

Subject Code: 1RI3000102	Subject Title: Essentials of Disciplinary Research Subject-1 Subject Sub-Title Cell & molecular biology
Pre-requisite Subject	

Objectives of course: This course is framed to give knowledge of advanced cell & molecular biology and their applications

Learning outcomes: Students should become aware of cell & molecular biology and its application for improvement of life exist on the earth for being well as well as convenient and comfort

Teaching Scheme (Credit Distribution)				Assessment Scheme (Weightage)	
Lecture	Tutorial	Practical	Credit	Hall Exam	Continuous Evaluation
4	--	--	4	60%	40%

Unit	Content	Lecture	Wt. (%)
1	Cell structure and function Prokaryotic and Eukaryotic cell architecture, cell growth, cell division, growth and differentiation. Structure and function of various organelles : Plasma membrane , Endoplasmic Reticulum, Golgi Apparatus, Lysosomes, Mitochondria, Chloroplasts, Nucleus, Chromosome etc..	06	15%
2	Biomolecules, and metabolism Structure and function of Biomolecules: Carbohydrate, lipid, protein and nucleic acid. Synthesis of carbohydrate , glycolysis, photophosphorylation, oxidative phosphorylation.	12	25%
3	Molecular Genetics Concept of gene, prokaryotes as a genetic system, prokaryotic and eukaryotic chromosomes, Organization of genome in prokaryote and eukaryote. Mutation, recombination, conjugation transduction, transformation, transfection, and transposition.	12	30%
4	Genome replication and gene Expression Replication of genome, mechanism of replication and its regulation. Transcription mechanism and its regulation. Translation mechanism and its regulation.	10	30%

List of References:

- Alberts, B., Bray, D., Lewis, J., Raff, M., Roberts, K., Watson, J.D., 1989, Molecular Biology of The Cell, 2nd ed., Garland Publishing, Inc., New York
- Darnell, J., Lodish, H., Baltimore, D., 1990, Molecular Cell Biology, Scientific American Books, NY

- Freifelder, D., Malacinski, G.M., 1987, Essentials of Molecular Biology, John & Bartlett Pub, London
- Watson, Baker, Bell, Gann, Levine, Losick, 2004. Molecular biology of the gene . 5th ed. Pearson
- Snyder, L. and Champness, W. 2007. Molecular Genetics of Bacteria, 3rd edition, American Society for Microbiology, Washington DC
- Gene Function by Robert Glass
- Principles of Genetics by Gardener & Snustad
- Gene-VI to IX by Benjamin Lewin
- Molecular Genetics of Bacteria , Jeremy W. Dale, Simon F. Park, 2004
- Microbial Genetics , Stanley R. Maloy, John E. Cronan, David Freifelder
- Fundamental Bacterial Genetics , Nancy Trun, Janine Trempey
- From Genes to Genomes Concepts and Applications of DNA Technology, Jeremy W. Dale, Malcolm
- Molecular biology , David Freifelder
- Schaum's Outline of Molecular and Cell Biology , William Stansfield
- Molecular Biology , David P. Clark, Nanette Jean Pazdernik, 2013
- Molecular Biology , H.D. Kumar, 2000, Molecular Biology
- Basic Genetics , Daniel L. Hartl, David Freifelder, Leon A. Snyder
- Genetics of Bacteria and Their Viruses by William Hayes
- Microbial Genetics By Stanley Maloy, John Cronan, David Freifelder

Subject Code: 1RI3000103	Subject Title: Essentials of Disciplinary Research Subject-1 Subject Sub-Title: Molecular characterization and gene manipulation technology
Pre-requisite Subject	- NONE -

Objectives of course: Molecular characterization and gene manipulation technology are the science dealing with modification of genes to bring about the best of any biological system. Students will learn about the basic tools and techniques involved in the processes of Molecular characterization and gene manipulation technology as well as the potential products and applications of Molecular characterization and gene manipulation technology.

Learning outcomes: This course will educate the students to acquire knowledge of basic processes involved in Molecular characterization and gene manipulation technology such as tools and techniques involved, Isolation of gene of interest, cloning, selection and expression of clones and Different potentially useful applications of Molecular characterization and gene manipulation technology & its products.

Teaching Scheme (Credit Distribution)				Assessment Scheme (Weightage)	
Lecture	Tutorial	Practical	Credit	Hall Exam	Continuous Evaluation
2	--	--	2	60%	40%

Unit	Content	Wt. (%)
1	Molecular biology techniques: Isolation and purification of nucleic acid. Hybridization techniques southern blotting, northern blotting and western blotting., monoclonal and polyclonal antibody . Gel electrophoretic techniques, PCR techniques, FISH and RIA.	30%
2	Gene cloning : Silent feature of DNA vectors use in cloning like Plasmid , Bacteriophages ,Cosmid, BAC , YAC, Binary vector, Shuttle vector and expression vector. Strategy for gene cloning and sub cloning, basic of animal cloning and its risk assessment.	30%
3	Molecular markers: Restriction fragment length polymorphism (RFLP), Random amplified polymorphic DNA (RAPD), Simple sequence repeat (SSR), Amplified fragment length polymorphism (AFLP) and Single nucleotide polymorphism (SNP).	30%
4	Genomics: Structural and functional genomics, genome mapping	10%

List of References:

- Bioinformatics Methods and protocols: Methods in molecular biology Vol. 132: S. Misener and S. A. Krawetz (Eds)
- Developing Bioinformatics Computer Skills C. Gibas and P. Jamback.
- Principles of Gene Manipulation and Genomics by S. B. Primrose and R. M. Twyman, Blackwell Publishing, Oxford, UK
- Molecular Biology and Biotechnology (4th Ed) by J. M. Walker and R. Rapley, Panima Publishing Corporation, New Delhi
- Recombinant DNA by J. D. Watson and others
- Genetic Engineering by Chakravarty, CRC Publications
- Genetic Engineering by Sandhya Mitra
- Molecular Cloning (Volumes 1, 2, 3) by Sambrook and Russell. Cold Spring Harbor Laboratory Press International Edition
- Principles of Genetics by E. J. Gardner. John Wiley and Sons, New York
- Maximizing Gene Expression by W. Reznikoff and L. Gold, Butterworths Biotechnology Series
- Yeast Genetic Engineering by P. J. Barr and others, Butterworths Biotechnology Series
- . Biotechnology by M.D. Trevan
- Textbook of Biotechnology by R.C. Dubey, S. Chand Publications