

LS 503A**Microbial Physiology****2 Credits**

Name of the Faculty: Prof. A. K. Johri*, Dr. Vikas Yadav, Dr. Stanzin Dawa

S.No.	Topic	Faculty Name/Contact Hours
1.	Microbial growth and nutrition: Nutrient uptake into cells, concepts of media design, cultivation and isolation of microorganisms by enrichment. Effect of nutrients and environmental factors on growth rate, manipulation of microbial growth for human welfare purposes.	AKJ/3
2.	Microbial metabolism: Biosynthesis and degradation of biomolecules involving metabolic pathways to maintain microbial structural integrity and its functioning. Understanding of metabolomics, metabolic engineering in the context of human welfare.	VY/3
3.	Soil microbiology and biogeochemical cycles: carbon, nitrogen, sulphur and phosphorus cycles, nitrogen fixation and its role in crop improvement. Microbial mat communities and biofilms, biomass, and biomarkers.	VY/3
4.	Microbial physiology in the context of environment: Genetic and metabolic engineering of microorganisms for improved biodegradation and detoxification of toxic and recalcitrant compounds.	AKJ/2
5.	Fermentation technology: Exploitation of microbial metabolism in food technology, distilleries, enzymes, antibiotics and antimicrobial secondary metabolites, and alternative energy sources etc.	AKJ/3
6.	Microbe-microbe interaction: Positive and negative interactions, competition, synergism, commensalism, understanding of microbial immunity in the context of CRISPR/Cas system, microbial toxins.	SD/3
7.	Beneficial symbiotic association: Establishment of symbiosis, protection, types of symbiosis, microbe-plant symbiosis, microbe-animal symbiosis.	SD/3
8.	Human microbe interaction: Mechanism of microbial pathogenesis, innate-host defenses, adherence and penetration, colonization, virulence factors.	AKJ/2
	Microbiome: human microbiome and infectious disease, microbiome and metabolic disorders, microbiome and brain disorders microbiome and Disbiosis	SD/2 AKJ/1
9.	Food Microbiology: Food and disease, industrial food canning, aseptic packaging, radiation and industrial food preservation, microorganism and food production, dairy microbiology	SD/3 AKJ/1
10.	Vaccines: Use of bioinformatics, genomics, and proteomics for the vaccine development against important human pathogens: fungi, bacteria, and viruses.	AKJ/3

Further Reading:

1. Microbial Life: Perry, Staley and Lory
2. Microbiology An Introduction: Tortora, Funke and Case