BTECH-204 Basic Genetics (40 Hours)

Classical Genetics

Mendelian Genetics: Mendelian laws of inheritance, Mono-, Di- and Poly-hybrid tests and back cross experiments, Dominant, Recessive, and co-dominant alleles

Organization of Genes and Genome: Benzer's work on fine structure analysis of gene, *Cis-Trans* test, Linkage, Sex-linked inheritance, Mapping Linkage maps, 3-point test cross, Recombination Frequency analysis by chi-square

Synthesis of Nucleic acids and Proteins

DNA Replication: Models of DNA replication, Cairns and Rolling circle model, Semi-conservative and bidirectional process, Messelson and Stahl experiments

Proteins for DNA replication, Formation of Primosome, Replisome, Leading and Lagging Strands, Processivity, Proof reading and Termination, Post-replicative modifications.

Direct Repair by Excision, Mismatch, Recombination and SOS.

Modes of RNA Synthesis - RNA to RNA, DNA to RNA, RNA Polymerase, Reverse transcriptase

Nature of Genetic code, Initiation, Elongation and Termination of protein synthesis

Mutation

Spontaneous and Induced, Random and Directed, Transitions and Transversions, Insertions and Deletions

Mutagens: 5-BU, Nitrous acid, EES, Acridine orange, UV and Phage Mu.

Phenotypic Classes of Bacterial Mutants: Morphological, Nutritional, Biochemical, and Conditionally lethal mutants

Ames Test

Gene transfer

Vertical (Parents to Progeny)

Horizontal (Transformation, Transduction Transfection and Conjugation)

Genetic Recombination: Homologous, Non-homologous and illegitimate

Bacterial Plasmids: General properties, F-factor, R-factor, Bacteriocinogenic and Virulence

Transposable Elements: Insertion sequences and Tn elements

Reference

1. Snustad DP and MJ Simmons (2006) Principles of Genetics, (4thEd), Wiley
2. Watson JD et al (2006) Molecular Biology of the Gene, Pearson Education
3. Maloy SR, Cronan JE, Freifelder D (2006) Microbial Genetics, (2ndEd), Narosa
4. Tamarin Robert H (2002) Principles of Genetics, (7thEd), TMH
5. Krebs J, Goldstein ES and Kilpatrick ST (2010) Lewin's Essential Genes (2nd Ed) Jones and Bartlett
6. Russel J Peter (2010) iGenetics A Molecular approach (3rd Ed) Pearson

BTECH-205 Immunology (40 Hours)

Antigen, Antibodies and their reaction

Antigens Antigenic determinants, Epitopes, haptanes, Adjuvants, Super antigens

Antibodies Structure of Ig, Paratops, Properties of Ig classes, Basis of Antibody diversity, Monoclonal and polyclonal antibodies, Abzymes

Antigen-antibody reactions *In-vivo* (CF, Neutralization, Opsonization) and *in-vitro* (Precipitation, Agglutination and CF) immune reactions

Components and Response of Immune system:

Role B- and T-cells, Macrophages and APCs, Central (Bone marrow, Thymus) and Peripheral (Spleen, Lymph nodes, Payer's patches) organs of immune system

Immune Response: Primary and Secondary, Cytotoxic and Humoral, Specific and non-specific

Transplant and Tumour Immunity

MHC and HLA, MIF, MLR, Graft rejection, Tissue and organ transplant, Types of graft, Immunosuppression

Tumour immunity: Types of cancer, Types of tumour, Anticancer role of CMIR

Dysfunctional Immunity

Types of autoimmune disorders

Immunodeficiency Congenital and acquired

Hypersensitivities (Type I to IV)

Reference

1. Kindt TJ, Goldsby RA, BA Osborne (2007) Kuby Immunology, (6thEd), Freeman and Co.
2. Male David, Jonathan Brostoff, David B. Roth, Ivan M Roitt (2006) Immunology, (7thEd), Mosby Elsevier
3. Coico Richard and Geoffrey Sunshine (2009) Immunology A short course (6th Ed) Wiley-Blackwell

BTECH-206 Practical (40 Hours)

Practical Basic Genetics, Immunology (204, 205)

1. Detection of specific antigen by Gel-diffusion technique
2. Detection of HBSAg / Austrila antigen using ELISA
3. Isolation of Immuoglobulin fraction from serum
4. Isolation of Genomic DNA from Plant seeds
5. Isolation and quantitation of Total RNA from filamentous fungi / yeast
6. Isolation of UV-induced mutants Lac- (*E. coli*) or Pig- (*S. marcescence*)
7. Isolation of Nutritional mutants of *E. coli* using replica plate technique