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| <b>Subject Code: 2SC2020301</b> | <b>Subject Title: Omics and Recent Advances in Microbiology</b> |
| <b>COURSE TYPE: CORE COURSE</b> |                                                                 |

**Course Objective:** The course covers Proteomics, Genomics and Metagenomics in enough details necessary to understand the principles, tools and techniques applied in concerned fields. Apart from them, Recent Advances in Microbiology puts emphasis on various topics such as discovering new pathogens and treatment methods.

| Teaching scheme (hours) per week |           | Credit |           |       | Theory Marks    |                  | Practical Marks |                  | Total |
|----------------------------------|-----------|--------|-----------|-------|-----------------|------------------|-----------------|------------------|-------|
| Theory                           | Practical | Theory | Practical | Total | Uni. Assessment | Cont. Assessment | Uni. Assessment | Cont. Assessment |       |
| 4                                | --        | 4      | --        | 4     | 60              | 40               | --              | --               | 100   |

| Unit | Content                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Lectures | Weightage |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----------|
| 1    | <b>Unit 1: Proteomics:</b> <ul style="list-style-type: none"> <li>✓ Introduction to Proteomics</li> <li>✓ Proteomics and The New Biology</li> <li>✓ Tools and technique for proteomics <ul style="list-style-type: none"> <li>-Protein digestion techniques</li> <li>-Protein Identification by Peptide Mass Fingerprinting</li> <li>-Mass Spectrometers for protein and peptide analysis</li> </ul> </li> <li>✓ Proteomics of <i>Corynebacterium glutamicum</i>; Structural Proteomics and Computational Analysis of a Deadly Pathogen: Combating <i>tuberculosis</i> from Multiple Fronts</li> </ul> | 15       | 25%       |
| 2    | <b>Unit 2 : Genomics:</b> <ul style="list-style-type: none"> <li>✓ Tools and technique for Genomics</li> <li>✓ Bacterial Genomes for the Masses</li> <li>✓ Comparative Genomics for Microorganisms; Microbial Genome Sequencing and Annotation</li> <li>✓ Pharmacogenomics: Overview, concept, and applications</li> <li>✓ RNA Interference</li> </ul>                                                                                                                                                                                                                                                 | 15       | 25%       |
| 3    | <b>Unit 3: Metagenomics:</b> <ul style="list-style-type: none"> <li>✓ Introduction to Metagenomics and applications</li> <li>✓ Metagenomics: From Genomics to Metagenomics</li> <li>✓ Challenges of Metagenomics: Metagenomic data, The importance of Meta data; Databases for Metagenomic data; Software for metadata analysis</li> <li>✓ Designing a successful Metagenomics project</li> </ul>                                                                                                                                                                                                      | 15       | 25%       |

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| 4 | <b>Unit 4: Recent Advances in Microbiology:</b> <ul style="list-style-type: none"> <li>✓ Overview of clinical laboratory diagnosis</li> <li>✓ Molecular Diagnosis of genetic disease.</li> <li>✓ Overview and Current status of Anti-HIV, Anti Malaria, Anti Tuberculosis and Anti-Cancer treatment</li> <li>✓ Multidrug resistance</li> <li>✓ Discovering New Pathogens; New disease: COVID, Mucormycosis, Swine flu</li> <li>✓ Study of Selected recent review/ research paper in field of Microbiology</li> </ul> | 15 | 25% |
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**Learning Outcome:** Students, by offering this course will acquire enough knowledge about the recent advancements in the fields of Microbiology, Proteomics, Genomics and Metagenomics.

**Reference Books:**

1. Genomics, Proteomics and clinical bacteriology by Woodford
2. Computing for Comparative Microbial Genomics by Andreas
3. Microbial Proteomics by Humphery-Smith
4. Protein Biochemistry and Proteomics by Rehm
5. Introduction to Proteomics by Daniel
6. The New Science of Metagenomics by The National Academic Press, Washington, DC
7. Industrial Pharmaceutical Biotechnology by Heinrich
8. Bio safety in Microbiological and Biomedical Laboratories by Richmond
9. Drugs: From Discovery to Approval by Rick
10. Handbook of Pharmaceutical Biotechnology by Gad
11. Biopharmaceuticals Biochemistry and Biotechnology by Walsh
12. Pharmaceutical Microbiology, Blackwell scientific Publications by Hugo 12. Molecular Biotechnol by Glick