BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
INSTRUCTION DIVISION
FIRST SEMESTER 2015-2016

Dated: 03/08/2015

Course Handout

Course No. : BIO G523
Course Title : Advanced & Applied Microbiology
Instructor In-charge : Prabhat Nath Jha
Instructor : Jitendra panwar, 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., Dunlap, P.V., Clark, D.P. (2009). Brock Biology of Microorganism, 12th Ed., Pearson International Education

4. Reference Book (RB):
(i). Wiley, J.M., Sherwood, L.M., Woolverton, C.J. (2007). Prescott, Harley, and Klein's Microbiology, 7th Ed. McGraw-Hill International Edition.
(ii). 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	Introduction to the course	
2-5	Bacterial Evolution and Systematics	Microbial Evolution, Chemical and molecular methods for identification, Microbial Systematics and taxonomy.	TB-14, RB (i)-19
6-9	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
13-16	Medical Microbiology-1	Microbial interactions with human, normal microbiota in human, host-parasite interaction, pathogenicity of microorganisms	TB-28, RB(i)-33, Reviews
17-18	Medical Microbiology-2	Anitmicrobial chemotherapy, drug resistance	RB-34
19-21	Microorganisms for Sustainable Agriculture	Plant growth promoting microorganisms; Associative bacteria, Endophytic bacteria:	RB(i)-29 TB-24

		mechanisms of colonization; Biocontrol; Mycorrhiza	
22-24	Molecular Plant-Microbe interaction-1	Molecular basis of legume-rhizobia interaction, plant-pathogenic bacteria interaction, plant-micorrhiza interaction	RB(i)-29 TB-24
16-17	Molecular Plant-Microbe interaction-2	Plant immune response: Molecular aspects	Reviews
24-25	Molecular Tools for host-microbe interaction studies	Techniques used for study of host-microbe interaction (IVET, STM, DFI)	TB-32 Reviews
26-27	Biocatalysis: Microbial prospects	Biotransformation, Bioprospecting of natural enzymes for industrial use, Protein engineering; large scale biocatalytic processes;	RB(ii)-11
28-29	Bioplastics	Microbial polysaccharides and Polyesters	RB(ii)-8
30-31	Microbial Biosensors	Biosensors	Reviews
32-33	Recent advances	Microbial Nanotechnology and applications	RB(i)-41
34-35	Synthetic Microbiology	Synthetic microorganism and its application	Reviews
36-37	Application of Microbiology in food & Beverages	Primary and secondary metabolites, fermented foods, beverages, Enzymes, Single cell protein	TB-25
38-40	Microbes & fuel generation	Microbial biofuel (ethanol and other biofuel), Application of Metabolic engineering in fuel generation	RB(ii)-13, Reviews

7. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue	Remarks
1.	Mid Semester Test	90 min	30	6/10 10:00 - 11:30 AM	CB
2.	Quiz/Assignments		20		CB
3.	Seminar		10		OB
4.	Comprehensive	3 hours	40	3/12 AN	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