BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, Pilani

Pilani Campus

AUGS/ AGSR Division

SECOND SEMESTER 2020-2021

COURSE HANDOUT (PART II)

Date:

In addition to part I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : **BIO F212**
Course Title : **Microbiology**
Instructor In-charge : **PRABHAT NATH JHA**
Team of Instructors : **Sandhya Marathe, Simran Kushwaha, Divya Malik, Yash Katakia, Niyati Pandya, Palak Sangal, Sampriti Tahbildar**

1. Course Description: Introduction and classification of microbes; isolation, cultivation, physiological and biochemical characterization of microbes; structure, physiology and genetics of microbial cell; synthetic microbiology; host parasite relationship; physical chemical methods of controlling microbes; antimicrobial drugs; clinical microbiology; microbiology of soil, water and food; and related lab components.

2. Scope & Objective of the Course: This course deals with the structure, physiology, genetics and growth of various microorganisms as well as their control. Emphasis will be given on microbes and their role in human health, environment and industry.

3. Text Book (TB):

Tortora, G.J., Funke, B.R. and Case, C.L. 2016. Microbiology: An Introduction, 11th Ed., Pearson India Education Services Pvt. Ltd. India

4. Reference Book (RB):

Willey, J.M., Sherwood, L.M. and Woolverton, C.J. 2017. Prescott, Harley and Klein's Microbiology, 7th Edition, The McGraw-Hill Companies Inc., New York.

5. Lab Manual:

Experimental write-ups will be provided.

6. Course Plan:

Module No.	Lecture/ Tutorial Session	Reference	Learning Outcome
1. Course lay out and introduction to microbiology	L 1-2. The microbial world	TB-2, RB-1	Understanding the role of microbes in our life
2. Methods in microbiology	L 3-5. Requirement for growth and maintenance	TB-6, RB-7	Knowledge about conditions favoring microbial growth
	L 6. Microscopy	TB-3, (notes)	Application of microscopic techniques in microbiology
3. Microbial growth	L 7-9. Measuring microbial growth; synchronous and	TB-6, RB-7	Understanding bacterial growth curve, methods of microbial growth measurement and how do

	continuous culture, growth under natural environment		bacteria grow in natural environment
4. Identifying microorganisms	L 10-12. Characterization, classification and identification of microorganism	TB-10, RB-19	Understanding methods of microbial classification & identification
5. Study of microbial structures	L 13-16. The morphology & fine structure of bacteria	TB-4, RB-3	Understanding size, shape & arrangement of bacterial cells and their structures
	L 17-18. Eukaryotic microorganisms	TB-12, RB-4	Understanding fungi, algae and lichens
6. Clinical microbiology	L 19-21. Principles and mechanisms of microbial pathogenicity	TB-14, 15	Knowledge about bacterial pathogenesis in humans
7. Virology	L 20-22. Virus, Viroids, Prions	TB-13, RB-6,27	Understanding features, type, taxonomy and replication of virus
8. Microbial physiology	L 23-25. Microbial metabolism	TB-5, RB-10, 11, 12	Knowledge of energy generation and utilization in microbes
9. Control of microorganism	L 26-28. Physical and chemical methods of microbial control, Antimicrobial drugs	TB-7, 20 RB-8	Knowing the methods to prevent microbial growth
10. Microbial genetics	L 29-32. The genetics of microorganisms; Synthetic microbiology	TB-8, RB-16	Understanding genetic transformation & recombination in microbes and approaches in synthetic microbiology for applied purposes.
11. Environmental microbiology	L 33-35. Microbiology of soil, domestic and waste water	TB-27 RB-43	Understanding the role & application of microbes in environment
12. Applied microbiology	L 36-39. Microbiology of food and Industrial microbiology	TB-28 RB-42	Understanding applications of microbes in food & beverage industry

7. Portions for self-study:

To be announced in class from time to time.

8. Lab Component:

PART 1: Basics

Exp 1: Introduction to microbiology laboratory and practices, virtual tour of microbiology Lab and introduction to biosafety levels for handling microorganisms.
Exp 2: Culture media, Isolation of pure cultures of bacteria and fungi from various samples
Exp 3: Bacterial growth curve
Exp 4: Enumeration of microbial cells (in air, soil and liquid), preparation of glycerol stock for long term preservation

Exp 5: Dehydrogenase activity assay for qualitative determination of microbial population
Exp 6: Gram's staining of bacteria, staining of fungus- Lactophenol cotton blue staining
Exp 7: Biochemical characterization of bacteria (IMViC , Carbohydrate utilization, API)
Exp 8: Test of hydrolytic enzymes (pectinase, cellulase, amylase, protease) in bacteria
Exp 9: Effect of various antibiotics and metals on microbial growth
Exp 10: Effect of pH, temperature, salt and radiation on growth of microorganisms
Exp 11: Coliform counts in contaminated water sample, Fluorogenic detection of *E. coli*

Note: *Out of the above-mentioned list, a minimum of 10 experiments will be conducted in the Semester as per the availability of the consumables.*

9. Evaluation Scheme:

S. No.	Evaluation Component*	Weightage (%)	Date & Time	Remarks
1.	Mid-Semester Test	25		CB
2.	Quiz/Assignments	20		CB/OB
3.	Laboratory evaluation	25		
4.	Comprehensive	30		CB/OB

**Material in soft-copy will not be allowed in any evaluation component.*

10. Chamber consultation hour: To be announced in the class.
11. Notices: All notices will be displayed on the notice board of Department of Biological Sciences.
12. 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-ups for Lab component and Quizzes.

Note: It shall be the responsibility of the individual student to be regular in attending lectures and the lab demonstration as per the schedule announced

(Prabhat Nath Jha)
Instructor-in-charge
BIO F212