| | | |
|---|---|---|
| **Name of Program** | : | Master of Science |
| **Course Code** | : | 1MSB01 |
| **Course** | : | Microbial Genetics and Biostatistics |
| **Type of Course** | : | Professional Core |
| **Year of Introduction** | : | 2023-24 |

| | | |
|---|---|---|
| **Prerequisite** | : | To impart the knowledge of Microbial genetics |
| **Course Objective** | : | Understanding the concept of gene and DNA<br>Understanding the concept of phage, plasmid replication<br>Understanding and application of Biostatistics<br>Microbial genetics has a role in developing the fields of molecular and cell biology and has various applications in medicine, food, agriculture and pharmaceutical industries. |
| **Course Outcomes** | : | At the end of this course, students will be able to: |
| | CO1 | Know and understand the concept of DNA, Plasmid, replication and also various concepts of replication, transcription and translation |
| | CO2 | Understand the concepts of molecular biology |
| | CO3 | Application of concepts of biostatistics in research. |
| | CO4 | Analyses and interpret the statistical data. |

**Teaching and Examination Scheme**

| **Teaching Scheme (Contact Hours)** | | | **Credits** | **Examination Marks** | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | **Theory Marks** | | **Practical Marks** | | **Total marks** |
| **L** | **T** | **P** | **C** | **SEE** | **CIA** | **SEE** | **CIA** | |
| 4 | 0 | 0 | 4 | 70 | 30 | - | - | 100 |

*Legends:* ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.*

**Course Content**

| **Unit No.** | **Topics** | **Teaching Hours** | **Weightage** | **Mapping with COs** |
|---|---|---|---|---|
| 1 | **Molecular Biology 1**<br>Features of DNA Replication, Proof of semiconservative nature of DNA replication, Features of bidirectional DNA replication. Mechanism of bidirectional DNA replication<br>RNA structure and types of RNA, Transcription in | 13 | 29% | CO1 |

| | | | | |
|---|---|---|---|---|
| | prokaryotes with E. coli as model system: Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains<br>Components of Protein synthesis machinery: Messenger RNA, tRNA structure and function, Charging of tRNA, aminoacyl tRNA synthetases, ribosome structure and assembly.<br>Mechanism of protein synthesis in prokaryotes: initiation, elongation and termination.<br>Principles of gene regulation, negative and regulation, concept of operons, Regulation of gene expression in bacteria : lac operon concept. | | | |
| 2 | **DNA damage and mutation**<br>Plasmid Biology (Types of plasmids, compatibility, regulation of plasmid copy number and plasmid segregation<br>Causes (spontaneous, chemical agent, radiation) and types of DNA damage<br>Mechanism of DNA repair: Direct repair, base excision repair, nucleotide excision repair mismatch repair, recombination repair.<br>Molecular basis of mutation, types of mutation (missense mutation, nonsense mutation silent mutation, point mutation, frameshift mutation) | 12 | 26% | CO1 |
| 3 | **Genetics of microorganisms**<br>Plasmid Biology (Types of plasmids, compatibility, regulation of plasmid copy number and plasmid segregation)<br>teriophage genetics: T4, T7, Lambda phages Bacteriophage recombination - complementation, fine structure analysis | 10 | 22% | CO2 |
| | **Biostatistics**<br>Meaning of data and their representation in biostatistics.<br>Measures of central tendency<br>Measures of dispersion with computation.<br>Normal distribution curve, characteristics and uses with computation.<br>Correlation: meaning, types and methods of correlation.<br>➢ Statistical inference and significance of test in biostatistics. | 10 | 23% | CO3<br>CO4 |

| Suggested Distribution of Theory Marks Using Bloom's Taxonomy | | | | | | |
|---|---|---|---|---|---|---|
| **Level** | Remembrance | Understanding | Application | Analyse | Evaluate | Create |
| **Weightage** | **25** | **25** | **25** | **25** | **0** | **0** |

*NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.*

**Major Equipment / Instruments**

| Sr. No. | Name of Major Equipment/ Instruments and Software |
|---|---|
| 1 | Analytical Balance |
| 2 | Autoclave |
| 3 | Micropipettes |
| 4 | Stains |
| 5 | Light Microscope |
| 6 | Anaerobic jar |
| 7 | UV Chamber |
| 8 | Hot Air Oven |
| 9 | Centrifuge |
| 10 | Electrophoresis |
| 11 | SDS PAGE |
| 12 | PCR |
| 13 | Deep Freezer |
| 14 | Autoradiography |

**Suggested Learning Websites**

| Sr. No. | Name of Website |
|---|---|
| 1 | https://onlinecourses.nptel.ac.in/noc22_bt07/preview |

**Reference Books**

| Sr. No. | Name of Reference Books |
|---|---|
| 1 | Genetics of bacteria Scaife et.al |
| 2 | Molecular biology of gene J.D.Watson |
| 3 | Molecular cell biology Lodish et.al |
| 4 | Molecular genetics of bacteria Snyder & champnes |
| 5 | Introduction to biostatistics R. N. Forthofer & Lee Duncun microorganism |