BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
INSTRUCTION DIVISION
SECOND SEMESTER 2016-2017

02.08.2016

Course Handout

Course No. : BIO G523
Course Title : Advanced & Applied Microbiology
Instructor In-charge : Prabhat Nath Jha
Instructor : Sandhya Amol Marathe, S.N. Mukhopadhyay

1. Course of Description: Molecular taxonomy, Systematic Microbiology, Study of molecular diversity of microorganisms, Molecular tools employed in study of microbial ecology, clinical microbiology, human-microbe interaction, molecular plant-microbe interaction, applied microbiology, nanotechnology and synthetic microbiology.

2. Scope & Objective of the Course:

This course deals with in-depth study of microbial taxonomy and evolution as well as the molecular aspects of microbe-host interactions. In addition, it includes applied aspects of microorganisms being utilized in industry and human-health. It also emphasizes on recent development in microbial genomics, nanotechnology and biotechnology.

3. Text Book (TB):

Madigan M.T., Martinko J.M., Stahl D.A., Clark, D.P. (2012). Brock Biology of Microorganism, 13th Ed., Pearson International Education

4. Reference Book (RB):

1. Wiley, J.M., Sherwood, L.M., Woolverton, C.J. (2007). Prescott, Harley, and Klein's Microbiology, 7th Ed. McGraw-Hill International Edition.
2. Glazer, A.N. and Nikaido, H. (2008). Microbial Biotechnology, Fundamentals of applied Microbiology, 2nd Ed., Cambridge.

5. Course Plan:

Lec. No.	Learning Objectives	Topic to be covered	Ref. to Chapters
1	Introduction to the course		
2-4	Bacterial Evolution and Systematics	Microbial Evolution, Chemical and molecular methods for identification, microbial nomenclature	TB-16, RB1-19
5-9	Microbial Ecology and Environmental Genomics	Factors determining Microbial Ecology, Culture- dependent and independent analysis of microbial communities, metagenomics, stable isotope probing, Application of metagenomics in bioprospecting of drugs and enzymes.	TB-22, 23. Reviews
10-12	Socio-microbiology	Quorum-sensing; prospective application of quorum-sensing mechanisms in medicine, Biofilm	Reviews
13-17	Medical Microbiology-1	Microbial interactions with human, normal microbiota in human, host-parasite interaction, pathogenicity of microorganisms	TB-27, RB1-33, Reviews
18-19	Medical Microbiology-2	Anitmicrobial chemotherapy, drug resistance	RB1-34
20-21	Microorganisms for Sustainable Agriculture	Plant growth promoting microorganisms; Associative bacteria, Endophytic bacteria:	RB-129 TB-25

		mechanisms of colonization; Biocontrol; Mycorrhiza	
22-23	Molecular Plant-Microbe interaction-1	Molecular basis of legume-rhizobia interaction, plant-pathogenic bacteria interaction, plant-micorrhiza interaction	RB1-29 TB-25
24-25	Molecular Plant-Microbe interaction-2	Plant immune response: Molecular aspects	Reviews
26-28	Molecular Tools for host-microbe interaction studies	Techniques used for study of host-microbe interaction	Reviews
29-30	Microbes as therapeutic & research tool	Pathogen in cancer, vaccine improvement, CRISPR-Cas gene editing	Reviews
31-32	Microbial Biosensors	Biosensors	Reviews
33-34	Synthetic Microbiology	Synthetic microorganism and its application	Reviews
35-38	Industrial microbiology	Biotransformation, Bioprospecting of natural enzymes for industrial use, Protein engineering; large scale biocatalytic processes, Primary and secondary metabolites, fermented foods, beverages, Enzymes, Single cell protein Bioplastics	RB2-8, RB2-11,
39-40	Microbes & fuel generation	Microbial biofuel (ethanol and other biofuel), Application of Metabolic engineering in fuel generation	RB2-13, Reviews

7. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue	Remarks
1.	Mid Semester Test	90 min	30	<TEST_1>	CB
2.	Quiz/Assignments		30		CB/OB
3.	Comprehensive	3 hours	40	<TEST_C>	Partly OB

Chamber consultation hour: To be announced in the class.

Notices: All notices will be displayed on the Dept. of Biological Sciences notice board.

Make-up policy: Make-up decisions will be made on a case-by-case basis and only genuine cases as determined by the team and validated by Wardens and/or Medical Officer will be considered. No make-up for Lab component and Quizzes.

Instructor-in-charge
BIO G523