**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI**

**FIRST SEMESTER 2023-2024**

Dated: 11.08.23

**Course Handout (PartII)**

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 : RUCHI JAIN DEY**

**Team of Instructors :**

**Lab Instructors: : Ruchi Jain Dey, Puja and Shifa**

**1. Description** **of course**

This course will help in understanding the basic principles of Microbiology, the classification and description of microorganisms, study of the role of microbes in human disease and in human health, and the overall benefits and uses of microorganisms.

**2. Scope & Objective of the Course**

The primary objective of this course is to provide a quality educational experience in a field of laboratory science. This course will provide students with a basic knowledge of the principles of bacteriology, virology, and immunology, and introduce them to recombinant DNA technology. During the course students will be encouraged to develop good laboratory techniques that will be useful in subsequent courses as well as in their careers. A clear understanding of the principles of microbiology is fundamental to the comprehension and appreciation of subsequent courses. This course encourages students to think critically and to engage in a deeper understanding of their microbial environment.

**3.** **Text Book (TB):**

1. Tortora, Gerard J & Others Microbiology: An Introduction Pearson Edu., 9th ed., 2007

2. John, Saby & S. Ramachandran Laboratory Manual for Microbiology Notes EDD, 2006

**4.** **Reference Book (RB)**:

Willey, J.M., Sherwood, L.M. and Woolverton, C.J. 2008. Prescott, Harley and Klein’s Microbiology, 7th Edition, McGraw Hill, India.

**5. Lab Manual:**

Laboratory Manual for Microbiology (BIO C241 & PHA C241), 2006, Educational Development Division, BITS, Pilani.

**6. Course Plan:**

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| --- | --- | --- | --- |
| **Lec. No.** | **Learning Objectives** | **Topic to be covered** | **Chapter in the Text Book** |
| 1-2 | Introduction to microbiology | The microbial world | TB-1, RB-1 |
| 3-4 | Methods in Microbiology | Microscopy and Specimen preparation | TB-3, RB-2 |
| 5-6 | Requirement for growth, obtaining pure cultures and maintenance | TB-6, RB-5 |
| 7-10 | Study of Microbial Structures | The morphology & fine structure of bacteria | TB-4, RB-3 |
| 11-12 | Microbial Growth | Growth of Microbes and its measurement | TB-6, RB-6 |
| 13-14 | The types of Microorganisms | The characterization, classification and identification of microorganism | TB-10, 11 RB-19 |
| 15-16 | Study of Microbial Structures | Eukaryotic microorganisms | TB-12, RB-4 |
| 17-20 | Microbial Physiology | Microbial metabolism | TB-5,  RB-8,9,10 |
| 21-24 | Microbial Genetics | The genetics of microorganisms | TB-8,  RB-11,12,13 |
| 25-27 | Control of Microorganisms | Physical and chemical methods of microbial control, antimicrobial drugs | TB-7, 20  RB-7 |
| 28-31 | To understand viruses | Virus, Viroids, Prions, Viral genetics | TB-13  RB-16,17,18 |
| 32-36 | Microorganisms and diseases | Principles of diseases and epidemiology, Microbial Mechanisms of Pathogenicity | TB-14, 15 |
| 37-38 | Environmental Microbiology | Microbiology of soil, domestic and wastewater | TB-27  RB-27,29,41 |
| 39-40 | Applied Microbiology | Microbiology of food and Industrial microbiology | TB-28  RB-40,41 |

**7. Portions for self-study:**

To be announced in class from time to time.

**8. Lab Components:**

Exp 1 : Introduction to Laboratory, Biosafety and sanitation

Exp 2 : Preparation and Sterilization of culture media

Exp 3 : Isolation of pure cultures (Bacteria and Fungi) and quantitation of viable cells

Exp 4 : Staining and motility of bacteria- Simple staining, Hanging drop technique

Exp 5 : Staining of bacteria- negative staining, Gram’s staining,

Exp 6 : Staining and visualization of Fungi

Exp 7 : Effect of environmental factors upon growth of microorganisms

Exp 8 : IMViC Test

Exp 9 : Starch hydrolysis in bacteria

Exp 10 : Assay of antibiotics

Exp 11 : Phage titration

Exp 12 : Bacterial conjugation

Exp 13 : Phenol coefficient for antimicrobial agent.

Exp 14 : Milk Microbiology

**Note:** A full sleeve lab coat, fully covered dress (full sleeve dress and full pants) and closed shoes are essential prerequisite to enter the Microbiology lab, without which, students will not be permitted into the lab due to Biosafety reasons. Out of the above-mentioned list, maximum 10-12 experiments will be conducted in the Semester as per days available for laboratory classes. Lab records will be maintained, updated and evaluated immediately on completion of each experiment. **Only on attendance of a lab session in person, that the respective experiment will be marked, else it won’t be marked.** Lab records will be evaluated for each experiment.

**9. Evaluation Scheme:**

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| --- | --- | --- | --- | --- | --- |
| **EC No.** | **Evaluation Component** | **Duration** | **Weightage (%)** | **Date, Time & Venue** | **Nature of Component** |
| 1. | Mid-semester Exam | 90 min | **25% [75M]** | 14/10 - 2.00 - 3.30PM | 25% CB (75M) |
| 2. | Laboratory evaluation  - Lab Record  -Comprehensive Laboratory exam + Quiz | Variable | **25% [75M]**   * Lab Record + Lab participation   [40M, OB]   * Comprehensive Laboratory Exam/Quiz [35M, CB] | To be announced | ~13% OB (40M) +  ~12% CB (35M) |
| 3. | Presentations and Surprise Quizzes (3) | Variable | **~17% [50M]**  -Class Presentations  [20M, OB]  -Best 2/3 quizzes [30M, CB] | To be announced | ~7% OB (20M)  ~10 % CB (30M) |
| 4. | Comprehensive Exam | 3 hours | **~33% [100M]** | 21/12 FN | ~8% OB (25M) +  25% CB (75M) |
| # Weightage can be calculated based on total Marks: 300M. | | | | | |

**Notes:**

Students would be assessed on the basis of their regularity in the class, interactions during the lecture and laboratory sessions. Besides the regular assessment, pre-announced quizzes, records and discussion during the laboratory sessions will also be used to observe sincerity.

**10. Chamber consultation hour**: Once a week we will be discussing any doubts or issues related to lectures and laboratory during the consultation session via google meet/chamber meet. Day and time will be decided in consultation with students. Contact Email ID of IC: [ruchij80@hyderabad.bits-pilani.ac.in](mailto:ruchij80@hyderabad.bits-pilani.ac.in).

**Email Lab related doubts to Laboratory instructors with copy to IC–**

1. Puja -p20220006@hyderabad.bits-pilani.ac.in
2. Shifa- [p20180004@hyderabad.bits-pilani.ac.in](mailto:p20180004@hyderabad.bits-pilani.ac.in)

To get the most benefit of lectures and laboratory sessions, students are requested to regularly go through the study material and resolve doubts during the upcoming lectures and lab hours.

**11. Notices:** All notices will be displayed on CMS/ or via emails.

**12. Make up policy:** No make-ups will be provided for quizzes and evaluation components conducted as part of regular assessment during lecture or laboratory hours unless it is a genuine case of medical emergency or hospitalization. Prior intimation/ permission is essential along with submission of necessary documentary proof for the same.

13. **Computers, internet and textbooks:** It is expected that each student registered in a course in First Semester 2022-2023 shall acquire a Text book is available for purchase in the book stores, students are expected to purchase their text book at the beginning of the semester.

**14. 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.

#### Ruchi Jain Dey

#### Instructor-in-charge

**BIO F212**