FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology

Semester-I

Paper-I: Bacteriology

Code: MMB 101

UNIT-I

History, scope and development of bacteriology, sterilization, isolation, enrichment, pure culture and staining techniques, systematic study of bacteria; morphological, physiological, biochemical and serological studies.

UNIT-II

Habitat, structure, reproduction & classification of bacteria (morphological, biochemical, serological, chemical and molecular aspects), Actinomycetes, Mycoplasma, Rickettsiae, Chlamydiae and their significance.

UNIT-III

The photosynthetic bacteria; cyanobacteria, green bacteria, halobacteria and their economic importance. Methanogenic bacteria and their significance. Chemoautotrophs and Methylotrophs; nitrifying bacteria, sulfur oxidizers, iron bacteria, hydrogen bacteria and their economic importance.

UNIT-IV

Enterobacteriaceae and related organisms, their morphological & physiological characters, genetic interrelationship, taxonomic sub-division & their importance in human health. Myxobacteria, cytophage group, filamentous & gliding chemoheterotrophs & filamentous sulphur oxidizing bacteria.

UNIT-V

Gram positive spore forming bacteria; unicelluar endospore formers- Bacillus, Clostridia. Miscellaneous bacteria; lactic acid bacteria, Micrococci, Corynebacteria, Mycobacteria.

Text Books

Text Book of Microbiology : RC Dubey and Maheshwari
The Fundamentals of Bacteriology: Charles Bradfield Morrey

FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology

Semester-I

Paper-I: Virology

Code: MMB 102

UNIT-I

General virology: History and development of virology, origin, properties, ultrastructure and chemistry of viruses. virus related agents (viroids, prions), significance of viruses.

UNIT-II

General methods for isolation, identification, characterization and cultivation of viruses: Methodology for isolation, adsorption, One-step growth and burst size of virus. Determination of titre value, isolation of phage resistant strain, cultivation and maintenance of plant, animal and bacterial / cyanobacterial viruses. identification of viruses by physical, chemical and serological techniques.

UNIT-III

Bacterial/ cyanobacterial viruses: Structure and multiplication of lytic and lysogenic bacteriophage. Significance of lysogeny. Brief account of M13, Mu, T4 and λ, history, structure, genetics and life cycle of cyanophages, significance of bacteriophages and cyanophages.

UNIT-IV

Plant viruses: classification and nomenclature, structure and multiplication of plant viruses with special reference to TMV, cauliflower mosaic virus, effect of viruses on plants. Some common viral diseases of plants (TMV, CMV, leaf Curl of papaya). Transmission of plant viruses and control of viral diseases of plants.

UNIT-V

Animal viruses: Classification and nomenclature of animal and human viruses. Brief account of Adeno-, Herpes, Hepatitis, HIV and other oncogenic viruses. Prevention, treatment and control of viral diseases. Viral vaccines including DNA vaccines and interferons.

Text Books

Basic Virology : Elliott J. Blumenthal
Microbiology : Powar and Daginawala **Textbook of Virology** : Vinod Singh

FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology
Semester-I
Paper-I: Mycology
Code: MMB 103

UNIT-I

Status of fungi in the living world, general features of fungi and fungus like organisms; recent trends in the classification of fungi; physiology and growth of fungi; nutritional and environmental factors affecting growth; saprotrophs, parasites and mutualistic symbionts; physiology of reproduction in fungi, phylogeny of fungi.

UNIT-II

Fungal diversity-major taxonomic group, structure, reproduction, life cycle and significance of the following representatives: i) Gymnomycota-general account – cellular slime moulds (Dictyostelium), plasmodial slime moulds (Myxomycetes). ii) Mastigomycota- Coelomomyces, Lagenidlum, Achlya, Phytophthora, Peronospora, Plasmodiophora. iii) Amastigomycota-Zygomyocotina- Mucor, Syncephalastrum, Blakeclea, Cunninghamella, Entomophthora.

UNIT-III

Fungal diversity contd. structure, reproduction, life cycle and significance of the following representatives: i) Ascomycotina- Taphrina, Emericeilla, Chaetomium, Morchella, Neurospora, Claviceps, Erysiphae. ii) Basidiomycotina- Puccinia, Melamspora, Ustilago, Polyporus, Lycoperdon, Ganoderma. iii) Deutromycotina- Fusarium, Cercospora, Curvularia, Beauveria, Microsporum, Phoma, Collectotrichum.

UNIT-IV

Fungal genetics: i) Life cycle and sexual process in fungi; structure and organization of fungal genomes (mitochondrial genes, plasmids and transposable elements, virus and viral genes). ii) Genetic variations in fungi- nonsexual variations-haploidy, heterokaryosis, parasexuality; sexual variations- mating or breeding systems- homothallism and heterothallism, mutation, physiological specialization; strain improvement.

UNIT-V

Fungi and biotechnology: production of alcoholic beverages, antibiotics, organic acids, ergot alkaloids; the cultivation of fungi for food-mushrooms, myco protein and mycofoods; role of fungi in agriculture and forestry- mycorrhizae and their application, mycopesticides, mycotoxins, conservation of fungal germplasm.

Text Books

Introductory Mycology : C J Alexopoulos C W Mims
Textbook of Mycology : SR Mishra

FACULTY OF SCIENCE AND COMPUTER SCIENCE

M.Sc. Microbiology
Semester-I
Paper-I: Microbial Biochemistry
Code: MMB 104

UNIT- I

Structure of water and its solvent properties. Acid base pH and buffer: mono-, bi- and polyprotic buffer. Free energy and spontaneity of reactions. ATP and other phosphorylated compound with their free energy of hydrolysis, phosphoryl group transfer; biological oxidation reductions reaction; coupled reaction and oxidative phosphorylation, inhibitors and uncouplers.

UNIT – II

Enzyme classification, specificity, active site. Enzyme kinetics Michealis Menton equation, determination of kinetic parameters. Bi-substrate reaction and their kinetics. Enzyme inhibition and kinetics. allosteric enzyme, kinetics, and allosteric regulation of phospho fructo kinase

UNIT – III

Structure and chemistry of macromolecules: proteins, carbohydrates and lipids; protein folding; structure and chemistry of biomolecules such as antibiotics; pigments, vitamins as coenzymes; lipid analysis by GLC and mass spectrometry; oligosaccharide and polysaccharide analysis.

UNIT – IV

Biosignaling- Molecular mechanism of signal transduction; gated ion channels, nicotinic- acetyl choline receptor; receptor enzyme- the insulin receptor; G- proteins and cyclic AMP; membrane transport- biomembrane, nutrient transport across membranes, active and passive diffusion, symport, antiport and uniport, Na+ K+ pumps and their metabolic significance.

UNIT – V

Chromatographic technique- paper and TLC, gel filtration, ion-exchange, affinity; HPLC SDS-PAGE, isoelectric focusing, Westerns blotting; protein sequencing, mass spectrometry, MALDITOF– MS.

Text Books

Text Book of Biochemistry	:	Lehninger and Damodaran M. Vasudevan
Biochemistry	:	Manisha Bansal