## 2nd Year, Semester III

## Microbiology (B201)

**Course Title : Microbiology**
**Course Code : B201**
**Credits : 8 Credits**
**Course Category : Core**
**Course Prerequisites : No prerequisites**
**Contact Hours (28/42/56) : 56**
**(including tutorials)**

**Outcome of the Course:**

- Microbiology as a science.
- Key concepts in Microbes in health & disease.
- Overview of role of microbes in nutrient cycling
- Implications in Evolution, Health and disease.

**Course Contents:**

1. Development Microbiology as a science and Microbial world (6 Lectures + 2 Tutorials)
   - Microbial diversity: Microbial evolution and systematic, Eukaryotic microorganisms – Protists, Fungi, Unicellular red & green algae. Overview of viruses and their classification, overview of viral replication, Prions – non-microbial infectious agent
   - Cell structure and function of bacteria, archaea and eukaryotic microorganisms
   - Role of microorganisms in understanding biological systems
2. Microbial nutrition and physiology: (7 Lectures + 2 Tutorials)
   - Metabolic diversity – Phototrophy, Autotrophy, Chemolithotrophy and Nitrogen fixation
   - Catabolism of organic compounds – fermentations, anaerobic respiration & aerobic chemorganotrophic processes.
   - Microbial growth
3. Microbial genetics: Overview (6 Lectures + 2 Tutorials)
   - Bacterial genetics – chromosomes, plasmids & incompatibility, mutation, genetic exchange in prokaryotes – transformation, conjugation, transduction
4. Microbes in health & disease: (8 Lectures + 2 Tutorials)
   - Beneficial microbial interactions with humans,
   - Harmful microbial interactions with humans: host-parasite interactions, overview of host defense system, pathogenesis & infection establishment, Virulence factors & toxins.
   - Brief overview of antibiotics, antibiotic resistance & their mechanism of action
5. Microbes in agriculture: Overview (5 Lectures + 2 Tutorials)
   - Microbial diseases of economically important plants
   - Agrobacterium and crown gall disease, Transformation
6. Microbes in environment: (6 Lectures + 2 Tutorials)
   - Brief overview of role of microbes in nutrient cycling
   - Microbial bioremediation: leaching of ores, mercury & heavy metal transformation, petroleum degradation, biodegradation of xenobiotics
   - Animal-microbial symbiosis: rumen and ruminant animals,
   - Plant-microbial symbiosis: Lichens- mycorrhizae, Agrobacterium and crown gall disease, Legume-root nodule symbiosis
7. Microbes in industry: Brief over view of their roles in: (4 Lectures + 2 Tutorials)
   - Food, health and fermentation sectors

**Recommended Books:-**

a) Brock's Biology of Microorganisms by Madigan et al.
b) Microbiology by Prescott et al.
c) Class notes, handouts and other reading as suggested during the class.

**Suggested References:**

Relevant research articles with updates in knowledge as decided by the Instructor