M.TECH BIOINFORMATICS

(FULL TIME)

PROGRAM SPECIFIC OUTCOMES (PSO):

PSO1: An ability to acquire in-depth theoretical and practical knowledge of Biology, Computer Science, and Mathematics.

PSO2: An ability to acquire proficiency in tackling problems related to Biology using software or by development of new algorithms that help in addressing the biological challenges faced by humankind.

PSO3: An ability to get an innovative perspective on Biology by providing support in terms of hardware, software and Big Data-handling.

PROGRAM OUTCOMES (PO):

PO1- Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2- Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3- Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4- Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5- Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10- Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12- Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

I SEM

COURSE CODE: BE-520

COURSE NAME: BIOINFORMATICS AND BIOLOGICAL DATABASES

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to achieve these outcomes***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand the genesis of Bioinformatics, comparison with its allied disciplines, theoretical and computational models to study big data.
CO2	Explain nucleic acid and protein sequence databases, structural databases, literature databases, genome and organism-specific databases.
CO3	Understand development of biological databases, display, annotation, and retrieval tools of biological data.
CO4	Describe database similarity searching, biological file formats, and 3D structure visualization of biomacromolecules.
CO5	Explain applications of bioinformatics in the area of biological and biomedical sciences, statistical mining of gene and protein databanks.

CO-PO/PSO mapping

PO-PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**POS2**	**PSO3**
CO1	1	1	1	2	3	1	1	1	1	1	0	3	2	2	1
CO2	2	2	1	2	3	1	1	1	2	1	0	3	3	3	3
CO3	1	1	1	2	3	1	1	1	2	1	0	3	3	3	1
CO4	2	2	2	2	3	1	1	1	2	1	0	3	3	3	3
CO5	1	1	2	2	3	1	1	1	3	1	0	3	2	2	3

COURSE CODE: BE521

COURSE NAME: BIOCHEMISTRY AND GENETIC ENGINEERING

COURSE OUTCOMES (CO):
After completion of the course, a student will be able to

COURSE OUTCOME (CO)	**DESCRIPTION**
CO1	Learn about the carbohydrate metabolism, and its regulation; understand how the body meets the carbohydrate requirements, and how the carbohydrate metabolism is essential for synthetic pathways of other biomolecules.
CO2	Learn about structure, synthesis and degradation of lipids.
CO3	Understand about the mechanism and regulation of amino acid and protein synthesis and degradation.
CO4	Implement cloning strategies and expression of recombinant molecules.
CO5	Learn about the various applications of recombinant DNA technology.

CO-PO/PSO Mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	3	0	1	1	1	1	0	2	3	3	3
CO2	3	3	3	2	2	0	1	1	1	1	0	2	2	3	3
CO3	3	3	3	2	2	0	1	1	1	1	0	2	2	2	3
CO4	3	3	3	2	2	1	1	1	1	1	0	2	3	1	1
CO5	3	3	3	2	2	1	1	1	1	1	0	2	3	1	1

COURSE CODE: BE523

COURSE NAME: BIOCHEMISTRY AND MOLECULAR BIOLOGY LAB

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Learn and perform the techniques to determine the concentration of biomolecules such as carbohydrates and proteins from a given sample.
CO2	Learn and perform the estimation of nucleic acids (DNA and RNA) in unknown samples and determination of the melting temperature of nucleic acids.
CO3	Understand and perform the different types of chromatography techniques such as TLC and paper chromatography.
CO4	Comprehend and perform DNA isolation and its visualization through electrophoresis from different sources such as bacteria and plant.
CO5	Perform the quantitative estimation of genomic DNA by determining the absorption spectra of genomic DNA and tell about the purity of the DNA.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	2	1	1	2	1	3	3	1	3	3	1	1
CO2	1	3	2	2	1	1	2	1	3	3	1	3	3	1	1
CO3	1	3	2	2	3	1	2	1	3	3	1	3	3	1	1
CO4	1	3	2	2	2	1	2	1	3	3	1	3	3	1	1
CO5	1	3	2	2	2	1	2	1	3	3	1	3	3	1	1

COURSE CODE: BE524

COURSE: BIOINFORMATICS AND PROGRAMMING LANGUAGE LAB

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Perform text based search of NCBI Entrez and EMBL-EBI SRS.
CO2	Retrieve protein or nucleotide sequence of an organism in GenPept format and convert it to FastA format.
CO3	Retrieve 3-D structure of a protein from PDB and visualize it in PyMol, RasMol or DS Visualizer.
CO4	Write programs in C language based on basic Biological problems.
CO5	Perform Python Programming.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	2	1	1	1	3	3	1	3	1	3	3
CO2	2	2	2	2	2	1	1	1	3	3	1	3	1	3	3
CO3	2	2	2	2	3	1	1	1	3	3	1	3	1	3	3
CO4	2	2	3	2	2	1	1	1	3	3	1	3	2	3	3
CO5	2	2	3	2	3	1	1	1	3	3	1	3	2	3	3

II SEM

Course Code BE525

Course: Biomolecular Modeling and Simulation

Course Outcomes: ***After completion of the course, a student will be able to achieve these outcomes***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Explain the concepts of secondary and tertiary structure predition of proteins.
CO2	Understand the principle of molecular docking and its applications to biological R&D.

CO3	Understand the concept and applications of protein modeling and its implications to biological research.
CO4	Understand the basic concept of Monte Carlo (MC) and molecular dynamic (MD) simulation and their applications.
CO5	Describe nucleic acid secondary structure prediction and its relevance in RNA-based drug design and development.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	2	2	1	1	2	1	1	1	3	2	3	3
CO2	2	2	1	2	3	1	1	2	1	1	1	1	2	2	3
CO3	2	2	2	2	3	1	1	1	1	1	2	1	3	3	3
CO4	1	2	2	2	2	1	3	2	2	1	2	3	3	3	2
CO5	2	2	2	2	3	1	1	1	1	1	1	3	2	2	2

COURSE CODE: BE526

COURSE: ALGORITHMS IN MOLECULAR BIOLOGY

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

Course Outcome (CO)	**Description**
CO1	Explain the basics of genetic algorithms, genetic operators and schema theorem.
CO2	Understand the proper application and execution of genetic algorithms.
CO3	Understand the concept and applications of Artificial neural networks in biological sciences.
CO4	Understand the concept and functionality of Hidden markov models and its application in the field of bioinformatics.

CO5	Draw out the importance and applicability of Fuzzy logic in solving fuzzy biological problems.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
CO1	2	2	2	2	2	1	1	1	1	1	1	2	3	1	1
CO2	3	3	3	3	3	1	1	1	1	2	2	2	3	2	3
CO3	3	2	3	3	3	2	1	2	1	1	2	2	3	2	2
CO4	3	3	3	3	2	2	1	1	1	2	1	2	3	2	3
CO5	3	3	3	3	3	2	2	2	1	1	1	2	2	2	3

COURSE CODE: BE527

COURSE: METABOLOMICS

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand the concept of metabolic pathways for the biomolecules such as carbohydrate and lipid, and their feedback control.
CO2	Understand the enzymes and their classification. The students will also learn about the databases and information systems related to the enzymes.
CO3	Understand and learn about the various metabolic pathway databases related to the enzymes.
CO4	Understand the concepts related to the engineering of the metabolic pathways through mathematical and dynamic representation of these pathways.
CO5	Reconstruct the metabolic pathways and annotate the complete genome by the knowledge of the pathways.

PO-PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CO															
CO1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1
CO2	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1
CO3	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1
CO4	1	1	1	1	2	1	1	1	1	1	1	3	2	2	2
CO5	1	2	1	2	2	2	1	1	1	1	1	3	1	2	2

COURSE CODE: BE-528

COURSE NAME: SEQUENCE ANALYSIS AND PHYLOGENETICS

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to achieve these outcomes***

COURSE OUTCOME (CO)	**DESCRIPTION**
CO1	Understand the sequences alignment, comparison with its other sequences available in specific databases, theoretical and computational analysis of algorithm.
CO2	Understand the different approaches of matrices and problem solving, construction of PAM and BLOSSUM matrices and their applications
CO3	Understand the uses of various software and tools to validate the sequences search and similarity to others sequences and display, annotation, and retrieval tools of biological data.
CO4	Understand and development of the Phylogenetics and phylogenetic trees; Reconstruction of Phylogenetic trees by using bioinformatics tools.
CO5	Explain applications of algorithm in the area of biological and biomedical sciences, applications and overview of MEGA software

CO-PO/PSO mapping

PO-PSO	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PS**	**PO**	**PS**

CO															
CO1	1	1	1	1	3	1	1	1	1	1	0	3	2	2	1
CO2	2	2	1	2	3	1	1	1	2	1	0	3	3	3	3
CO3	2	2	1	2	3	1	1	1	2	1	0	3	3	3	2
CO4	2	2	2	2	3	1	1	1	3	1	0	3	3	3	3
CO5	1	1	2	2	3	1	1	1	3	1	0	3	2	2	3

COURSE CODE: BE-529
COURSE: **MODELING AND PHYLOGENETICS LAB**

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	**DESCRIPTION**
CO1	Draw the 2D and 3D structures of chemical compounds in the ChemSketch software and build the dipeptides, tripeptides and oligonucleotides molecules in the Argus Lab.
CO2	Carry out the Energy minimization studies of the biological molecules using SPDB viewer by applying the GROMOS force field.
CO3	Virtually mutate the small parts of protein molecules and study the Molecular Dynamics with the help of GROMACS. The students will also be able to perform the secondary structure prediction studies of the given protein using GOR and nnPredict tools available at ExPASy sever.
CO4	Perform the homology based comparative protein modeling of the given protein using MODELER and validate the Homology based predicted model using different tools such as WHATIF, PROSA, PROCHECK, and VERIFY 3D.
CO	Carry out multiple sequence alignment of the given nucleotide sequences using Clustal W and T-Coffee tools.

CO-PO/PSO mapping

PO-PSO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**POS2**	**PSO3**
CO1	1	2	1	1	3	2	1	1	3	1	0	3	2	1	2

CO2	2	2	3	2	3	3	1	1	3	1	0	3	2	2	2
CO3	2	3	3	3	3	3	1	1	3	1	0	3	2	3	3
CO4	2	3	3	3	3	3	1	1	3	1	0	3	2	3	3
CO5	2	2	3	2	3	3	1	1	3	1	0	3	2	2	3

III SEM

Course Code: BE 604

Course name: ADVANCES IN MOLECULAR TECHNIQUES

Course Outcome (CO)

Course Outcome (CO)	**Description**
CO1	The students will learn different techniques of DNA amplification, their principle and applications.
CO2	The students will understand the application of gene therapy by the use of gene silencing technique
CO3	The students will learn about the different DNA sequencing techniques, there principle, method, result interpretation and applications.
CO4	To make students understand about the importance and use of Molecular markers and techniques in molecular biology and biotechnology to identify a particular sequence of DNA in a pool of unknown DNA

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
CO1	**3**	**2**	**2**	**1**	**2**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**3**	**2**	**2**
CO2	**2**	**2**	**3**	**2**	**2**	**1**	**2**	**1**	**0**	**0**	**0**	**1**	**3**	**2**	**0**
CO3	**1**	**2**	**3**	**2**	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**2**	**1**
CO4	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**0**	**0**	**2**	**1**	**2**	**3**

COURSE CODE: BE620

COURSE: **COMPUTER AIDED DRUG DESIGN**

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

Course Outcome (CO)	**Description**
CO1	Explain the stages of modern era drug designing and apply it while correlating with any drug's discovery and approval pattern.
CO2	Analyze the important drug targets and understand its significance in designing new drugs against new targets.
CO3	Understand the concept and applications of structure based drug design and apply it in corresponding case studies.
CO4	Understand the concept and applications of ligand based drug design and apply it in corresponding case studies.
CO5	Analyze the pharmacokinetic and toxicity related issues of the drug molecules.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
CO1	1	2	2	3	3	2	1	2	1	2	1	2	3	2	2
CO2	1	2	2	2	2	2	1	1	1	2	1	1	3	2	1
CO3	3	3	3	3	2	2	1	1	1	1	1	2	3	1	2
CO4	3	3	3	3	2	2	1	1	1	1	1	2	3	1	2
CO5	3	2	2	1	3	2	2	1	1	1	1	2	3	2	2

COURSE CODE: BE621

COURSE: **APPLIED GENOMICS**

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand the term genome and the methods of genetic and physical mapping.
CO2	Learn about different methods of DNA sequencing, genome annotation, and gene prediction.
CO3	Understand the concepts of structural, functional, and comparative genomics; and gain knowledge about the applications of comparative genomics.
CO4	Understand the concept of microarray data analysis for gene expression and will gain knowledge about the bioinformatics tools used in microarray data analysis.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	1	1	1	1	1	1	0	3	1	1	1
CO2	2	3	1	1	2	2	1	1	1	1	0	3	2	3	1
CO3	1	2	1	1	2	3	1	1	1	1	0	3	1	3	1
CO4	2	3	3	2	3	2	1	1	1	1	0	3	2	3	1

COURSE CODE BE622

COURSE: PROTEIN INFORMATICS

Course Outcomes (CO): ***After completion of the course, students will be able to achieve these outcomes***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand the details of protein's hierarchical evolutionary classification and their associated databases.
CO2	Explain the concepts and applications of spectroscopy and their impact on display and analysis of proteomics data.
CO3	Understand the basics of chromatography and electrophoretic techniques and their implications to the analysis of biological macromolecules.
CO4	Discuss the practical aspects of protein-protein interactions using online tools of Expert Protein Analysis System (ExPASy).

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**2**	**2**	**2**	**2**	**3**	**2**	**2**	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**2**
CO2	**2**	**2**	**1**	**3**	**3**	**1**	**1**	**1**	**1**	**3**	**2**	**3**	**2**	**2**	**2**
CO3	**1**	**2**	**2**	**2**	**3**	**1**	**1**	**1**	**1**	**2**	**1**	**3**	**2**	**2**	**2**
CO4	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**1**	**1**	**2**	**1**	**3**	**2**	**2**	**2**

COURSE CODE: BE623

COURSE: **COMPUTATIONAL AND SYSTEM BIOLOGY**

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand the basic concepts and principles of computational modeling and its advantages.
CO2	Understand the concepts and utility of system biology tools such as modeling tools and databases such as Gene Ontology and Reactome.
CO3	Understand the concepts of simulation related to pathways and gene networks.
CO4	Understand the basic concepts of designing of gene circuits and databases related to systems biology.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	2	2	1	1	1	2	1	0	3	2	3	3

CO2	2	2	2	2	3	1	1	1	2	1	0	3	2	3	3
CO3	2	2	2	2	3	1	1	1	2	1	0	3	2	3	3
CO4	2	2	2	2	3	1	1	1	2	1	0	3	2	3	3

COURSE CODE: BE624

COURSE: CHEMOINFORMATICS AND PHARMACOGENOMICS

COURSE OUTCOMES (CO): ***After completion of the course, a student will***

Course Outcome (CO)	**Description**
CO1	Explain the concept of design and applications of chemical databases.
CO2	Analyze the important chemoinformatics tools required in the process of drug discovery.
CO3	Understand the concept of pharmacogenomics and its current developments.
CO4	Understand the concept of drug metabolism and correlate it with drug response pattern in human pharmacokinetic studies.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
CO1	2	2	3	2	2	1	1	1	2	2	1	2	3	1	2
CO2	3	2	2	3	3	1	1	1	2	2	1	2	2	3	1
CO3	3	3	3	2	2	2	1	2	1	2	1	2	3	2	1
CO4	3	3	2	3	2	2	2	2	1	2	1	2	2	3	1

COURSE CODE: BE625

COURSE: COMPUTER AIDED DRUG DESIGN LAB

COURSE OUTCOMES (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Retrieve the protein structures from PDB and perform energy minimization studies. The students will become efficient in visualizing and commenting on the active sites of the retrieved protein structures using Accelrys Discovery studio visualizer.
CO2	Identify the ligand binding sites in the protein molecules using Q-site Finder.
CO3	Retrieve the chemical compounds from the PubChem database and convert them into suitable pdb, asn and mol formats using Open Babel.
CO4	Perform the protein-ligand docking experiments using AutoDock Tools and the protein-protein docking experiments using Z-DOCK server; and draw out important inferences.
CO5	Check the Drug-Likeliness properties of the given chemical compound using Lipinski's Rule of Five, and the *in silico* toxicity studies of the given chemical compound and draw out the important inferences.

CO-PO/PSO mapping

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	2	2	2	1	1	1	3	3	1	3	2	3	3
CO2	3	1	2	2	2	1	1	1	3	3	1	3	2	3	3
CO3	3	1	2	2	3	1	1	1	3	3	1	3	2	3	3
CO4	3	1	2	3	3	1	1	1	3	3	1	3	2	3	3
CO5	3	1	2	3	3	1	1	1	3	3	1	3	2	3	3

COURSE CODE:BE603
COURSE NAME: COLLOQUIUM

Course Outcomes (CO): ***After completion of the course, a student will be able to***

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Perform scientific literature survey for a given research topic.
CO2	Identify research gap based on the literature survey.
CO3	Define a research problem, design the methodology to solve the said problem and analyze the solution.
CO4	Understand the ethics in conducting research.
CO5	Write a report on the research work in a proper format.

CO-PO/PSO mappimg

PO-PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
CO1	0	0	0	0	3	3	0	0	3	0	2	2	3	3	3
CO2	0	2	2	3	2	3	0	0	2	0	0	2	3	3	3
CO3	0	3	3	3	3	3	0	0	3	0	3	3	3	3	3
CO4	0	0	0	0	0	3	0	3	0	0	0	3	3	3	3
CO5	0	0	2	2	3	3	0	2	2	3	3	3	3	3	3

I SEMESTER

Course Code	Course Name	SEM
BE-520	Bioinformatics and Biological Databases	I
BE-520	Bioinformatics and Biological Databases	I
BE-520	Bioinformatics and Biological Databases	I
BE-520	Bioinformatics and Biological Databases	I
BE-520	Bioinformatics and Biological Databases	I
BE-520	Bioinformatics and Biological Databases	I

Course Code:	Course Name	Sem
BE521	Biochemistry and Genetic Engineering	I
BE521	Biochemistry and Genetic Engineering	I
BE521	Biochemistry and Genetic Engineering	I
BE521	Biochemistry and Genetic Engineering	I
BE521	Biochemistry and Genetic Engineering	I
BE521	Biochemistry and Genetic Engineering	I

Course Code:	Course Name	Sem
BE523	Biochemistry and Molecular Biology Lab	I
BE523	Biochemistry and Molecular Biology Lab	I
BE523	Biochemistry and Molecular Biology Lab	I
BE523	Biochemistry and Molecular Biology Lab	I
BE523	Biochemistry and Molecular Biology Lab	I
BE523	Biochemistry and Molecular Biology Lab	I

Course Code:	Course Name	Sem
BE524	Bioinformatics and Programming Language Lab	I
BE524	Bioinformatics and Programming Language Lab	I
BE524	Bioinformatics and Programming Language Lab	I
BE524	Bioinformatics and Programming Language Lab	I
BE524	Bioinformatics and Programming Language Lab	I
BE524	Bioinformatics and Programming Language Lab	I

II SEMESTER

Course Code	Course Name	SEM
BE-525	Biomolecular Modeling and simulation	II
BE-525	Biomolecular Modeling and simulation	II
BE-525	Biomolecular Modeling and simulation	II
BE-525	Biomolecular Modeling and simulation	II
BE-525	Biomolecular Modeling and simulation	II

BE-525	Biomolecular Modeling and simulation	II

Course Code	Course Name	SEM
BE-526	Algorithms in Molecular Biology	II
BE-526	Algorithms in Molecular Biology	II
BE-526	Algorithms in Molecular Biology	II
BE-526	Algorithms in Molecular Biology	II
BE-526	Algorithms in Molecular Biology	II
BE-526	Algorithms in Molecular Biology	II

Course Code	Course Name	SEM
BE-527	Metabolomics	II
BE-527	Metabolomics	II
BE-527	Metabolomics	II
BE-527	Metabolomics	II
BE-527	Metabolomics	II
BE-527	Metabolomics	II

Course Code	Course Name	SEM
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II
BE-528	Sequence Analysis and Phylogenetics	II

Course Code	Course Name	SEM
BE-529	Modeling and Phylogenetic Lab	II
BE-529	Modeling and Phylogenetic Lab	II
BE-529	Modeling and Phylogenetic Lab	II
BE-529	Modeling and Phylogenetic Lab	II
BE-529	Modeling and Phylogenetic Lab	II
BE-529	Modeling and Phylogenetic Lab	II

III SEMESTER

Course Code:	Course Name	Sem
BE604	ADVANCES IN MOLECULAR TECHNIQUES	III
BE604	ADVANCES IN MOLECULAR TECHNIQUES	III
BE604	ADVANCES IN MOLECULAR TECHNIQUES	III
BE604	ADVANCES IN MOLECULAR TECHNIQUES	III

BE604	ADVANCES IN MOLECULAR TECHNIQUES	III

Course Code:	Course Name	Sem
BE620	Compute Aided Drug Design	III
BE620	Compute Aided Drug Design	III
BE620	Compute Aided Drug Design	III
BE620	Compute Aided Drug Design	III
BE620	Compute Aided Drug Design	III
BE620	Compute Aided Drug Design	III

Course Code	Course Name	SEM
BE-621	Applied Genomics	III
BE-621	Applied Genomics	III
BE-621	Applied Genomics	III
BE-621	Applied Genomics	III
BE-621	Applied Genomics	III

Course Code	Course Name	SEM
BE-622	Protein informatics	III
BE-622	Protein informatics	III
BE-622	Protein informatics	III
BE-622	Protein informatics	III
BE-622	Protein informatics	III

Course Code	Course Name	SEM
BE-623	Computational And System Biology	III
BE-623	Computational And System Biology	III
BE-623	Computational And System Biology	III
BE-623	Computational And System Biology	III
BE-623	Computational And System Biology	III

Course Code	Course Name	SEM
BE-624	CHEMOINFORMATICS AND PHARMACOGENOMICS	III
BE-624	CHEMOINFORMATICS AND PHARMACOGENOMICS	III
BE-624	CHEMOINFORMATICS AND PHARMACOGENOMICS	III
BE-624	CHEMOINFORMATICS AND PHARMACOGENOMICS	III
BE-624	CHEMOINFORMATICS AND PHARMACOGENOMICS	III

Course Code	Course Name	SEM
BE-625	Computer Aided Drug Design Lab	III

BE-625	Computer Aided Drug Design Lab	III
BE-625	Computer Aided Drug Design Lab	III
BE-625	Computer Aided Drug Design Lab	III
BE-625	Computer Aided Drug Design Lab	III
BE-625	Computer Aided Drug Design Lab	III

Course Code	Course Name	SEM
BE-603	Colloquium	III
BE-603	Colloquium	III
BE-603	Colloquium	III
BE-603	Colloquium	III
BE-603	Colloquium	III
BE-603	Colloquium	III

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	2	3	1	1
CO2	2	2	1	2	3	1	1
CO3	1	1	1	2	3	1	1
CO4	2	2	2	2	3	1	1
CO5	1	1	2	2	3	1	1
BE-520	1.4	1.4	1.4	2	3	1	1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	2	3	0	1
CO2	3	3	3	2	2	0	1
CO3	3	3	3	2	2	0	1
CO4	3	3	3	2	2	1	1
CO5	3	3	3	2	2	1	1
BE-521	**3**	**3**	**3**	**2**	**2.2**	**0.4**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	3	2	2	1	1	2
CO2	1	3	2	2	1	1	2
CO3	1	3	2	2	3	1	2
CO4	1	3	2	2	2	1	2
CO5	1	3	2	2	2	1	2
BE523	**1**	**3**	**2**	**2**	**1.8**	**1**	**2**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	2	1	1
CO2	2	2	2	2	2	1	1
CO3	2	2	2	2	3	1	1
CO4	2	2	2	2	2	1	1
CO5	2	2	2	2	3	1	1
BE524	**2**	**2**	**2**	**2**	**2.4**	**1**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	2	2	1	1
CO2	2	2	1	2	3	1	1
CO3	2	2	2	2	3	1	1
CO4	1	2	2	2	2	1	3
CO5	2	2	2	2	3	1	1

BE-525	**1.6**	**1.8**	**1.6**	**2**	**2.6**	**1**	**1.4**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	1	3	1	2
CO2	3	2	1	1	3	2	1
CO3	3	2	1	2	2	1	1
CO4	3	1	1	2	2	2	2
CO5	3	1	2	1	2	1	1
BE-526	**2.7**	**2.0**	**1.3**	**1.3**	**2.7**	**1.3**	**1.3**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	2	2	1	1
CO2	3	1	2	2	2	1	1
CO3	3	1	2	2	3	1	1
CO4	3	1	2	3	3	1	1
CO5	3	1	2	3	3	1	1
BE-527	**3**	**1**	**2**	**2.4**	**2.6**	**1**	**1**

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	1	1	1	3	1	1
CO2	2	2	1	2	3	1	1
CO3	2	2	1	2	3	1	1
CO4	2	2	2	2	3	1	1
CO5	1	1	2	2	3	1	1
BE-528	1.6	1.6	1.4	1.8	3	1	1

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1	1	3	2	1
CO2	2	2	3	2	3	3	1
CO3	2	3	3	3	3	3	1
CO4	2	3	3	3	3	3	1
CO5	2	2	3	2	3	3	1
BE-529	**1.8**	**2.4**	**2.6**	**2.2**	**3**	**2.8**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	**3**	**2**	**2**	**1**	**2**	**0**	**2**
CO2	**2**	**2**	**3**	**2**	**2**	**1**	**2**
CO3	**1**	**2**	**3**	**2**	**3**	**2**	**1**
CO4	**3**	**2**	**3**	**3**	**2**	**3**	**3**

BE604	**2.3**	**2.0**	**2.8**	**2.0**	**2.3**	**1.5**	**2.0**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	2	3	3	2	1
CO2	1	2	2	2	2	2	1
CO3	3	3	3	3	2	2	1
CO4	3	3	3	3	2	2	1
CO5	3	2	2	1	3	2	2
BE620	2.2	2.4	2.4	2.4	2.4	2	1.2

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	1	2	1	1	1	1	1
CO2	2	3	1	1	2	2	1
CO3	1	2	1	1	2	3	1
CO4	2	3	3	2	3	2	1
BE-621	**1.5**	**2.5**	**1.5**	**1.25**	**2**	**2**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	2	2	3	2	2
CO2	2	2	1	3	3	1	1
CO3	1	2	2	2	3	1	1
CO4	1	2	2	2	2	1	1
BE-622	**1.5**	**2**	**1.75**	**2.25**	**2.75**	**1.25**	**1.25**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	1	2	2	1	1
CO2	2	2	2	2	3	1	1
CO3	2	2	2	2	3	1	1
CO4	2	2	2	2	3	1	1
BE-625	**2**	**1.75**	**1.75**	**2**	**2.75**	**1**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	2	3	2	2	1	1
CO2	3	2	2	3	3	1	1
CO3	3	3	3	2	2	2	1
CO4	3	3	2	3	2	2	2
BE-624	**2.7**	**2.3**	**2.7**	**2.3**	**2.3**	**1.3**	**1.0**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	1	2	2	2	1	1

CO2	3	1	2	2	2	1	1
CO3	3	1	2	2	3	1	1
CO4	3	1	2	3	3	1	1
CO5	3	1	2	3	3	1	1
BE-625	**3**	**1**	**2**	**2.4**	**2.6**	**1**	**1**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	0	0	0	0	3	3	0
CO2	0	2	2	3	2	3	0
CO3	0	3	3	3	3	3	0
CO4	0	0	0	0	0	3	0
CO5	0	0	2	2	3	3	0
BE-603	**0**	**1**	**1.4**	**1.6**	**2.2**	**3**	**0**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	1	1	0	3	2	2	1
1	2	1	0	3	3	3	3
1	2	1	0	3	3	3	1
1	2	1	0	3	3	3	3
1	3	1	0	3	2	2	3
1	2	1	0	3	2.6	2.6	2.2

PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	1	1	0	2	3	3	3
1	1	1	0	2	2	3	3
1	1	1	0	2	2	2	3
1	1	1	0	2	3	1	1
1	1	1	0	2	3	1	1
1	**1**	**1**	**0**	**2**	**2.6**	**2**	**2.2**

PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	3	3	1	1
1	3	3	1	3	3	1	1
1	3	3	1	3	3	1	1
1	3	3	1	3	3	1	1
1	3	3	1	3	3	1	1
1	**3**	**3**	**1**	**3**	**3**	**1**	**1**

PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	3	3	1	3	1	3	3
1	3	3	1	3	1	3	3
1	3	3	1	3	1	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	**3**	**3**	**1**	**3**	**1.4**	**3**	**3**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
2	1	1	1	3	2	3	3
2	1	1	1	1	2	2	3
1	1	1	2	1	3	3	3
2	2	1	2	3	3	3	2
1	1	1	1	3	2	2	2

1.6	**1.2**	**1**	**1.4**	**2.2**	**2.4**	**2.6**	**2.6**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
2	2	2	3	2	2	1	3
1	1	2	1	1	1	1	3
1	2	2	1	2	2	2	2
1	2	2	1	2	2	1	1
2	2	2	2	2	3	2	3
1.3	**1.7**	**2.0**	**1.7**	**1.7**	**1.7**	**1.3**	**2.7**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	**3**	**3**	**1**	**3**	**2**	**3**	**3**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	1	1	0	3	2	2	1
1	2	1	0	3	3	3	3
1	2	1	0	3	3	3	2
1	3	1	0	3	3	3	3
1	3	1	0	3	2	2	3
1	2.2	1	0	3	2.6	2.6	2.4

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	3	1	0	3	2	1	2
1	3	1	0	3	2	2	2
1	3	1	0	3	2	3	3
1	3	1	0	3	2	3	3
1	3	1	0	3	2	2	3
1	**3**	**1**	**0**	**3**	**2**	**2.2**	**2.6**

PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
0	**0**	**0**	**0**	**1**	**3**	**2**	**2**
1	**0**	**0**	**0**	**1**	**3**	**2**	**0**
0	**0**	**0**	**0**	**1**	**1**	**2**	**1**
2	**1**	**0**	**0**	**2**	**1**	**2**	**3**

1.0	**0.5**	**0.0**	**0.0**	**1.3**	**2.0**	**2.0**	**1.5**

PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
2	1	2	1	2	3	2	2
1	1	2	1	1	3	2	1
1	1	1	1	2	3	1	2
1	1	1	1	2	3	1	2
1	1	1	1	2	3	2	2
1.2	1	1.4	1	1.8	3	1.6	1.8

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	1	1	0	3	1	1	1
1	1	1	0	3	2	3	1
1	1	1	0	3	1	3	1
1	1	1	0	3	2	3	1
1	**1**	**1**	**0**	**3**	**1.5**	**2.5**	**1**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	1	3	2	3	2	2	2
1	1	3	2	3	2	2	2
1	1	2	1	3	2	2	2
1	1	2	1	3	2	2	2
1	**1**	**2.5**	**1.5**	**3**	**2**	**2**	**2**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	2	1	0	3	2	3	3
1	2	1	0	3	2	3	3
1	2	1	0	3	2	3	3
1	2	1	0	3	2	3	3
1	**2**	**1**	**0**	**3**	**2**	**3**	**3**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	2	2	1	2	3	1	2
1	2	2	1	2	2	3	1
2	1	2	1	2	3	2	1
2	1	2	1	2	2	3	1
1.3	**1.7**	**2.0**	**1.0**	**2.0**	**2.7**	**2.0**	**1.3**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
1	3	3	1	3	2	3	3

1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	3	3	1	3	2	3	3
1	**3**	**3**	**1**	**3**	**2**	**3**	**3**

PO8	PO9	PO10	PO11	PO12	PSO1	POS2	PSO3
0	3	0	2	2	3	3	3
0	2	0	0	2	3	3	3
0	3	0	3	3	3	3	3
3	0	0	0	3	3	3	3
2	2	3	3	3	3	3	3
1	**2**	**0.6**	**1.6**	**2.6**	**3**	**3**	**3**