# MANGALORE UNIVERSITY

## DEPARTMENT OF BIOCHEMISTRY

## MSc BIOCHEMISTRY - III SEMESTER

### SOFT CORE BCS 405 GENERAL MICROBIOLOGY

**Total number of lecturehours:42**
**Total number of credits: 03**

**Course objectives**

- To have an overall picture of Microbiology with the background of historical aspects.
- To know the techniques used in microbiology laboratories.
- To understand various microbes by their classification, properties, life cycles, growth media and soon.
- To cultivate and control microorganisms.

**Course outcome**

- Student would learn the existence of microorganisms around us. This would facilitate each student to have awareness about havoc caused by pathogenic microbes present in the surrounding atmosphere.
- Student would be able to differentiate between the useful and harmful microorganisms.
- He /She would learn the structure and functions of microscopic organisms.

**Unit I** **4hrs.**

Introduction to Microbiology – Scope of Microbiology - Ancient Microbiology - Refutation of a biogenesis: discovery of penicillin: discovery of vaccination: proposal of one gene one enzyme hypothesis - Major contribution of scientists– Leeuwenhock, Edward Jenner, Alexander - Flemming, Joseph Lister, Robert Koch, Louis Pasteur, Hargobind Khorana. Modern Microbiology-Landmark achievements in 20th century-Microbial Taxonomy-Definition and systematics, Nomenclatural rules and identification. Haeckel's three kingdom classification.

Role of Microorganisms in Nature, Sterilization Techniques (Physical and Chemical methods) Microscope: Principles and working of Bright Field Microscope, Dark Field Microscope, Florescent, Phase Contrast, Confocal Microscopy, Electron Microscopy, Microscope (SEM and TEM), Instruments in Microbiology

**Unit II** **14hrs.**

Biology of Microorganisms: Differences between prokaryotic and eukaryotic cell. Biology of bacteria - cell structure, size, shape, arrangement membrane, cell wall, cytoplasmic inclusions, mesosomes, flagella and motility, slime, capsule, pili, chemotaxis, endospore - biology of fungi, structure, physiology and classification – biology of yeast – reproduction - virus (bacteriophages) structure, life cycle (lytic and lysogenic) – biology of algae – Mycoplasma – prions.

Microbial nutrition: Microbial nutrient requirements – macro-nutrients, micro-elements – growth factors - sources of nutrients – nutritional classification of bacteria - Phototroph, Chemotroph, Autotroph (lithotroph), Heterotroph (organotroph), Photoautotroph, Photoheterotroph, Chemoautotroph, Chemoheterotroph - Nutritional patterns of pathogens - Saprophytes - Auxotroph

**Unit III** **14 hrs.**

Extremophiles: Diversity of microorganisms of arctic, Antarctic and hydrothermal vents – Archaeal biology - Acidophile, Alkaliphile, Anaerobe, Cryptoendolith, Halophile, Hyperthermophile, Hypolith, Lithoautotroph, Metal-tolerant microbes, Oligotroph, Osmophile, Piezophile, Polyextremophile, Psychrophile/Cryophile, Radioresistant, Thermophile, Thermoacidophile, Xerophile – mechanism of extremophiles.

Cultivation and control of microbes: Types of growth media (natural, synthetic, complex, enriched, selective- definition with example), pure culture methods (streak plate, spread plate, pour plate, stab culture, slant culture). Anaerobic (thioglycolate, anaerobic chamber, Robertson's media, microaerophilic), liquid shake culture of aerobic bacteria Control of microbes- Sterilization, disinfection, antiseptic, tyndallisation, pasteurization: Physical- dry heat, moist heat, UV light, ionizing radiation, filtration, HEPA filter, Chemical methods. Biofilms & Quorum Signaling.

**REFERENCES:**


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2. Ginsberg (1990). Microbiology (4th edition). J. B. Lippincott company, New York.
3. Heritage, J. Evans E.G.V. and Killington, R.A. (1996). Introductory Microbiology. Cambridge University Press.
4. Prescott LM Harley JP and Klein DA (2006). Microbiology (7th edition) McGraw Hill, NewYork.
5. Schaechter M and Leaderberg J (2004). The Desk encyclopedia of Microbiology. Elseiver Academic Press, California
6. Elizabeth Moore-Landecker. (1996). Fundamentals of the fungi (4th edition). Prentice Hall International, Inc, London.
7. Madigan MT Martinko.JM and Parker J Brock TD (1997). Biology of Microorganisms (8th edition). Prentice Hall International Inc, London