation.
3. Describe partial double bond nature of peptide linkage
4. Describe steps involved in determination of primary structure of polypeptide and their application for solving problems on primary structure determination.
5. Describe use of MALDI-TOF and MS in protein sequencing,
6. Describe structural classification of proteins, primary, secondary, tertiary, quaternary structures of proteins with specific examples.
7. Describe Structure of Nucleic acid bases, nucleosides, nucleotides, phosphodiester linkages, 5' phosphate, 3'hydroxyl polarity of nucleic acids, tautomeric forms of bases and their implication in pairing of bases.
8. Describe structure of DNA (A, B and Z forms), t-RNA, r-RNA, and m-RNA and other RNAs
9. Describe Tm value and its application, Cot curves.
10. Describe Structural organization and function of: Cytoskeleton, Endoplasmic Reticulum, Golgi apparatus.
11. Describe Protein trafficking among various cellular compartments.
12. Describe Events in cell cycle, Regulation of cell cycle, mechanism and significance of apoptosis.
13. Localization of macromolecules using electron microcopy, Immunoelectron microscopy, and Confocal microscopy
14. Describe Conserved nature of development, Concepts of commitment, determination and differentiation, Morphogen gradients in developmental regulation, Hox code, MPF.
15. Describe steps of embryogenesis, Organizer and its importance in Drosophilla and Xenopus) model systems
16. Describe pattern formation in body axis, anterio-posterior and dorso-ventral polarity
17. Describe Life cycle of Dyctiostellium discoidum and myxobacteria.
18. Describe Molecular mechanism of quorum sensing in slime moulds, myxobacteria and specific examples of Gram positive and Gram negative bacteria,
19. Describe Biofilms, their organization, signals involved in their formation and dispersal, applications of study on biofilms in pathogenic and non-pathogenic environments
20. Describe The chemical structure and functions of each hormone in connection with the gland responsible for its production: The thyroid, parathyroid, pancreas, adrenals, pituitary glands, Sex hormones

MB 601

Teachers:

Class: M Sc Microbiology I

Pattern: 2013 Semester II

Course Outcome: Cos Instrumentation and Molecular Biophysics

Students will be able to:

1. Explain biomolecular separation and detection by chromatography, electrophoresis and centrifugation
2. Explain principles of operation, instrumentation of UV/Visible spectroscopy, Fluorescence spectroscopy, Infrared spectroscopy Circular Dichroism (CD) Mass spectroscopy
3. Explain principles of operation, instrumentation of X-ray crystallography
4. Explain principles of operation, instrumentation of NMR spectroscopy
5. Explain protein structure and folding
6. Explain various tools of bioinformatics

MB 602

Teachers:

Class: M Sc Microbiology I

Pattern: 2013 Semester II

Course Outcome: Cos Virology

Students will be able to:

1. Explain structure and replication of viruses
2. Explain cultivation and detection methods for viruses
3. Explain nomenclature & classification systems of viruses
4. Explain bacteriophage ecology
5. Explain bacteriophage therapy for control of bacterial poultry diseases
6. Explain morphology, genome organization and life cycles of DNA and RNA viruses
7. Explain effects of viruses on plants
8. Explain behavior of viruses in plants
9. Explain methods for detection of plant viruses
10. Explain transmission of plant viruses
11. Explain prevention of crop losses due to virus infection

MB 603

Teachers:

Class: M Sc Microbiology I

Pattern: 2013 Semester II

Course Outcome: Cos Microbial metabolism

Students will be able to:

1. Describe Purifications of enzyme, purification chart,
2. Describe kinetics of and derive kinetic equations for single substrate enzyme catalyzed reaction and reversible inhibitions of enzymes. Solve Problems to Dermine kinetic constants Km, Vmax and Ki.
3. Describe use of King Altman approach to derive – two substrate enzyme catalyzed reactions, types of two substrate enzyme catalyzed reactions,
4. Describe concept of allosterism, positive and negative co-operativity,models of allosteric enzymes (Monod, Wyamann and Changuax model, Koshland, Nemethy and Filmer model), examples of allosteric enzymes and their significance in allosteric regulation.
5. Derive kinetic equation for kinetics of allosteric enzyme, Hill plot.
6. Describe Laws of thermodynamics, entropy, enthalpy, free energy, free energy and equilibrium constant,Gibbs free energy equation, Problem solving on determination of free energy of hydrolytic and biological oxidation reduction reactions, under standard and non-standard conditions,
7. Describe high energy compounds with specific examples and their application in coupled reactions, determination of feasibility of reactions,
8. Describe Atkinson's energy charge, phosphorylation potential and its significance.
9. Describe oxidative phosphorylation in details. inhibitors and un-couplers of electron transport chain and oxidative phosphorylation.
10. Describe Concept of anaerobic respiration, components of electron transfer system and energy generation of bacteria where nitrate, sulfate and carbonate acts as terminal electron acceptors
11. Describe the composition and architecture of membranes, Membrane dynamics,
12. Describe Solute transport across membranes: Passive diffusion, facilitated transport, primary and secondary active transport using P , V and F type ATPases, Ionophores, Ion mediated transport, transport of ions across membranes (ion pumps), ligand and voltage gated ion channels.
13. Describe structure and significance of liposomes and model membranes.
14. Describe Structure of chloroplast, electron carriers in photosynthesis, Organization of photosystem I and II, light and dark reaction, energy consideration in photosynthesis,
15. Describe cyclic and non-cyclic flow of electrons, Z scheme, Hill reaction, photolysis of water.
16. Describe the features of photosynthesis in C3, C4, CAM plants, photorespiration, Regulation of photosynthesis.
17. Describe Bacterial photosynthesis with respect to scope, electron carriers, Photosynthetic reaction center, cyclic flow of electrons, bacterial photophosphorylation in various groups of phototrophic bacteria, electron donors other than water in anoxygenic photosynthetic bacteria.

MB 701

Teachers: Ms. Yogini Kanade, Dr. Gauri Phadke

Class: M Sc Microbiology II

Pattern: 2013 Semester III

Course Outcome: Cos Immunology

Students will be able to:

1. Explain structure and function of cell receptors.
2. Explain structure and function of signal transduction path way.
3. Explain the mechanism of self-tolerance and clonal deletion.
4. Explain cytokine families and cytokine mediated cross regulation of T_H sub set.
5. Explain different methods of animal cell culture and media used for it.
6. Explain cytokine assays.
7. Explain uses of different experimental animals.
8. Explain types of tumors and tumor surface markers.
9. Explain concept of surveillance and escape of tumor cells.
10. Explain theory of autoimmunity and pathophysiology, symptoms and treatments for immunodeficiencies.

MB 702

Teachers: Dr.Gauri Phadke, Ms. Yogini Kanade

Class: M Sc Microbiology II

Pattern: 2013 Semester III

Course Outcome: Cos Molecular Biology I

Students will be able to:

1. Explain method and importance of different molecular techniques.
2. Explain concept of operon and different levels of controlling gene expression in prokaryotes.
3. Explain steps involved and significance of RNA processing in prokaryotes and eukaryotes.
4. Explain families of transposable elements and their significance.
5. Explain concept of metabolomics and proteomics.
6. Explain various molecular diagnostic tools used in the detection of cancer.
7. Explain different types of PCR with their applications.

MB 801

Teachers: Dr. Gauri Phadke, Ms. Yogini Kanade

Class: M Sc Microbiology II

Pattern: 2013 Semester IV

Course Outcome: Cos Pharmaceutical and Medical Microbiology

Students will be able to:

1. Explain steps involved in drug discovery.

2. Explain methods for screening of antimicrobial properties of compounds.

3. Explain types and mechanisms of bacterial pathogenicity and concept of bacterial resistance.

4. Explain quantitative methods for assessment of antimicrobial activity of drugs.

5. Explain GMP, GLP and safety measures.

6. Explain role of regulatory authorities and importance of pharmacopeia.

7. Explain concept of biological warfare.

MB 802

Teachers: Ms. Yogini Kanade, Dr. Gauri Phadke

Class: M Sc Microbiology II

Pattern: 2013 Semester IV

Course Outcome: Cos Molecular Biology II

Students will be able to:

1. Explain concept of eukaryotic and bacterial SNPs.
2. Explain gene cloning strategies and their applications.
3. Explain applications of recombinant DNA technology.
4. Explain approaches to produce GMOs and their applications in different fields.
5. Explain concept and applications of bioremediation.
6. Explain concept of genome project and its applications.

1. Department: Microbiology

A. Name of the Head of the Department: Mrs. Sneha Ogale

B. Program Specific Outcome. (PSO)-UG

Sr	Objectives/ Outcomes
1	To enrich students' knowledge and train them in various branches of Microbiology such as Medical Microbiology, Genetics and Molecular Biology, Biochemistry, Immunology, Fermentation Technology; Air, Water, Food and Soil Microbiology.
2	To introduce the concepts of application and research in Microbiology
3	To understand basic microbiological concepts and perform following procedures as per laboratory standards 1) Aseptic techniques 2) Preparation of reagents and nutrient media 3) Isolation, characterization and maintenance of bacterial cultures 4) Production of biofertilizers 5) Microbial analysis/ Quality Control testing of samples such as soil, water, milk and injectibles. 6) Biochemical and molecular biology techniques, enzyme assays, chromatography, electrophoresis. 7) Antibiotic sensitivity testing and hematological techniques. 8) Basic computer literacy
4	To inculcate sense of scientific responsibilities and social and environmental awareness
5	To help students build-up a progressive and successful career

C. Program Specific Outcome. (PSO) -PG

Sr	Objectives/ Outcomes
1	To enrich specific knowledge in areas like Cell Biology, Biochemistry, Biostatistics and Bioinformatics, Biophysics and Instrumentation, Virology, Molecular Biology, Pharmacology, Waste Water Microbiology, Immunology and Microbial Technology.
2	To understand basic microbiological concepts and perform following procedures as per laboratory standards 1) Isolation and characterization of microbes belonging to different taxonomic groups and ecological niches.

	2) To develop the expertise to use and handle various instruments used in Microbiology laboratory as per SOPs. 3) Molecular biology and immunological techniques 4) Literature survey, design and execution of plans and protocols for experimentation, data analysis and interpretation, scientific communication as part of dissertation. 5) Basic statistics and bioinformatics required for life sciences. 6) Presentation skills and Team work
3	To inculcate sense of scientific responsibilities and social and environmental awareness.
4	To help students build-up a progressive and successful career.