BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
SECOND SEMESTER 2019-20

Dated: 07.1.2020

Course Handout Part II

Course No. : BIO G523
Course Title : Advanced & Applied Microbiology
Instructor In-charge : JAYATI RAY DUTTA
Instructors : Jayati Ray Dutta, Naresh Patnaik & Rolly Kumari

1. Course 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 microbiology for in industry and human-health. It also emphasizes on recent developments in microbial genomics, nanotechnology and biotechnology.

3. Text Book (TB):
Madigan M.T., Martinko, J.M., Dunlap, P.V., Clark, D.P., Brock, Biology of Microorganism, 12th Ed., 2009, Pearson International Education.

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

5. Course Plan:

Lec. No.	Learning Objectives	Topic to be covered	Ref. to Chapters
1-4	Bacterial Evolution and Systematics	Microbial Evolution, Microbiology Systematics, Microbial taxonomy	TB-14, RB1-19
5-6	Molecular biology of Archaea	Molecular biology of Archaea, DNA replication, Transcription and RNA processing, protein synthesis, shared features of Bacteria and Archaea	TB-8
7-9	Socio-microbiology	Quorum-sensing; prospective application of quorum-sensing mechanisms in medicine, biofilm	TB-9, 23
10-13	Microorganisms for Sustainable Agriculture	Plant growth promoting microorganisms; Associative bacteria, Endophytic bacteria: mechanisms of colonization, various plant growth promoting properties; Biocontrol: Mycorrhiza	RB1-29 TB-24

14-17	Molecular Plant-Microbe interaction-1	Molecular basis of legume-rhizobia interaction, plant-pathogenic bacteria interaction	RB1-29 TB-24
18-21	Molecular Plant-Microbe interaction-2	Plant immune response: Molecular aspects	Reviews
22-26	Medical Microbiology	Microbial interactions: Microbe-human interaction, normal microbiota in human; Host-parasite/pathogen interaction; Pathogenicity of Microorganisms, Antimicrobial Chemotherapy,	TB-28, RB1-33 RB1-34 and relevant reviews
27-28	Microbial Biosensors	Biosensors and their applications	RB1-35
29-34	Synthetic Microbiology	Synthetic / engineered microorganisms and their applications	Reviews
35-36	Industrial Microbiology	Microbial polysaccharides and Bioplastics	RB2-8
37-38	Food Microbiology	Primary and secondary metabolites, fermented foods, beverages, Enzymes, Single cell protein	TB-25
39-41	Microbes & fuel generation	Biomass production, Bioethanol/biodiesel production from different microbial sources.	Reviews

7. Evaluation Scheme:

EC No.	Evaluation Component	Duration	Weightage (%)	Date, Time & Venue	Remarks
1.	Mid-semester	90 min	20	2/3 11.00 -12.30 PM	CB
2.	Lab practical (Evaluation components include: 1. Laboratory quiz based on experiments conducted during class + Attendance 2. Comprehensive Written test 3. Minor project		20		OB
3.	Presentations/ assignments		20		OB
4.	Comprehensive	3 hours	40	01/05 AN	CB

8. Chamber consultation hour: To be announced in the class.

9. Notices: All notices will be displayed on Course management system.

10. Make-up policy: Make-up decisions will be considered for only genuine cases and validated by proper evidence of illness. No make-up for Lab component and assignments.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge
BIO G523