VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY

JNANASAGARA CAMPUS, BALLARI-583105

Department of Studies in

Biotechnology

IV Semester Syllabus

Bachelor of Science/Commerce /Arts/etc…

With effect from 2021-22 and onwards

Department of Biotechnology

Semester-IV

DSC: 21BSC4C4BTL: Molecular Biology

Course Title: Molecular Biology	**Course code: 21BSC4C4BTL**
Total Contact Hours: 56 Hrs	**Course Credits: 04**
Internal Assessment Marks: 40	**Duration of SEE: 02 Hrs**
Semester End Examination Marks: 60	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Study the advancements in molecular biology with latest trends.
2. Will acquire the knowledge of structure, functional relationship of proteins and nucleic acids.
3. Aware about the basic cellular processes such as transcription, translation, DNA replication and repair mechanisms.

DSC: 21BSC4C4BTL: Molecular Biology

Unit	Description	Hours
1	**Molecular basis of life and Nucleic Acids:** An introduction RNA and experimental proof of DNA as genetic material and types of DNA. Structure and functions of DNA and RNA, Watson and Crick model of DNA and other forms of DNA (A and Z) functions of DNA and RNA including ribozymes.	11
2	**DNA Replication:** Replication of DNA in prokaryotes and eukaryote– Enzymes and proteins involved in replication, Theta model, linear and rolling circle model. Polymerases and all enzyme components. The replication complex: Pre-primming proteins, primosome, replisome, unique aspects of eukaryotic chromosome replication, Fidelity of replication	11
3	**Damage and Repair:** DNA damage and Repair mechanism, photo reactivation, excision repair, mismatch repair and SOS repair.	10
4	**Transcription and RNA processing:** Central dogma, RNA structure and types of RNA, Transcription in prokaryotes RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains. Transcription in eukaryotes: Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, promoter clearance and elongation RNA splicing and processing: processing of pre-mRNA: 5' cap formation, polyadenylation, splicing, rRNA and tRNA splicing.	12
5	**Regulation of gene expression and translation:** Genetic code and its characteristics, Wobble hypothesis**,** Translation- in	12

	prokaryotes and eukaryotes- ribosome, enzymes and factors involved in translation. Mechanism of translation- activation of amino acid, aminoacyl tRNA synthesis, Mechanism- initiation, elongation and termination of polypeptide chain. Fidelity of translation, Inhibitors of translation. Protein folding and modifications, Post translational modifications of proteins.	

References:

1. Glick, B.R and Pasternak J.J (1998) Molecular biotechnology, Principles and application of recombinant DNA, Washington D.C. ASM press
2. Howe. C. (1995) Gene cloning and manipulation, Cambridge University Press, USA
3. Lewin, B., Gene VI New York, Oxford University Press
4. Rigby, P.W.J. (1987) Genetic Engineering Academic Press Inc. Florida, USA
5. Sambrook et al (2000) Molecular cloning Volumes I, II & III, Cold spring Harbor Laboratory Press New York, USA
6. Walker J. M. and Ging old, E.B. (1983) Molecular Biology & Biotechnology (Indian Edition) Royal Society of Chemistry U.K
7. Karp. G (2002) Cell & Molecular Biology, 3rdEdition, John Wiley & Sons; I

Date Course Coordinator Subject Committee Chairperson

Department of Biotechnology

Semester-IV

DSC: 21BSC4C4BTP: Molecular Biology Lab

Course Title: Molecular Biology Lab	**Course code: 21BSC4C4BTP**
Total Contact Hours:	**Course Credits: 02**
Internal Assessment Marks: 25	**Duration of SEE: 03 Hrs.**
Semester End Examination Marks: 25	

Course Outcomes (CO's):

At the end of the course, students will be able to:

1. Apply skills in molecular biology that are generally useful in biological and medical research.
2. Demonstrate an understanding of some basic molecular genetic techniques
3. Demonstrate nucleic acid extraction, resolution, and detection.

DSC: 21BSC4C4BTP: Molecular Biology Lab

List of Experiments

1. Preparation of DNA model
2. Estimation of DNA by DPA method
3. Estimation of RNA by Orcinol method
4. Column chromatography – gel filtration (Demo)
5. Extraction and partial purification of protein from plant source by Ammonium sulphate precipitation.
6. Extraction and partial purification of protein from animal source by organic solvents.
7. Protein separation by SDS-Polyacrylamide Gel Electrophoresis (PAGE)
8. Charts on- Conjugation, Transformation and Transduction, DNA replication, Types of RNA

References:

1. Molecular Cloning, Laboratory Manual, Maniatis, E.F. Fritsch and J. Sambrook (Cold Spring Harber Laboratory, New York).
2. Techniques in Molecular Biology (1992), J. Walker and W. Castra (GeomHelns, London).
3. Practical Methods in Molecular Biology (1991), R.F. Schecleif and PC. Wensik (SpringerVerlag).
4. Sharma AK & A Sharma. 1980. Chromosome techniques: Theory & Practice. Batterworth.

Date Course Coordinator Subject Committee Chairperson