STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : Bioinformatics
Name/s of the Faculty : Ms. Pujaa B
Course Title : Biomolecules and Biochemistry
Course Code : 23BI/PC/BM14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Define the structure, function, concepts of Biomolecules and relate the importance of the biomolecules	K1, K2
CO2	Illustrate the intricacies of metabolic pathways and inculcate effective reasoning capability	K3
CO3	Demonstrate the importance of enzymes and enzyme kinetics to inter-relate their role in normal vs diseased condition	K4
CO4	Interpret the primary to highly complex structures of protein and its folding mechanisms in evaluating the research questions	K5
CO5	Examine the nature of biomolecules, xenobiotics and the applications of various analytical techniques	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	1.1. Biomolecules - Structure and functions of Atoms and Molecules	K1-K4	6	1-5	Lecture and Power Point presentations	Quiz and discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)		1.2. Chemical bonds - Covalent and non-covalent interactions, acid base concept and buffers, pH, water - properties and its importance	K2-K5	6	1-5	Lecture and Power Point presentations	Quiz and discussion
July 5 – 12, 2024 (Day Order 1 - 6)		1.3. Bioenergetics - Thermodynamics systems - laws of thermodynamics, entropy and enthalpy, concepts of free energy	K3-K6	4	1-5	Lecture and Power Point presentations	Written test (15 marks)
July 15 – 23, 2024 (Day Order 1 - 6)	2	2.1. Structures, types and Functions of Carbohydrates	K1-K4	5	1-5	Group discussion	Assignments
July 24 – 31, 2024 (Day Order 1 - 6)		2.2. Structure, types and function of Lipids and nucleic acids	K2-K5	5	1-5	Lecture and Power Point presentations	Quiz and discussion
Aug 1 – 5, 2024 (Day Order 1 - 3)		2.3. Carbohydrate and Lipid metabolism – Glycolysis, Glycogen metabolism, TCA cycle, β-oxidation	K3-K6	3	1-5	Discussion and role play	Presentation
Aug 6 – 10, 2024	**C.A. Test - I**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	3.1. Structures and properties of amino acids, Peptide bonds, disulphide bridges and other conformations.	K1-K4	3	1-5	Lecture and Power Point presentations	Quiz and discussion

Aug 16 – 23, 2024 (Day Order 1-6)		3.2. Protein structure levels- primary, secondary, tertiary, quaternary. Ramachandran plot.	K2-K5	5	1-5	Lecture and Power Point presentations	Written test
Aug 27 – Sep 3, 2024 (Day Order 1-6)		3.3. Protein folding pathways, classifications of proteins.	K3-K6	5	1-5	Discussion and role play	III component Seminar (20 marks)
Sep 4 – 11, 2024 (Day Order 1-6)	4	4.1 Nomenclature, Classification of enzymes, Enzyme specificity, Cofactors, Coenzyme and Prosthetic group	K1-K4	3	1-5	Lecture and Power Point presentations	Quiz and discussion
Sep 12 - 20, 2024 (Day Order 1-6)		4.2 Enzyme Kinetics, Michaelis-Menten Equation, significance of Vmax and Km, Enzyme inhibition Competitive and non-competitive Inhibition, Feedback inhibition. Enzyme regulation. Allosteric modulation.	K2-K5	5	1-5	Group discussion	III component (15 marks)
Sep 23 - 26, 2024 (Day Order 1-4)		4.3 Extraction and purification of enzymes, Immobilized enzymes, Application of enzymes in medicine and industry	K3-K6	3	1-5	Lecture and Power Point presentations	Quiz and discussion
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	5	5.1. Xenobiotics and general detoxification methods in the body.	K1-K4	3	1-5	Group discussion	III component Assignment

Oct 7 - 15, 2024 (Day Order 1 to 6)		5.2. Principles, types and applications of Spectroscopy, Nuclear Magnetic Resonance- The phenomenon, types and applications	K2-K5	5	1-5	Lecture and Power Point presentations	Discussion
Oct 16 - 22, 2024 (Day Order 1 to 6)		5.3. Mass Spectrometry for protein and peptide analysis, MALDI-TOF Analyser, Tandem Mass Analyser, The Ion Trap Mass Analyser, Q-TOF Instrument	K3-K6	4	1-5	Lecture and Power Point presentations	Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : Bioinformatics
Name/s of the Faculty : Dr. R. Sagaya Jansi
Course Title : Essentials of Bioinformatics
Course Code : 23BI/PC/EB14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Recognize and relate the biological databases, tools and software to be used in the interdisciplinary fields	K1, K2
CO2	Infer the required information from different databases and utilise the fundamental tools in bioinformatics analysis	K3
CO3	Compare and identify the differences in sequences to interpret their role in health and disease	K4
CO4	Perform a complete analysis of the genes and protein to provide innovative research outcomes	K5
CO5	Examine the gene, protein sequences and offer solutions to the health care problems	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	**Basics of Bioinformatics** 1.1. Introduction to Bioinformatics; Computers in Biology to understand Biological System; Concept of open resources in Bioinformatics. Biological databases	K1- K3	4	1-5	Lecture and Power Point presentations	Quiz and discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	1.2. Concept of reference genome. Genome sequencing - human genome project- versions hg19, hg38, T2T. Role of bioinformatics in human genome projects. Other genome projects- 1000 genomes, Encode, Indian genome project. Practical: Primary Nucleotide Sequence Databases: NCBI, EMBL, DDBJ	K2– K4	4	1-5	Learning by Doing	Practical
July 5 – 12, 2024 (Day Order 1 - 6)	1	1.3. Browsers and visualizers- UCSC, IGV, JBrowse, the Wellcome Trust Sanger Institute (WTSI), ENSEMBL, NCBI Map viewer	K5- K6	3	1-5	Lecture and Power Point presentations	Written test
July 15 – 23, 2024 (Day Order 1 - 6)	2	Introduction to Biological Databases 2.1. Type of Databases, Public Biological Databases –. Primary Nucleotide Sequence Databases: EMBL, GenBank, DDBJ	K1-K2	5	1-5	Group discussion	III Component-Assignments (10 marks)
July 24 – 31, 2024 (Day Order 1 - 6)	2	2.2. Secondary Nucleotide Sequence Databases: UniGene, Sequence Submission Methods and Tools (Sequin, Sakura, Bankit) Practical: Protein Sequence Databases – PIR, RefSeq, UniProt Practical: Genome browsers - UCSC, ENSEMBL, ENCODE, IGV	K3-K4	5	1-5	Learning by Doing	III Component-Quiz and discussion

Aug 1 – 5, 2024 (Day Order 1 - 3)	2	2.3. Sequence Retrieval Systems (Entrez & SRS); Sequence File Formats and Conversion Tools.	K5-K6	3	1-5	Demonstration	Presentation
Aug 6 – 10, 2024	**C.A. Test - I**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	**Introduction to Sequence Alignment** 3.1. Protein and nucleotide alignment, Homology, Similarity, Identity, Pairwise alignments: Dot Plots, Scoring Matrix-PAM, BLOSUM, Gap Penalty	K1-K2	3	1-5	Lecture and Power Point presentations	Quiz and discussion
Aug 16 – 23, 2024 (Day Order 1-6)	3	3.2. Dynamics programming - Alignment Algorithms: Global Sequence Alignment: Needleman-Wunsch Algorithm. Local Sequence Alignment: Smith –Waterman Algorithm. Rapid, Heuristic Versions of Smith Waterman: FASTA	K3-K4	5	1-5	Learning by Doing	III Component-Written test (20 marks)
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	3.3. Basic Local Alignment Search Tool - BLAST Search Steps, Search Strategy, E Value, Raw Scores and Bit Scores, Ensembl BLAST, TIGR BLAST, PSI-BLAST Practical: BLAST, Pairwise and Multiple	K5-K6	5	1-5	Demonstration	Practical assignments
Sep 4 – 11, 2024 (Day Order 1-6)	4	**Multiple Sequence Alignment and Phylogeny** 4.1. Definition of Multiple Sequence Alignment. Tools of Multiple Sequence Alignment Programs and their algorithms - Clustal, Phylip, MAFT, Hidden Markov Models Practical: Sequence Alignment Tools: EMBOSS, Clustal W and Clustal Omega	K1-K2	5	1-5	Lecture and Power Point presentations	Practical

Sep 12 - 20, 2024 (Day Order 1-6)	4	4.2. Evolutionary analysis, Relationship of Phylogenetic Analysis to Sequence Alignment, Genome Complexity. Bootstrap, Tree Construction Methods. Neighbor-Joining Method, Unweighted Pair Group Method with Arithmetic Mean (UPGMA)	K3-K4	5	1-5	Learning by Doing	III Component-Written test (15 marks)
Sep 23 - 26, 2024 (Day Order 1-4)	4	4.3. Character based methods: Maximum Parsimony Method and Maximum-Likelihood Method Practical: Phylogenetic Tree Construction Tool: MEGA Software, Phylip, MAFT	K5-K6	5	1-5	Lecture and Power Point presentations, Learning by Doing	Quiz and discussion
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	5	**Specialised databases** 5.1. Literature databases and biomedical databases – PubMed, OMIM, Metabolic database- KEGG, Metacyc, Reactome	K1-K2	5	1-5	Group discussion	Case study
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	5.2. Protein domain and motif prediction. Databases and tools to infer STS, EST, CDS, ORF, Domains and motifs. Protein structure databases - PDB, SCOP, CATH. Small molecule databases - Zinc, PubChem, Drug Bank. Practical: Protein Visualization Tools- Rasmol, Swiss PDB Viewer, PyMol	K3-K4	5	1-5	Lecture and Power Point presentations, Learning by Doing	Practical and Discussion
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	5.3. Homologs, paralogs, xenologs, orthologs, COG databases, Plant and Animal databases. Model organism databases - SGD, MGD, ZFIN	K5-K6	3	1-5	Lecture and Power Point presentations, Learning by Doing	Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : Bioinformatics
Name/s of the Faculty : Ms. Pujaa B
Course Title : Programming in C++ and PERL
Course Code : 23BI/PC/CP14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Explain the basics of programming to handle multitudes of data	K1, K2
CO2	Relate the necessity for programming in handling high volumes of data from various fields of science	K3
CO3	Solve biological problems with C++ and Perl scripts	K4
CO4	Apply programing to analyze genomic, proteomic sequences and structure to aid innovative research solutions	K5
CO5	Elaborate use of Bio-Perl in precisely solving complex problems in Bioinformatics	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	1.1. Machine/Assembly Language, Higher Level Languages, Simple and Compound Data, Code: Syntax and Semantics	K1-K3	6	1-5	Lecture and Power Point presentations	Quiz and discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)		1.2. Programming in C++: C++ Characteristics, Tokens, Keywords, Identifiers and Constants, Basic Data Types, User Defined Data Types, Derived Data Types, Expressions and Control Structures. Practical - Find the area and circumference of a circle, Armstrong Number, Prime Number	K2-K4	6	1-5	Point presentations and Demonstration	Quiz and Practical test
July 5 – 12, 2024 (Day Order 1 - 6)		1.3. Functions and Variables: Scope, Declaration and Definition, Arrays and Strings in C++.	K4-K6	4	1-5	Lecture and Power Point presentations	Written test
July 15 – 23, 2024 (Day Order 1 - 6)	2	2.1. Using Objects, Classes, Encapsulation, Inheritance, Abstraction and Polymorphism. Friend functions Practical - An example with classes and object Checking for palindrome of a given string (without using the built in string function)	K1-K2	5	1-5	Point presentations and Demonstration	Assignments and Practical test
July 24 – 31, 2024 (Day Order 1 - 6)		2.2. String and file operations– creating string objects, Standard Streams – string and Files, Open, close, EOF, updating files and error Handling	K3-K4	5	1-5	Lecture and practice sessions	Quiz and written test

Aug 1 – 5, 2024 (Day Order 1 - 3)		2.3. String manipulation- String operators Manipulating String, String characteristics, Comparing and Swapping	K5-K6	3	1-5	Lecture and Power Point presentations	III component test (20 marks)
Aug 6 – 10, 2024	**C.A. Test - I**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	3.1. Introduction, Statements and Declarations, Default Variable, Expressions, Statements, Operators in Perl, Control Structures	K1-K2	3	1-5	Lecture and practice sessions	Quiz and discussion
Aug 16 – 23, 2024 (Day Order 1-6)		3.2. Variable Types and Data types– Scalar, Arrays, Hashes. Functions- split, join, length, lcfirst, ucfirst, index and exists	K3-K4	5	1-5	Lecture and practice sessions	III component test (15 marks)
Aug 27 – Sep 3, 2024 (Day Order 1-6)		3.3. Creating Regular Expressions- Characters, Classes, Alternative Match Patterns, Quantifiers, Assertions, Back References, Modifiers and Translator Practical - Use regular expressions to modify a sequence of letters in Sentences. Convert DNA to RNA (transcription)	K5-K6	5	1-5	Point presentations and Demonstration	Assignments and Practical test
Sep 4 – 11, 2024 (Day Order 1-6)	4	4.1. Subroutines- Defining Subroutines, Returning Values, Using Arguments	K1-K2	3	1-5	Lecture and Power Point presentations	Quiz and discussion
Sep 12 - 20, 2024 (Day Order 1-6)		4.2. Files- Overview and working with File handles, Closing the files, printing, renaming files Practical - Translate the given RNA sequence Calculate the frequency of bases	K3-K4	5	1-5	Point presentations and Demonstration	Written and Practical test

Sep 23 - 26, 2024 (Day Order 1-4)		4.3. Various Ways of Opening a Perl File Handlers- Normal Scalar variable, Use Perl IO, Open the Standard Input and Standard Output, Use Sysopen ().	K5-K6	3	1-5	Lecture and practice sessions	Quiz and discussion
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	5	5.1. Introduction to Bioperl: Installation Procedures, Architecture, Uses of Bioperl	K1-K2	3	1-5	Lecture and Power Point presentations	Assignments
Oct 7 - 15, 2024 (Day Order 1 to 6)		5.2. Modules of bioperl- seq, seqio, alignio, db Practical - Using Bioperl retrieve a sequence from database Using Bioperl Convert DNA to Protein (Translation)	K3-K4	5	1-5	Point presentations and Demonstration	III component quiz (15 marks)
Oct 16 - 22, 2024 (Day Order 1 to 6)		5.3. Modules of Bioperl – Annotation, location, tools Practical - Using Bioperl retrieve a subset of sequences, domain and motif regions from the given protein sequence	K5-K6	4	1-5	Point presentations and Demonstration	Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : Bioinformatics
Name/s of the Faculty : Dr. M. Sharanya
Course Title : Database Management Systems
Course Code : 23BI/PC/DB14
Shift : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Explain the working of different operating systems to analyse various data types	K1, K2
CO2	Compare the data models and schemas in DBMS for a variety of datasets	K3
CO3	Create Entity- relationship between multiple data tables and write SQL queries to develop databases	K4
CO4	Compare various RDBMS tools, NoSQL databases in the context of research problems	K5
CO5	Design databases using the knowledge of SQL to provide feasible solutions	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	Introduction to File and Database systems- Record Storage and Primary File Organization- Secondary Storage Devices.	K1, K2	2	1-5	PowerPoint Presentation	Discussion
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	Linux basics commands. Working with Files, Text Editors, I/O Redirections, Pipes, Filters, and Wildcards. Practical: Linux- create directory, move directory, remove directory and create files, move files, copy files	K3-K4	5	1-5	Demonstration and Practice session	Hands-on-Exercise
July 5 – 12, 2024 (Day Order 1 - 6)	1	Changing Access Rights. Bash scripting, loops, text mining, Awk, sed and grep. Editors- vim, nano, gedit. Practical: Linux - changing user rights	K5-K6	5	1-5	Demonstration and Practice session	Hands-on-Exercise
July 15 – 23, 2024 (Day Order 1 - 6)	2	Introduction to Database Systems, Architecture, Data Models, Layers and Types of Database Management Systems	K1, K2	3	1-5	PowerPoint Presentation	Discussion
July 24 – 31, 2024 (Day Order 1 - 6)	2	Operations on Files- Heap File- Sorted Files- Hashing Techniques – Index Structure for Files. Different Types of Indexes- B-Tree - B+Tree. Database System Structure, Data Models, database schemas. Practical : Linux – using wildcard characters and sort files	K3-K4	6	1-5	Demonstration and Practice session	Hands-on-Exercise (Other Components) (15 marks)
Aug 1 – 5, 2024 (Day Order 1 - 3)	2	Database Normalisation and denormalization for Relational Databases (up to BCNF) .	K5-K6	3	1-5	PowerPoint Presentation	Group Discussion

Aug 6 – 10, 2024	**C.A. Test - I**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	Data Definition Language, Data Manipulation Language, Transaction Control and Data Control Language Grant and Revoke Privilege Command. Practical : Create – a table and insert values using SQL	K1, K2	4	1-5	Demonstration and Practice session	Hands-on-Exercise
Aug 16 – 23, 2024 (Day Order 1-6)	3	Set Operators, Joins-Kinds of Joins, Table Aliases, Sub queries, Multiple and Correlated Sub Queries. Practical : Create queries with constraints – NOT NULL and, DEFAULT	K3-K4	5	1-5	Demonstration and Practice session	Assignment (10 marks)
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	Functions-Single Row, Date, Character, Numeric, Conversion, Group Functions. Constraints-Domain, Equity, Referential Integrity Constraints Practical : Create subqueries with a where clause	K5-K6	5	1-5	Demonstration and Practice session	Hands-on-Exercise
Sep 4 – 11, 2024 (Day Order 1-6)	4	Text and Multimedia Databases - Basic Concepts and Applications, Types of DBMS-Network, object oriented, graph based. Overview of RDBMs, Advantages of RDBMs Over DBMs. Practical : Queries with Joins and functions	K1, K2	5	1-5	Demonstration and Practice session	Hands-on-Exercise

Sep 12 - 20, 2024 (Day Order 1-6)	4	Establishing relations between tables. Entity relationship concepts. Keys in linking relational databases - primary, foreign, super, candidate keys. Practical : Queries with primary and foreign keys	K3-K4	5	1-5	Demonstration and Practice session	Hands-on-Exercise
Sep 23 - 26, 2024 (Day Order 1-4)	4	Brief history of No SQL databases. Features of No SQL, differences and advantages of No SQL over RDBMS. Types and misconceptions in No SQL databases. No SQL vs SQL.	K5-K6	3	1-5	Discussion	Presentation (Other Component 15 marks)
Sep 27 – Oct 3, 2024	**C.A. Test - II**						
Oct 4 – 5, 2024 (Day 5 & 6)	5	MongoDB, web development with MongoDB, install MongoDB, shell commands.	K1, K2	5	1-5	PowerPoint Presentation	Quiz (Other Component 10 marks)
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	How can you store a DNA sequence using MongoDB? Role of MongoDB in 1000 genomes projects, MongoDB or Redis for biomedical data. Practical : Revision	K3-K4	5	1-5	PowerPoint Presentation	Discussion
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	Database file formats- JSON, BSON, Creating uniprot mongodb, querying and retrieving protein sequences.	K5-K6	3	1-5	PowerPoint Presentation	Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN June - November 2024

Department : **Bioinformatics**
Name/s of the Faculty : **Dr. P. Subbulakshmi**
Course Title : **Biomathematics and Biostatistics**
Course Code : **23BI/PE/BS15**
Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	List the importance of mathematics for research based problems	K1
CO2	Explain the different statistical tests for research	K2
CO3	Analyse and solve aptitude based problems in competitive exams	K3, K4
CO4	Evaluate the equations and problems related to population genetics	K5
CO5	Propose the regression and correlation techniques to interpret Drug activity based on QSAR	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 24 – 26, 2024 (Day Order 4 - 6)	1	**Set Theory and Vectors** 1.1 Introduction, Representation of a Set, Set Operations – Types of Sets, Subsets, Complement of Sets, Union and Intersection of Sets, Difference of Sets	K1, K2	2	1-5	Lecture and Group Discussion Learning by Doing Problems	Assignments
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	1.1 Introduction, Representation of a Set, Set Operations – Types of Sets, Subsets, Complement of Sets, Union and Intersection of Sets, Difference of Sets 1.2 De Morgan's Law, Venn diagram, Cartesian Product of Sets	K1, K2 K3, K4	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Quiz
July 5 – 12, 2024 (Day Order 1 - 6)	1	1.2 De Morgan's Law, Venn diagram, Cartesian Product of Sets 1.3 Vector Additions, Subtraction, Dot, Cross, Magnitude, Scalar Triple Product	K3, K4 K5, K6	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Problem Solving
July 15 – 23, 2024 (Day Order 1 - 6)	1 2	1.3 Vector Additions, Subtraction, Dot, Cross, Magnitude, Scalar Triple Product **Matrices, Relations and Functions** 2.1 Matrix, Basic Operations, Transpose, Square Matrices, Non Singular Matrices	K5, K6 K1, K2	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Questioning
July 24 – 31, 2024 (Day Order 1 - 6)	2	2.2 Inverse of a Matrix, Determinants, Elementary Applications	K3, K4	5	1-5	Lecture and Group Discussion Learning by Doing Problems	III Component I-Problem Assignment Test (10 Marks)

Aug 1 – 5, 2024 (Day Order 1 - 3)	2	2.3 Relations and Functions – Linear Function, Polynomials and Differences	K5, K6	3	1-5	Lecture and Group Discussion Learning by Doing Problems Case Studies	Quiz
Aug 6 – 10, 2024	**C.A. Test – I**						
Aug 12 – 14, 2024 (Day Order 4-6)	3	**Probability** 3.1 Rules of probability, Theorems of probability, Addition and Multiplication Theorem	K1, K2	2	1-5	Lecture and Group Discussion Learning by Doing Problems	Problem solving
Aug 16 – 23, 2024 (Day Order 1-6)	3	3.2 Probability distributions: Binomial distribution, Poisson distribution, Normal distribution	K3, K4	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Assignments
Aug 27 – Sep 3, 2024 (Day Order 1-6)	3	3.3 Binomial Coefficient, Permutations, Combinations, Identities, Applications	K5, K6	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Third Component (20 marks)
Sep 4 – 11, 2024 (Day Order 1-6)	3 4	3.3 Binomial Coefficient, Permutations, Combinations, Identities, Applications **Introduction to Biostatistics** 4.1 Scope, collection, classification and tabulation, Graphical representation of data – measures of location and dispersion – Diagrammatic and Graphical Presentation of data, Types of data	K5, K6 K1, K2	5	1-5	Lecture and Group Discussion Learning by Doing Problems Case Studies	Presentations
Sep 12 - 20, 2024 (Day Order 1-6)	4	4.2 Frequency distribution: Discrete and continuous frequency distribution, Mean-Median-Mode	K3, K4	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Problem Solving

Sep 23 - 26, 2024 (Day Order 1-4)	4	4.3 Measures of dispersion- Standard Deviation, Coefficient of Variation, Range	K5, K6	4	1-5	Lecture and Group Discussion Learning by Doing Problems	Problem Solving
Sep 27 – Oct 3, 2024	**C.A. Test – II**						
Oct 4 – 5, 2024 (Day 5 & 6)	4	4.3 Measures of dispersion- Standard Deviation, Coefficient of Variation, Range	K5, K6	1	1-5	Lecture and Group Discussion Learning by Doing Problems Case Studies	Quiz
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	**Application and Testing** 5.1 Sampling techniques, Sampling Distribution, Standard error, testing of hypotheses, Null Hypothesis 5.2 Correlation – Types of Correlation- Simple, Linear and Nonlinear- Pearson's Coefficient Correlation, Regression analysis- Types of Regression, Regression Equations	K1, K2 K3, K4	5	1-5	Lecture and Group Discussion Learning by Doing Problems	Third Component Test- (20 Marks)
Oct 16 - 22, 2024 (Day Order 1 to 6)	5	5.3 Chi-square test, t-test, Analysis of Variance (ANOVA), Population Genetics: Hardy-Wienberg principle	K5, K6	5	1-5	Lecture and Group Discussion Learning by Doing Problems Case Studies	Discussion
Oct 23 - 24, 2024 (Day Order 1 to 2)	**REVISION**						