# DEPARTMENT OF MICROBIOLOGY ACADEMIC PLAN 2022-2023
## ODD SEMESTER

| Week | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
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| Name | Sem/ paper | "14/06/2022-19/06/2022" | 20/06/2022-25/06/2022 | 27/06/2022-2/07/2022 | 4/7/2022-09/7/2022 | 11/7/2022-16/07/2022 | 18/07/2022-23/07/2022 | 25/07/2022-30/07/2022 | 1/8/2022-6/8/2022 | 8/08/2022-13/08/2022 | 17/08/2022-23/08/2022 | 24/08/2022-30/08/2022 |
| Ms. Hemlata Chakrabarty | MSc sem 1 , paper 3 module4 | Introduction to module,, discussion of LO and Out come of module | Immune tolerance - central tolerance | Peripheral tolerance | Tolerance induction | Autoimmunity - introduction ,interplaying factors | Triggering factors cie 1 | Mechanism of damages | common autoimmune disorders cie 2. | | | |
| | sem 1 CC2 M1 | | | | | | | | | | Discussion of CO and LO of module.Introduction to historical background | different parts of microscope and it's function |
| | Sem3 CC 1 M1 | Discussion of course learning objectives and outcomes, encounter between host and m.o. | Cytokines | Cytokines | Cytokines | Antigen presentation | Antigen presentation | Antigen presentation | MHC Complex and MHC molecule | MHC Complex and MHC molecule | Complement System | Complement System |
| | Sem 5 CC 2 M3 | Discussion of course learning objectives and outcomes, introduction to components of immune system | Concepts of Cell theory & Cellular totipotency | Comparison with microbial culture | Aseptic techniques | Culture Media CIE | Culture Media | Explants | Callus culture technique | Callus culture technique | Anther & pollen culture | Anther & pollen culture |
| | Sem 5 DSE2 M2 | Discussion of course learning objectives and outcomes, introduction to ATC | Comparison with microbial culture | Comparison with microbial culture | Equipment and infrastructure CIE | Equipment and infrastructure | Primary cell culture | Primary cell culture | Primary cell culture CIE | Primary cell culture | Characterization of cell lines | Characterization of cell lines |
| | Sem V Practical | | 1. Study of biochemical | 1. Enrichment | 1. Phosphata | 1. Detection of homo | 1. Preparation | 1. Isolation and | 1. Detection | 1. Gradient plate | 1. Isolation of spoilage- | 1. Enrichment |

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| | s | | pathway and study of end products of enzymes in the characterization of microorganisms 2. Phosphatase –Qualitative detection | of phosphate solubilizing microorganisms 2. Oxidase 3. Catalase 4. Methyl Red (MR) and Voges Proskauer (VP) test 5. Assignment announcement of Medical | se –quantitative 2. Oxidative and fermentative utilization of glucose by microbes 3. Isolation and characterization of phosphate solubilizing microorga | and mixed acid fermentation 2. Detection of Amylase activity 3. Isolation and Characterization of Lignin degrading microorganisms 4. Enrichment of chitinase- | of Idli batter, Determination of Microbial load , 2. Testing of acidity from idli batter 3. Detection of homo and mixed acid fermentation | characterization of chitinase-producing microorganisms 2. Enrichment of phenol degrading organisms. 3. Enrichment of Cellulose degrading organisms. 4. Isolation of genomic DNA of E. coli | of homo and mixed acid fermentation 2. Isolation and characterization of Cellulose degrading microorganisms 3. Enrichment of dye degrading microorganisms. 4. Pure | technique for isolation of mutants 2. Detection of homo and mixed acid fermentation 3. Isolation of Lactic acid bacteria 4. Pure culture Proteus Pseudomonas 5. Isolation and | causing microorganisms from milk, cheese, and yogurt. 2. Pure culture Pseudomonas, Staphylococcus, and Streptococcus 3. Isolation and characterization of dye degrading microorgani | methods for mutants 2. RTI Lower and Upper |
| | Sem I CCI MIII Theory | | | | | | | | | | CI MIII Discussion of CO , LO of the module, Nutritional requirements | CI MIII Utilization of Elements |
| | Sem. III CII MIII | Discussion of CO, LO of the module, Taxonomic ranks, Binomial | CII MIII Phylogenetic approach and Classical approach to taxonomy | CII MIII Numerical taxonomy CIE | CII MIII Numerical taxonomy | CII MIII Numerical taxonomy | CII MIII Newer methods to Bacterial Taxonomy: a) DNA base composition | CII MIII Newer methods to Bacterial Taxonomy: b) Nucleic acid | CII MIII Newer methods to Bacterial Taxonomy : c) DNA | CII MIII Newer methods to Bacterial Taxonomy: c) DNA Sequencing | CII MIII Newer methods to Bacterial Taxonomy: d) RNA Fingerprintin | CII MIII Newer methods to Bacterial Taxonomy: e) Ribotyping f) Fatty acid |
| | Sem. V CIV MII Theory | Discussion of CO, LO of the module, Types of | CIV MII Mechanical fermenter | CIV MII Hydrodynamic fermenter CIE | CIV MII Pneumatic - air-lift fermenter, | CIV MII Pneumatic - bubble-cap fermenter, | CIV MII Pneumatic - acetator, | CIV MII Pneumatic - cavitator. CIE | CIV MII Animal cell culture reactors | CIV MII Animal cell culture reactors | CIV MII Photo-bioreactor, tower and packed | CIV MII Biofilters and Fixed film processes, Single use |

Dr. Lolly Jain

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| | | fermenters | | | | | | | | | tower fermenters | disposable fermenters |
| | Sem. V CIV MIII Theory | Discussion of CO, LO of the module, Different types of sensors | CIV MIII Temperature Monitoring and Control | CIV MIII Flow measurement and control CIE | CIV MIII Pressure measurement and control | CIV MIII Foam sensing and control | CIV MIII Measurement and control of dissolved oxygen | CIV MIII Measurement and control of dissolved oxygen CIE | CIV MIII Inlet and exit gas analysis | CIV MIII Inlet and exit gas analysis | CIV MIII pH measurement and control | CIV MIII Control systems CIE |
| | Sem. III CII MIII | Discussion of CO, LO of the module, Transgenics in crop improvement | DSE MIII Methods of gene transfer | DSE MIII Resistance to biotic stresses CIE | DSE MIII Resistance to abiotic stresses | DSE MIII Production of therapeutic proteins & vaccines using cell | DSE MIII In Vitro Fertilization | DSE MIII embryo transfer CIE | DSE MIII IVF and embryo culture in farm animals , embryo | DSE MIII Gene transfer | DSE MIII Targeted gene transfer; t, Cloning of animals- Dolly sheep | DSE MIII Terminator technology CIE |
| | PG Sem III CII MI Theory | Discussion of CO , LO of the module, Insect resistance (Bt toxin) | CII MI Insect resistance (Bt toxin) | CII MI Virus Resistance CIE | CII MI Bacterial & Fungal Disease resistance | CII MI Herbicide Resistance (Glyphosate ) | CII MI The nature of abiotic stress, the nature of water deficit stress | CII MI Target approaches toward the manipulation of tolerance to salt stress | CII MI Improvement of crop yield and quality by manipulation of | CII MI Improvement of crop quality by manipulation of nutritional | CII MI Improvement of crop quality by manipulation of nutritional | CII MI Plants as bioreactors |
| | Sem. I Theory | | | | | | | | | | CI M2 Intro to bacteria | C i M2 bacteria- size, shape |
| | Sem. III CII M1 Theory | CII M1 Central Dogma | CII M1 Central Dogma | CII M1 Central Dogma | CII M1 Double helix DNA | CII M1 Double helix DNA | CII M1 Double helix DNA | CII M1 Double helix DNA | CII M1 Supercoiling | CII M1 Supercoiling | CII M1 Genetic code | CII M1 Genetic code |
| | Sem. III CII M2 Theory | CII M2 Virology Intro | CII M2 Virology classification | CII M2 Virology classification | CII M2 T4 lifecycle revision | CII M2 Vertebrate viruses- | CII M2 Vertebrate viruses- | CII M2 HIV | CII M2 HIV | CIE 2 | | |
| | Sem. V C I M2 Theory | C I M2 DNA Replication- features | C I M2 Historical experiments | C I M2 Historical experiments | C I M2Historical experiment | C I M2 molecular mechanism | C I M2 molecular mechanism | C I M2 molecular mechanism | C I M2 molecular mechanism | C I M2 molecular mechanism CIE | C I M2 molecular mechanism | C I M2 Telomere replication |
| | Sem. V C III M2 and M3 | C III M2 Bioenergetics- | C III M2 ETC | C III M2 Chemiosmotic coupling | C III M2 Chemiosmotic | C III M3 Catabolism of | C III M3 Catabolism of | C III M2 ATP synthase | C III M2 Shuttle systems, | C III M3 EMP, TCA CIE | C III M3 HMP, ED | C III M3 Anaplerotic pathways, |

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| Dr Sonj | Theory | | | | coupling | carbohydrat | carbohydrat | | Bacteriorh | | | Glyoxylate |
| | Sem. I MSc | | | | | | | | Sem I CII M1 Amino acid | Sem I CII M1 Protein structure | Sem I CII M1 Protein structure | Sem I CII M1Protein structure |
| | FY.B.Sc Practicals | | | | | | | | | | 1. Introduction of safety precautions in lab. 2. Preparation of microaid kit. 3. Introduction to Glasswares | 1. Media preparation. 2. Study and care of Microscope. 3. Monochrome staining 4. Hay infusion |
| | Sem V Practical | | 1. Study of biochemical | 1. Enrichment | 1. Phosphata | 1. Detection of homo | 1. Preparation | 1. Isolation and | 1. Detection | 1. Gradient plate | 1. Isolation of spoilage- | 1. Enrichment |

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| | Sem I F.Y.B.Sc. CC-I, M-I | | | | | | | | | | CC-I, M-I, Introduction to the learning | CC-I, M-I Brief History of |
| | S.Y.B.Sc Sem III, CC III | Introduction to the Learning outcomes of the module and the applications | CC-III, M III Types- in-situ and ex-situ bioremediation. | CC-III, M III Types- in-situ and ex-situ bioremediation. | CC-III, M III Bioremediation of hydrocarbons CIE-I | CC-III, M III Bioremediation of Dyes, paper and pulp | CC-III, M III Bioremediation of heavy metals, xenobiotics, | CC-III, M III Bioremediation of common pesticides and oil spills | CC-III, M III Biofilters, Bioaugmentation and Bioventing CIE-II | CC-III, M III Role of Biosurfactants in bioremediation | CC-III, M III Schematic representation of components of a Biosensor | CC-III, M III Schematic representation of components of a Biosensor |
| | T.Y.B.Sc. Sem V | Introduction to the | CC I, M III Structure of | CC I, M III Transcription | CC I, M III Transcripti | CC I, M III Transcriptio | CC I, M III Transcriptio | CC I, M III Translation- | CC I, M III Translatio | CC I, M III Translation | CC I, M III Translation | CC I, M III Introduction |

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| Mr.Sha | | Learning outcomes of the module and the applications of | prokaryotic and eukaryotic promoters. DNA dependent synthesis of | initiation | on elonagation and terminatio n | n termination<br><br>CIE-I | n inhibiition and intro to transcription in eukaryotes | types of m-RNAs, t-RNAs and ribosomes | n initiation<br><br>CIE-II | elongation | termination | to Translation in eularyotes<br><br>CIE-III |
| | T.Y.B.Sc. Sem V, CC-III | Introduction to the Learning outcomes of the module and the applications | CC III, M I Structure and function of Biological membrane | CC III, M I Structure and function of Biological membrane | CC III, M I Preparatio n and use of proteolipo somes Role of membrane | CC III, M I Passive diffusion Facilitated diffusion | CC III, M I Passive diffusion Facilitated diffusion | CC III, M I Active transport: Primary active transport: Binding proteins | CC III, M I Active transport: Primary active transport: Binding proteins, | CC III, M I Secondary active transport: (Uniport, Antiport, Symport) | CC III, M I Secondary active transport: (Uniport, Antiport, Symport) | CC III, M I Mechanism of Group translocation : Phosphotran sferase system |
| | T.Y.B.Sc. Sem V, DSE-I | Introduction to the Learning outcomes of the module and the | DSE-I, M III Types- in-situ and ex-situ bioremediati on. | DSE-I, M III Types- in-situ and ex-situ bioremediatio n. | DSE-I, M III Bioremedi ation of hydrocarb ons<br><br>CIE-I | DSE-I, M III Bioremediat ion of Dyes, paper and pulp | DSE-I, M III Bioremediati on of heavy metals, xenobiotics, | DSE-I, M III Bioremediati on of common pesticides and oil spills | DSE-I, M III Biofilters, Bioaugme ntation and Bioventing | DSE-I, M III Role of Biosurfacta nts in<br><br>bioremediati on | DSE-I, M III Schematic representati on of components of a | DSE-I, M III Types and advantages of Biosensors |
| | M.Sc.II, Sem III, CC- I | Introduction to the Learning outcomes of the module and the applications | CC I, M II Introduction to Biostatistics, Terminologie s used | CC I, M II Introduction to Biostatistics, Terminologie s used | CC I, M II Data summariza tion, parametric and non-parametric tests | CC I, M II Measures of central tendency | CC I, M II Measures of Dispersion<br><br>CIE-I | CC I, M II Hypothesis testing | CC I, M II t-test | CC I, M II Chi-square | CC I, M II One-way ANOVA | CC I, M II Correlation and Regression<br><br>CIE-II |
| | M.Sc.I Sem I, CC-II, M-II | | | | | | | | | Introduction to the Learning outcomes of the module and the correlation of one carbon and two | CC-II,M-II Metabolism of one carbon compounds | CC-II,M-II Metabolism of one carbon compounds |

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| *Ms. Varsah Peghwal* | SYBSC course I Module 2 | Intorduction to the learning objectives and learning outcomes of pathogenecity of microorgnaims. Intorduction of Prokaryotes | Terms and terminologies - Host, Paraiste, Disease, bacterial adherence factors | Bacteria adherence factor cont..AND TEST | Mathematical expression of infection | Various types of infection and CIE -1 | concept of LD50 and ID50 | Virulence factor:collagenase, streptokinase | Virulence factors: Enzymes: hyaluronidase, collagenase, CIE-2 | Virulence factors | coagulase, hemolysin CONT. | Toxigenicity : a. Exotoxins: neurotoxin |
| | TY,CI MI , Classical and Population genetics | ntroduction to the learning objective and outcomes of the module. Branches of genetics eukaryotes | Branches of genetics cont. | Eukaryotic chromosomes, | Heterochromatin and euchromatin | Mendelian genetics | Pedigree analysis problems: Autosomal dominanat and recessive inheritance | Pedigree analysis problems: X linked, Y-Linked and Mitochondrial inheritance | Model organisms-Arabidosis Thaliana, C.elegans , Salient features , CIE-II | Model organisms-Yeast , Mus musculus, Salient features | Population genetics: Genotypic frequencies | Allelic frequencies |
| | TY SEC M2- Food borne illnesses | Introduction to the learning objective and outcomes of the module. Branches of genetics | food intoxication-S.aurues | food intoxication-S.aurues cont.. | Clostridium botulinum | Clostridium botulinum | Mycotoxin | Mycotoxin | Shigellosis | Shigellosis | Salmonellosis | Salmonellosis |
| | MSC CIII M1, | Introduction to the learning objective and outcomes of | Gene expression from strong adn | Gene expression from strong adn | Fusion protein ,CIE-I | Protein folding | Increasing protein stability | DNA integration into host cells, CIE-II | Heterologus Protein production | Heterologus Protein production | Directed mutagenesis | Directed mutagenesis |
| | MSC CIII M3, | Introduction to the learning objective and outcomes of the module. | Hot start PCR, Multiplex Pcr, Nested Pcr | Broad Range, Arbitarily primed Pcr, Quantitative Pcr. CIE-I | Microarray technology | Microarray technology | Next generation sequencing | Metagenomics | Metagenomics | Metaproteomics, CIE-II | Metaproteomics | Metabolomics |
| | MSC CIV MIV, | Introduction to the learning objective and | Drug discovery pipeline | Genomics and proteomics | Genomics and proteomics | Gene chips, CIE-I | Natural products for lead | Natural products for lead | Natural products for lead | Regulatory authorities | Regulatory authorities, CIE II | Role of proetin 3 D structures in |

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| | MSC CIV MI | | | | | | | | Introduction to the learning objective and | Prokayotes and Eukaryotes | RNA Modifications | RNA Modifications |
| | SEM III CC3 MODULE 1 | biogeochemical cycles and it's importantance in environment | Introduction to nitrogen cycle, assimilation | Nitrification, denitrification and significance | Cyclic representation of nitrogen cycle (CIE | Sulphur cycle introduction . cyclic representati | Diffferent microbes used in Sulphur cycle | Phosphorus cycle introduction and different enzymes | phosphate solubalization and variety of microbes | carbon cycle introduction (CIE 2) | degradation of cellulose and various organisms involved in it | degradation of hemicellulose |
| | SEM V DSE-1 | introduction to different cycles of environment. Role of various microbes in environment | Nitrogen cycle introduction. | concept of nitrogen fixation, Nitrification and denitrification | Steps involved in nitrogen cycle. Cyclic representation of nitrogen | Introduction to Sulphur cycle and steps involved in Sulphur cycle | Concept of assimilatory and dissimilatory sulphate reduction. different organisms | discussion of various end products formed in sulphate reduction pathway | Introduction to phosphorus cycle and different enzymes involved in | Phosphate solubalization mechanism and it's significance (CIE 2) | Introduction to carbon cycle and various forms of carbon available in the | Degradation of cellulose |
| | SEM V DSE 1 | Introduction to different products from biological original and need for designing bioproducts | Biogas introduction, advantages disadvantages of studying biogas | Types of digesters | Factors affecting biogas yield and different microbes involved in biogas. (CIE1) | Biodiesel production from lipids | Biodiesel from hydrocarbons | Methods of production: Biohydrogen | Routes of production of Bio hydrogen, anaerobic fermentation | Photosynthetic algae In-vitro photosynthetic hydrogenase system. (CIE2) | Bioethanol, Biobutanol Advantages of Bioethanol over Petrol Production and Recovery of | Future directions for Research and Development for bioethanol and Biobutanol |
| | SEM III MSC 2 C1 S | Intellectual Property Rights (IPR) and Protection (IPP) | Biotechnology and IPR-Rationale of Patent in Research | Scientific Innovations, Biotechnological Patents | Patentability of life forms | TRIPS , GATT ,WIPO | PCT BUDAPEST TREATY AND MADRID PROTOCOL | Geographical indications. | Indian patenting process: | Patentable and Non-patentable intellectual property in India | nonpatentable invention in India | Ethical limits of Biotechnology IPP |
| | SEM III MSC 2 C2 | Stem cell niches, | Stem cell lineage tracing | Isolation, characterization and maintenance of embryonic stem cells. | Isolation, characterization and maintenance of adult stem cells | Stem cells in tissue engineering | Stem Cell Technology, | Cloning techniques Applications | Transgenics and knockouts | Transgenic cattle, Transgenic birds | transgenic fish | Applications: Transgenic mice preparation |

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| SEM III MSC 2 C4 | Biologics (microbial and mammalian type) Biopharmaceut | Protein therapeutics introduction | upstream processing | downstream processing | cytokine and interleukin production | interferon production | Therapeutic hormones-insulin human growth | Recombinant blood product | Therapeutic enzymes 1 | Therapeutic enzymes 2 | Newer vaccines |
| SEM III MSC 2 C4 | Testing of Cosmetic –Pyrogen test | LAL test | Microbiological test, safety &microbiology and toxin detection | Sterile and other products. A injections | Noninjectible fluids , dressings and opthalmic | Method validation | Process validation | Cosmetic Microbiology-Testing method and | Anti-Microbial preservation efficiency | Microbial content testing | Validation methods for cosmetics |
| SEM I MSC 1 C1 | | | | | | | | | Introduction to Cell Junctions, Cell Adhesion | Cadherins and Cell-Cell Adhesion, | Tight Junctions, Gap junctions, |
| SEM I MSC 1 C2 | | | | | | | | | Protein transport introduction | extracellular protein secretion | drug export systems MDR systems |
| SEM I MSC 1 C4 | | | | | | | | | Molecular tools for studying genes and gene activity | Use of recombinant DNA technology to identify human genes, | Cystic fibrosis |

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| *Ms Kiran Surve* | Sem V Prac | | 1. Study of biochemical pathway and study of end products of enzymes in the characterization of microorganisms 2. Phosphatase –Qualitative detection | 1. Enrichment of phosphate solubilizing microorganisms 2. Oxidase 3. Catalase 4. Methyl Red (MR) and Voges Proskauer (VP) test 5. Assignment announcement of Medical | 1. Phosphatase –quantitative 2. Oxidative and fermentative utilization of glucose by microbes 3. Isolation and characterization of phosphate solubilizing microorganisms 4. Enrichment of Lignin degrading microorganisms 5. Pure | 1. Detection of homo and mixed acid fermentation 2. Detection of Amylase activity 3. Isolation and Characterization of Lignin degrading microorganisms 4. Enrichment of chitinase-producing microorganisms | 1. Preparation of Idli batter, Determination of Microbial load , 2. Testing of acidity from idli batter 3. Detection of homo and mixed acid fermentation | 1. Isolation and characterization of chitinase-producing microorganisms 2. Enrichment of phenol degrading organisms. 3. Enrichment of Cellulose degrading organisms. 4. Isolation of genomic DNA of E. coli 5. E test (Demonstration) 6. Isolation of mitochondria and assay for ETC activity | 1. Detection of homo and mixed acid fermentation 2. Isolation and characterization of Cellulose degrading microorganisms 3. Enrichment of dye degrading microorganisms. 4. Pure culture Corynebacterium diphtheriae 5. Acid-fast staining | 1. Gradient plate technique for isolation of mutants 2. Detection of homo and mixed acid fermentation 3. Isolation of Lactic acid bacteria 4. Pure culture Proteus Pseudomonas 5. Isolation and characterization of phenol degrading microorganisms | 1. Isolation of spoilage-causing microorganisms. from milk, cheese, and yogurt. 2. Pure culture Pseudomonas, Staphylococcus, and Streptococcus 3. Isolation and characterization of dye degrading microorganisms 4. Acid-fast staining for M. leprae 5. Cultivation of model organisms – | 1. Enrichment methods for mutants 2. RTI Lower and Upper 3. UTI 4. Karyotyping 5. Cell Viability Testing with Trypan Blue Exclusion Method |
| | EM V C2M | Introduction to | Strptococcal | streptococal | Dipththeria | Diphtheria | Rubella | Rubella Mea | Measles, M | Mumps, Chi | Tuberculosi | bacterial pne |
| | SEM V C4 M1 | Introduction to strain improvement, sterilization | Random & empirical apporoach | Power of recombination in strain constructio | Directed screening for mutants with | Methods of detection of mutants | Recombinant DNA approaches to strain improveme | Strain improvement for high value | Consequences of invasion in fermentat | Significance of sterilization | Batch sterilization | Continuous sterilization |
| | SEM III C1 | Introduction to | Types of dat | primary data | Types of s | Hypothesis | Alternet hyp | Scientific lav<br>principle | Sampling<br>simple ran | systematic<br>random san | cluster samp<br>unintended | ecological a<br>ation in labo |
| | | Introduction | General | Biological | Sequence | Data | Sequence | Introductio | local & | Overview | Protein | Basic tools |

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| | PG SEM III C1M4 | to bioinformatics | introduction, 2L | databases – Introduction & Classificatio | & Structure databases | retrieval from biological | alignment | n, Scoring Matrices 3L | global alignment, Pairwise | of molecular phylogenetics | Structure analysis | & databases 4L |
| | PG SEM III C3M2 | Introduction to human microbiome | Microbiome Ecosystem Ecology | Scientific background; Initiation of the HMP; | Implementation of the NIH HMP; | The International | Typical components and diversity of | Archaea, viruses, fungi, and other eukaryotes; | eographic | Microbiome establishment and early | Hallmarks of health; outlook. | Human Microbiome at the interface of health and |
| | SEM III C4 | P MANAGEME | GMP REGULATORY ASPECTS | Quality assu | Quality assurance beyond GMP ICH | pharmacop | Sanitary practises in cosmetic manufactur | Premises and contamination control, | location, design, structure, layout | services and cleaning. | Personal / management training, | hygiene and health, |
| | PG SEM 1 C3M1 | | | | | | | | Etiology, Transmission, Pathogenesis of dengue | Clinical Manifestations, Lab Diagnosis, Prophylaxis and | Listeriosis | VRE |
| | UG SEM 1 C2M3 | | | | | | | | | Definition; Conditions influencing the effectiveness of | Heat: Moist &, | Low tempera |

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| | SEM V C2M2 | Introduction to respiratory tract | Strptococcal infection | streptococcal infection | Dipththeria | Diphtheria | Rubella | Rubella Mea | Measles, M | Mumps, Chikenpox | Tuberculosi | bacterial pneumonia |
| | SEM V C4M1 | Introduction to strain improvement, sterilization | Random & empirical apporoach | Power of recombination in strain constructio | Directed screening for mutants with | Methods of detection of mutants | Recombinant DNA approaches to strain | Strain improvement for high value products | Consequences of invasion in | Significance of sterilization | Batch sterilization | Continuous sterilization |
| | PG SEM | Introduction | Types of dat | primary | Types of | Hypothesi | Alternet | Scientific | Sampling | systematic | cluster | ecological |

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| | III C1M1 | to research methodology | | data collection | secondary data collection | s testing ( Null | hypothesis | laws and principles | frame, importance of | sampling, stratified random | sampling, problems due to | and statistical population |
| | PG SEM III C1M4 | Introduction to bioinformatics | General introduction, Scope and Application. | Biological databases – Introduction & Classificatio | Sequence & Structure databases, Specialize | Data retrieval from biological databases – ENTREZ | Sequence alignment | Introduction, Scoring Matrices (PAM & BLOSUM) | local & global alignment, Pairwise sequence alignment | Overview of molecular phylogenetics. | Protein Structure analysis | Basic tools & databases (Visualization, classificatio |
| | PG SEM III C3M2 | Introduction to human microbiome | Microbiome Ecosystem Ecology | Scientific background; Initiation of the HMP; The goal of | Implementation of the NIH HMP; | The International Human Microbiom | Typical components and diversity of | Archaea, viruses, fungi, and other eukaryotes: | Geographical variation in the healthy | Microbiome establishment and early | Hallmarks of health; outlook. | Human Microbiome at the interface of health and |
| | PG SEM III C4M1 | GMP MANAGEMENT | GMP REGULATORY ASPECTS | Quality assurance | Quality assurance beyond GMP,ICH | pharmacop | Sanitary practises in cosmetic manufactur e | Premises and contaminati on control | location, design, structure, layout | services and cleaning. | Personal /management training, | hygiene and health, |
| | PG SEM 1 C3M1 | | | | | | | | Etiology, Transmission, Pathogenesis of | Clinical Manifestations, Lab Diagnosis, Prophylaxis and | Listeriosis | VRE |
| | UG SEM 1 C2M3 | | | | | | | | | Definition; Conditions influencing the effectiveness of | Heat: Moist &, | Low temperature, filtration |
| | Sem V C II M I | Introduction to the learning objectives & learning outcomes | Types of host defence meachanisms & summary of types of cells tissues &organ involved in | cont..of summary of types of cells tissues &organ | physical barrier-skin and mucous membrane | physical barrier-skin and mucous membrane CIE -1 | Physical barrier- GIT and genitourinary tract | Antimicrobial peptides-cationic peptides - 3 types | complement system - opsonization and introduction of of complement pathway | Complement system - alternative pathway | CIE 2 and lectin pathway | Classical complement pathway |

| MS. POONAM SHINDE | | | | | | | | | | | | |
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| | Sem V C VII M I | Introduction to the learning objectives & learning outcomes | Dairy starter cultures | continuation of Dairy starter cultures | Fermented dairy products- Yoghurt | fermented dairy products- tofu and dahi | fermented dairy products- cheese | continuation of cheese | Rivision on dairy starter cultures and | other products- Idli and dosa | other products- kombucha | other products- green tea |
| | S.Y.B.S. c sem V CI M III | introduction to Epidemiology of infectious disease and discussion on learning objectives and | Epidemiology terminology | Measuring frequency | continuation of Measuring frequency | CIE 1on epidemiology terminology and measuring frequency | Infectious disease cycle | Infectious disease cycle | Recognition of a infectious disease in a population | Virulence and mode of transmission | CIE 2 | Emerging and re-emerging infectious diseases and pathogens |
| | S.Y.B.S. c sem V CIII M II( | Conventional fuels and their impact on the environment | Conventional fuels and their impact continuation | Biogas | Biogas | CIE1 | Biogas | Bioethanol, Biobutanol | Bioethanol, Biobutanol | CIE2 | Biodiesel | Biohydrogen |
| | MSc II C III M IV | introduction to learning objectives & outcomes & History of synthetic | continuation of history | Introduction to Synthetic Biology | Introduction to engineering and design | The synthetic biology tool kit and Biobrick | CIE1 | Top-down approaches & Bottom-up synthetic biology | Biodesign process overview & Planning vaccinations to bio- | Biodesign process overview & Planning vaccinations to bio- | CIE2 | Applications - Constructing Microbial Cell Factories |
| | MSc II CII M IV | Genetic Testing of diseases and disorders | Immunogenetics& prenatal diagnosis- chorionic villus | continuation & Pre-implantation diagnosis. Genetic counselling. | CIE1 | Vectors and gene targeting and tissue-specific expression | Antisense Technology | Introduction to pharmacogenomics, Pharmacogenetics | toxicogenomics | CIE2 | Social-genetic discrimination | Social-genetic discrimination |
| | MSc II CII M III | Extreme environmental conditions, Marine life forms | Biomimetic materials& new class of pharmaceuticals | Environmental research in marine environment, Bioactive Compounds And | CIE1 | Methods in Marine Microbiology | Methods in Marine Microbiology | Methods in Marine Microbiology | Biofouling and biodeterioration | CIE2 | Detection of microorganisms and microbial activity | Degradation of pollutants, Bioremediation, Role of microorganisms in ocean processes |

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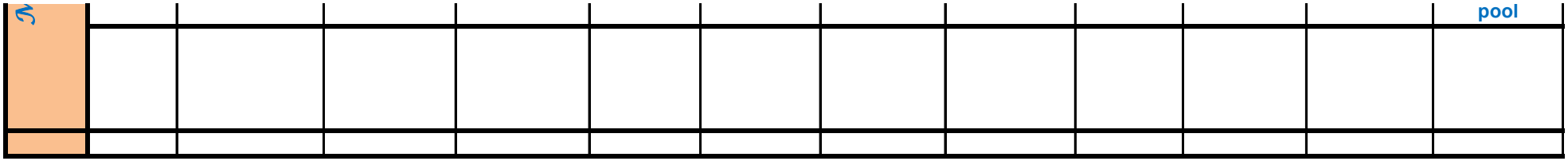
| *Taramnoom Khan* | MSc I CIV M III | | | | | | | | | Introduction to learning objectives and outcomes of module | Cytoplasmic Inheritance introduction and the Genetics of Organelle-Encoded Traits protozoa | continuation of organelle encoded traits genetics and endosymbiotic theory Economical importance |
| | SYBSc SEM III Course II | | | | | | | | | | Introduction to TMV virus ( Structure, stability | TMV life cycle ( Attachment, penetration |
| | MSc I SEM I Paper 101 Module 2 Membr | | | | | | | | | history of Evolutionary theories, Neo-darwinism and its importance | Spotaneous mutation controversy, Rate of mutation. CIE 1 | Types and levels of selection, Neutral evolution |
| *Ms. Ankita Mahulkar* | M.Sc 1 sem 1 paper 102 | | | | | | | | | | | U-4 Ion exchange chromatography |
| | M.Sc 1 Sem 1 paper 103 | | | | | | | | | | | |
| | M.Sc 1 Sem 1 paper 104 | | | | | | | | | | | Unit 4 A.Population genetics Population and gene |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| 05/09/2022-10/9/2022 | 12/9/2022-17/9/2022 | 09/09/2022-24/09/2022 | 26/09/2022-30/09/2022 | 3/10/2022-8/10/2022 | 10/10/2022-15/10/2022 | 17/10/2022-22/10/2022 |
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| image formation in compound microscope.and Bright field microscope | N.A.,A.A,and significance of using oil in oil immersion objective | Darkfield microscopy | Phase contrast microscopy | | | |
| Complement System | Revision | Revision | Revision | | | |
| Micropropogation | Protoplast isolation and fusion CIE | Hydroponics and Aeroponics | Revision | | | |
| Characterization of cell lines | Cell storage and distribution | Cell storage and distribution | Revision | | | |
| 1 . Proteins electrophoresis | | | | | | |

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| Native and SDS-PAGE 2.Problems on Population Genetics | | | | | | |
| CI MIII Utilization of Elements | CI MIII Nutritional types of microorganisms | CI MIII Nutritional types of microorganisms | CI MIII Types of culture media with examples | CI MIII Types of culture media with examples | CI MIII Isolation of microorganisms & pure culture techniques | CI MIII Revision and TEST |
| CII MIII Bergey's Manual | CII MIII Revision | CII MIII Test 1 | CII MIII Test 2 | | | |
| CIV MII Solid State fermenters, Membrane fermenters | CIV MII Revision | CIV MII Test 1 | CIV MII Test 2 | | | |

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| CIV MIII Control systems | CIV MIII Revision | CIV MIII Test 1 | CIV MIII Test 2 | | | |
| DSE MIII Gene drives for vector control | DSE MIII Revision | DSE MIII Test 1 | DSE MIII Test 2 | | | |
| CII MI Plants as bioreactors | CII MI Edible Vaccines | CII MI Concerns about GM crops: Antibiotic resistance genes, Superweeds | CII MI Concerns about GM crops:Gene containment and Techniques for gene containment | | | |
| C i M2 bacteria-size, shape | Ci M2 Cell envelope | Ci M2 Cell envelope | Ci M2 Cell envelope | C I M2 Internal structures | C I M2 Internal structures | C I M2 Internal structures |
| CII M1 Genetic code CIE | CII M1 Genetic code | CII M1 Genetic code CIE | CII M1 Revision | | | |
| | | | Revision | | | |
| C I M2 Telomere replication CIE | C I M2 Rolling circle (σ) | C I M2 Revision CIE | C I M2 Revision | | | |
| C III M3 Fermentations CIE | C III M3 Fermentations | C III M2 Calculations CIE | Revision | | | |

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| Sem I CII M1 Protein Engineering | Sem I CII M1 Protein Engineering CIE | Sem I CII M1 Protein Engineering CIE | Sem I CII M1 Protein Engineering | Sem I CII M1 Protein Engineering | |
| 1. Different Methods to study inolucation.<br>2. Qualitative tests(Carbohydrates, proteins and amino acids) | 1.Isolation and study of colony characteristics on Nutrient agar.<br>2. Disc diffusion method.<br>3. Study of oligodynamic action of hevay metals.<br>4. Negative staining CIE-I | 1. Isolation on MacConkey and Sabouraud's agar.<br>2.Study of effect of UV light.<br>3. Gram staining | 1. Isolation on SMA and SIBA agar plate<br>2. Study of effect of dessication.<br>3. Study of soap as disinfectant. CIE-II | 1. Fungal wet mount<br>2. Observation of permanent slides of Blue Green Algae and Protozoa. | Qualitative tests for nucleic acids CIE III |
| 1 . Proteins electrophoresis | | | | | |

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| Native and SDS-PAGE 2.Problems on Population Genetics | | | | | |
| CC-I, M-I Brief History of Microbiology: Golden age | CC-I, M-I Modern developments of Microbiology | CC-I, M-I Types of chemical bonds | CC-I, M-I Structure and function of Water molecule | | CC-I, M-I Structure and function of Water molecule |
| CC-III, M III Applications of Biosensors<br><br>CIE-III | CCIII, Module III Revision | CCIII, Module III Test | CCIII, Module III Test | | |
| CC I, M III Post Translational | CC I, M III Revision | CC I, M III Test | CC I, M III Test | | |

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| **Modifications PTM** | | | | |
| **CC III, M I Introduction to Siderophores. Iron Transport**<br><br>**CIE-III.** | **CC III, M I Revision** | **CC III, M I Test** | **CC III, M I Test** | |
| **DSE-I, M III Applications of Biosensors**<br><br>**CIE-III** | **DSE-I, M III Revision** | **DSE-I, M III Module III Test** | **DSE-I, M III Module III Test** | |
| **CC I, M II Types of research report, Guidelines for writing a report,** | **CC I, M II Report format appendices, Layout of research paper,** | **CC I, M II Journals in science, Bibliography, Ethics in scientific writing** | **CC I, M II Oral and Poster presentation**<br><br>**CIE-III** | |
| **CC-II,M-II Metabolism of one carbon compounds**<br><br>**CIE-I** | **CC-II,M-II Metabolism of one carbon compounds** | **CC-II,M-II Metabolism of one carbon compounds** | **CC-II,M-II Metabolism of one carbon compounds** | **CC-II,M-II Metabolism of one carbon compounds** |

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| Endotoxins: Chief characteristics | Enterotoxin, c. Cytotoxin | cont.. Test | Revision |
| Problems based on genotypic and allelic frequencies | Hardy Weinberg law | Problem based on H-W CIE-III | Forces that drives evolution. |
| Entamoeba histolytica | Giardia lamblia | Yersinia enterocolitica | Listeria monocytogenes |
| Directed mutagenesis | Directed mutagenesis, CIE-III | Directed mutagenesis | Directed mutagenesis |
| Cryonelectron microscopes | Cryonelectron microscopes, CIE-III | Cryonelectron microscopes | |
| Pharmacogenetics | Pharmacodynamics | Pharmacokinetics, CIE-III | pharmacokinetics |

| Transcription in eukaryotes | Translation | Post Translation Modifications | Gene regulations in Prokayotes | Gene regulations in Prokayotes | Gene regulations in Prokayotes | Gene regulations in Prokayotes |
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| degradation of lignin (CIE 3) | degradation of chitin | assimilatory and dissimilatory pathways of sulphate reduction | revision of all cycles | revision | | |
| Degradation of hemicellulose (CIE 3) | Degradation of chitin | Degradation of lignin | revision of all cycles | | | |
| Microbial Fuel Cells Features and applications. (CIE 3) | Comparison among different types of Biosensors in MFC | Biofuels: Conventional fuels and their impact on the environment Oil, Coal, Natural gas | Advantages and disadvantages of Biofuels. Conversion of Wood, Sugar and starch crops into biofuel, Hydrocarbon producing crops | revision | | |
| Global Issues of Technology Transfer and Regulations. | Bioethical limits | Steps involved in filing a patent | different issues in BIOETHICS | | | |
| Retroviral method | DNA microinjection method | Engineered Embryonic Stem cell method | revision of stem cells basics | | | |

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| New vaccine designing approaches | Combinational chemistry, and Cheminformatics, | In silico Modelling, Molecular modelling, | structure Prediction, Rational, drug designing, | Drug development | | |
| Peservation strategies | Evaluations and Antimicrobial mechanism | Preservative resistance | validation of equipments | | | |
| Basal Lamina, Integrin and Extracellular Matrix | Extracellular signal molecules, | nitric oxide gas signal, | classes of cell-surface receptor proteins | Signalling through enzyme linked cell surface receptors | Docking sites, Ras molecules information | MAP kinase, PI-3 kinase pathways |
| Folding of periplasmic proteins, | translocation of folded proteins | Sec dependent protein Translocation: | Sec system, Model for protein export. Sec independent protein translocation | Translocation of membrane bound proteins, E. coli SRP system, | TAT system. Extracellular protein secretion: type I pathway (hemolysin secretion by E. coli, | type II system |
| Gene therapy: Concept, vectors, gene targeting, and tissue specific expression | Mapping and quantifying transcripts (S1 mapping) | primer extension, run-off transcription) | (Nuclear run – on transcription, reporter gene transcription | (filter binding, gel mobility shift, DNAase and DMS foot printing assay) | Population and gene pool | Population and gene pool<br>B. Genotypic and Allelic frequencies |

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| 1 . Proteins electrophoresis Native and SDS-PAGE 2.Problems on Population Genetics | | | | | | |
| Influenza | Influenza, Introducti | E.coli | Proteus | | | |
| | | | | | | |
| Mechanism of filtration | Depth & absolute fil | Filter sterilization of fermentation media | filter sterilization of air& fermenter exhaust | | | |
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| Experimental data c | data processing | Processing operatic | software for data | | | |
| ratory | of analysis in data proces | | processing. | | | |
| structure prediction | Overview of | Basic concepts of | Basic concepts of | | | |

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| of proteins | molecular phylogenetics. | computer aided drug design | computer aided drug design | | | |
| Influences on the microbiota | Influences on the microbiota during host life cycles; | Disease links and health implications. | Disease links and health implications. | | | |
| documentation. | Global regulatory aspects | toxicological aspect | Cosmetic preservation | | | |
| Leptospirosis | Hepatitis non-A | Chikunguniya | Swineflu | Campylobacter | AIDS | AIDS |
| High pressure, Radiation | Desiccation | Osmotic Pressure | Phenolics, Biguanides | Alcohol, halogens | Heavy metals, QAC | Surface active agents, Aldehydes |

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| 1 . Proteins electrophoresis Native and SDS-PAGE 2.Problems on Population Genetics | | | | | | |
| Influenza | Influenza, Introduction to urinary tract infection | E.coli | Proteus | | | |
| Mechanism of filtration | Depth & absolute filters | Filter sterilization of fermentation media | filter sterilization of air& fermenter exhaust | | | |
| Experimental | data processing | Processing | software for | | | |

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| data collection | | operation , problems in processing, | data processing. | | | |
| structure prediction of proteins | Overview of molecular phylogenetics. | Basic concepts of computer aided drug design | Basic concepts of computer aided drug design | | | |
| Influences on the microbiota | Influences on the microbiota during host life cycles; | Disease links and health implications. | Disease links and health implications. | | | |
| documentation. | Global regulatory | toxicological aspect | Cosmetic preservation | | | |
| Leptospirosis | Hepatitis non-A | Chikunguniya | Swineflu | Campylobacter | AIDS | AIDS |
| High pressure, Radiation | Desiccation | Osmotic Pressure | Phenolics, Biguanides (Chlorhexidine) | Alcohol, halogens | Heavy metals, QAC | Surface active agents, Aldehydes |
| Interferons and Acute Phase Proteins | Phagocytosis. Pathogen Recognition | Toll like Receptors, Intracellular Digestion Acute Inflammatory Response. | CIE 3 and doubt solving discussion | | | |

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| continuation of green tea | Rivision on other fermented food products | Probiotics | Probiotics | | | |
| Control of epidemics | Nosocomial infections | Global travel and health considerations | CIE3 | | | |
| Biohydrogen | Microbial Fuel Cells | Microbial Fuel Cells | CIE3 | | | |
| Medical and Health Applications | Synthetic Biology for a Sustainable World and Cas-9 tool | Synthetic Biology for a Sustainable World and Cas-9 tool | CIE3 | | | |
| Tissue Engineering, Methods of Synthesis, Biomolecular Engineering. | Tissue Engineering, Methods of Synthesis, Biomolecular Engineering. | Tissue Engineering, Methods of Synthesis, Biomolecula engineering | CIE3 | | | |
| Marine Genomics and Proteomics | Marine bioprospecting – Isolation of Marine Natural Products | Marine bioprospecting – Isolation of Marine Natural products | CIE3 | | | |

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| Rivision and CIE 1 | Mitochondrial DNA of Human, yeast and flowering plants iii. Mitochondrial DNA replication, transcription & translation | iii. Mitochondrial DNA replication, transcription & translation | Codon usage in Mitochondria v. Damage to Mitochondrial DNA and aging. | mt DNA analysis for study of evolutionary relationships cp DNA introduction | Gene structure and organization | General features of replication, transcription and translation |
| characteristics and | Chlamydomonas | Yeast, fungi and | Schizosaccharomy | | | |
| TMV lifecycle | Influenza virus. CIE2 | Influenza life cycle | Viroids. CIE3 | | | |
| Molecular clock and Phylogeny. CIE 2 | Co evolution and speciation in sexual and asexual organisms CIE 3 | Co- evolution and speciation in sexual and asexual organisms CIE 3 | Diversity of secondary metabolites | | | |
| U-4 Ion exchange chromatography | Unit 4 -HPLC and Gas chromatography | Unit 4 -HPLC and Gas chromatography | Unit 4 NMR and Mass | | | |
| Unit 2 Descriptive Epidemiology.2.2 Host parasite interactions | Unit 2 Descriptive Epidemiology.2.2 Host parasite interactions | Unit 2 Measures of risks | Unit 3 3.1 Molecular basis of diversity of immunoglobulin molecules. | | | |
| | Unit 4 Hardy-Weinberg Law and proble | Unit 4 problems and Changes in the genetic structure of populations: | | | | |