

Optional course

LS 509 Microbial Physiology (2 credits)
A K Johri*, Sneh Lata Panwar, Vikas Yadav

S No	Topic	faculty	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	4
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 context human welfare.	VY	3
3.	Soil microbiology and biogeochemical cycles: carbon, nitrogen, sulphur and phosphorus cycle, nitrogen fixation and its role in crop improvement. Microbial mat communities and biofilms, biomass and biomarkers.	VY	3
4.	Microbial physiology in 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	4
6.	Microbe-microbe interaction; Positive and negative interactions, competition, synergism, commensalism, understanding of microbial immunity in context of CRISPER/Cas system, microbial toxins.	SLP	3
7.	Beneficial symbiotic association: Establishment of symbiosis, protection, types of symbiosis, microbe-plant symbiosis, microbe-animal symbiosis.	SLP	4
8.	Human microbe interaction: Human microbiome, pathogenesis mechanisms, innate-host defences, adherence and penetration, colonization, virulence factors.	AKJ	3
9.	Viruses: origin of viruses, viral restriction and modifications, viral diseases of humans, viral infections and mechanism of action.	AKJ	3
10.	Vaccines: Use of bioinformatics, genomics and proteomics for the vaccine development against important human pathogens: fungal, bacteria and viruses	AKJ	3

Books

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