STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Ms. K. S. Dhanya**

Course Title : **Molecular Biology**

Course Code : **23BI/PC/MB24**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Grasp the functions of the prokaryotic and eukaryotic genome mechanisms at the molecular level	K1
CO2	Represent and illustrate the structural organization of genes and the control of gene expression	K2
CO3	Interpret the significance of central dogma of life	K3, K4
CO4	Relate and analyse the protein synthesis mechanism	K4,K5
CO5	Link the concepts of molecular signaling to a better understanding of diseases, including cancer	K5,K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 18 – 25, 2024	1	**Unit 1: Structure and Organisation of**	K1-K3	2	1-5	Lecture, PowerPoint	Case studies

(Day Order 1-6)		**Genesand Chromosomes** 1.1. DNA-Structure and Conformations, Chromosomes – Structure and Functions				presentation and Animations	
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.2. Cell division - Mitosisand meiosis, Cell cycle regulation, Check points	K2-K4	4	1-5	Lecture, PowerPoint presentation and Animations	III Component Assignment-15 marks
Dec 4-11, 2024 (Day Order 1 to 6)	1	1.3. Organisation of Genomes - Coding Sequences, Repetitive Sequences, transposons	K5-K6	4	1-5	Lecture and PowerPoint presentation	Discussion
Dec 12-19, 2024 (Day Order 1 to 6)	2	**Unit 2: Organelle, Bacterialand Viral Genome** 2.1. Mitochondrion Genome - Organisation andFunction	K1-K3	3	1-5	Lecture and PowerPoint presentation	Discussion
Dec 20, 2024 (Day Order 1)	2	2.1. Chloroplast Genome -Organisation and Function	K1-K3	3	1-5	Lecture and PowerPoint presentation	Quiz/Puzzle
Jan 3 – 7, 2025 (Day Order 3 to 6)	2	2.2. Bacteria - Cells structure and bacterial genetics	K2-K4	4	1-5	Lecture and PowerPoint presentation	Discussion
Jan 8 – 17, 2024 (Day Order 1 to 6)	2	2.3. Virus - Structure, Viralgenome, Viroids and Prions	K5-K6	3	1-5	Lecture and PowerPoint presentation	Quiz/Puzzle
Jan 18 - 23, 2025	**C.A. Test - I**						

Jan 24 -31, 2025 (Day Order 1 to 6)	3	**Unit 3: Replication andTranscription** 3.1. DNA replication, Mutations, DNA damage and repair mechanisms in prokaryotes and eukaryotes	K1-K3	3	1-5	Lecture and PowerPoint presentation	Discussion
Feb 3-8, 2025 (Day Order 1 to 6)	3	3.2. Transcription- Prokaryotes, Transcriptionalcontrol by regulatory proteins, RNA polymerases	K1-K3	3	1-5	Lecture and PowerPoint presentation	III Component-Test (20 marks)
Feb 10– 18, 2025 (Day Order 1 to 4)	3	3.3. Post Transcriptional Regulation - DNA Methylation, Histone modification - Capping, RNAediting, Splicing, and Polyadenylation	K5-K6	3	1-5	Lecture and PowerPoint presentation	Discussion
Feb 19- 26, 2025 (Day Order 1-6)	4	**Unit 4: Translation** 4.1. RNA- Types, structure and functions, Ribosomes – Structure andAssembly 4.2. Translational Regulation - Regulation of gene expression in Prokaryotes (Operon)	K1-K3	3	1-5	Lecture and PowerPoint presentation	Group Discussion
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	4.2. Translational Regulation - Regulation of gene expression in Eukaryotes, Genetic code, GeneSilencing 4.3. Post- translational modifications of proteins	K2-K4	3	1-5	Lecture and PowerPoint presentation	Discussion
Mar 7 – 11, 2025 (Day Order 1 to 3)	5	**Unit 5: Cell Signaling andCancer** 5.1. Cell signaling – Signaling molecules, Receptors - Hormonesreceptors, cell surface receptor, G-protein coupledreceptors, signal	K1-K3	5	1-5	Lecture and PowerPoint presentation	Discussion

		transduction pathways					
Mar 12 –17, 2025	**C.A. Test - II**						
Mar 18 – 20, 2025 (Day 4 to 6)	5	5.2. Cancer Biology- Characteristics and geneticbasis of cancers, Proto- oncogene, Oncogenes, Tumor Suppressor Genes	K2-K4	5	1-5	Lecture and PowerPoint presentation	III Component-Test (15 marks)
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.3. Oncogenesis - Cancer Immunotherapy, Regulationof Cell Death, Apoptosis	K5-K6	5	1-5	Lecture and PowerPoint presentation	Discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Dr. M. Sharanya**

Course Title : **Genomics and Transcriptomics**

Course Code : **23BI/PC/GT24**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Acquaint the fundamental concepts of genome sequencing, file formats and data analysis	K1
CO2	Perform powerful computational and statistical methods to decode the functional information hidden in DNAand RNA sequences	K2
CO3	Experiential knowledge on Next generation sequencing and gene editing techniques	K3
CO4	Exploit the mechanisms of genomics and transcriptomics to deal with the growing demand for multiomics	K4
CO5	Apply functional genomics techniques to analyse data from biological system	K5, K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Nov 18 – 25, 2024 (Day Order 1-6)	1	**Unit 1: Genome Sequencing and Sequence File Formats** 1.1. Understanding a Genome sequence, Locating the genes in a Genome Sequence	K1- K3	2	1-5	Lecture and PowerPoint presentation	Quiz and Puzzles
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.1 Genome Sequencing technologies - Conventional Sequencing techniques **Practical Component:** Genome databases of plants, animals and pathogens, Gene Prediction by ORF analysis, Genscan, UCSC Genome Browser	K1- K3 K1- K2	2 2	1-5 1-5	Lecture and PowerPoint presentation Demonstration and Practice	Discussions Record and Assignment- Genome Browser
Dec 4-11, 2024 (Day Order 1 to 6)	1	1.2. Next generation sequencing technology- Whole Genome Shotgun Sequencing, Exome and amplicon sequencing, Genome assembly, Comparative Genomics **Practical Component:** DNA markers - dbSNP, EST Clustering databases - DBEST,UNIGene	K2– K4 K1- K2	2 2	1-5 1-5	Lecture and PowerPoint presentation Demonstration and Practice	Group Discussion Record and Assignment- Public repositories
Dec 12-19, 2024 (Day Order 1 to 6)	1	1.3. File formats- FASTQ, SAM/BAM, VCF, GFF/GTF, and BED. Databases and tools, Variations	K5- K6	2	1-5	Lecture and Presentations	File format analysis/

		at the Level of individual Nucleotides, Duplications, Indels, Rates and patterns of Nucleotide substitution, Molecular Clocks					puzzles
Dec 20, 2024 (Day Order 1)	2	**Unit 2: Epigenetic and Metagenome sequence analysis** 2.1. Genome variant analysis- GATK pipeline, concepts of genome wide association studies (GWAS) **Practical Component:** Command line SRA download, GATKpipeline	K1, K2 K1- K2	3 2	1-5 1-5	Lecture, PowerPoint Presentations and Discussion Demonstration and Practice	Case Studies Record and Assignment – SRA sequence retrieval
Jan 3 – 7, 2025 (Day Order 3 to 6)	2	2.2. Metagenome analysis- amplicon and shotgun metagenome, Alpha and Beta diversity, rarefaction curves and metrics	K3, K4	2	1-5	Lecture and PowerPoint Presentations	Discussion
Jan 8 – 17, 2024 (Day Order 1 to 6)	2	2.2 Logical steps for metagenome analysis, Taxonomical classification- silvaDB, green genes **Practical Component:** Metagenomics - In silico -Mg RAST, Kaiju web server, Galaxy server 2.3. Epigenomics, Local chromatin dynamics and epigenetic modifications, analysis of regulatory	K3, K4 K5- K6	2 2	1-5 1-5	Lecture and PowerPoint Presentations Demonstration and Practice	III Component Record and Assignment- Metagenomics tools

		sequence motifs, transcription factor - DNA interaction	K5, K6	2	1-5	Lecture and PowerPoint Presentations	Group Discussion
Jan 18 - 23, 2025	**C.A. Test - I**						
Jan 24 -31, 2025 (Day Order 1 to 6)	3	**Unit 3: Genome Editing** 3.1. Genome editing technologies - Clustered regularly interspaced short palindromic repeats (CRISPR) CAS 9 technology, Variants of CAS 9 nuclease, selection of targets from sequences **Practical Component:** Epigenetic data analysis, EWAS atlas, PWM and DNA binding motifs-signature logo generation	K1, K2 K3, K4	2 2	1-5 1-5	Lecture and PowerPoint Presentations Demonstration and Practice	Discussion Record and Assignment-Epigenetic data analysis
Feb 3-8, 2025 (Day Order 1 to 6)	3	3.2. Guide RNA design, recognition sequences, Best practices in SgRNA design, Repair and data analysis of theedited genome, Therapeutic applications. **Practical Component:** Crispr – sg RNA design- Chop Chop	K3, K4	2	1-5	Lecture and PowerPoint Presentations Demonstration and Practice	III Component-Presentation (20 Marks) Record and Assignment-Crispr Tools

Feb 10– 18, 2025 (Day Order 1 to 4)	3	3.3. Targeted mutagenesis- Transcription activator-like effector nuclease (Talens), Zinc Finger Nuclease (ZFNs) Technology. Recent innovations in genome editing in agriculture, diseases and healthcare	K5, K6	1	1-5	Lecture and PowerPoint Presentations	Case Study
Feb 19- 26, 2025 (Day Order 1-6)	3, 4	**Unit 4: Transcriptomics** 4.1. Transcriptomics - microarray technology and gene expression, SAGE	K1, K2	2	1-5	Lecture and PowerPoint Presentations, Practical Demonstration	III Component- Data Analysis (30 Marks)
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	Applications of Microarrays in Medicine, Databases - GEO, array express, Next generation Sequencing - RNA isolation and purification, RINnumber. Bulk RNA sequencing **<u>Practical Component:</u>** Differential gene expression analysis – RNA seq, microarray datasets- volcano plot, heatmap 4.3. Importance of gene silencing, miRNA, siRNA, lncRNA, competing endogenous RNA	K1, K2 K3, K4 K5, K6	2 3 2	1-5 1-5	Lecture and PowerPoint Presentations Demonstration and Practice	Discussion Record and Assignment- RNA Seq Analysis
Mar 7 – 11, 2025	5	**Unit 5: Transcriptomic Gene Annotation**	K1, K2	4	1-5	Practical Demonstration	Puzzles & Hands-on

(Day Order 1 to 3)		5.1. Data analysis- Quality check- fastqc, multi fastqc and trimming of adapters – trimmomatic, cutadapt **<u>Practical Component:</u>** Fastqc, trimmomatic and assembly	K5, K6	2	1-5	Demonstration and Practice	practice with biological data Record and Assignment- Linux tools for sequence analysis
Mar 12 –17, 2025	**C.A. Test - II**						
Mar 18 – 20, 2025 (Day 4 to 6)	5	5.2. Generation of contigs and scaffolds- Assembly using genome assemblers and alignment of sequences, Samtools and bowtie	K3, K4	2	1-5	Lectures, PowerPoint Presentation and Practical Demonstration	Group Discussion
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.3. Competing endogenous RNA network, Predicting DEGs and ontology analysis, Statistics behind DGE analysis. **<u>Practical Component:</u>** Small RNA network- using cytoscape 5.3. Gene annotations and protein interaction network prediction	K5, K6	2	1-5	Lecture and PowerPoint Presentation	Research article result interpretation and discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Ms. Pujaa B**

Course Title : **Python and R Programming**

Course Code : **23BI/PC/PR24**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Relate the necessity for programming in biology	K1
CO2	Handling biological concepts with Python and R scripts	K2
CO3	Apply R and Python programming to analyze genomic sequences	K3
CO4	Gain efficient programming skills to handle missing values and impute values in data	K4
CO5	Perform genomic data analysis and visualize them using Python and R	K5,K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 18 – 25, 2024 (Day Order 1-6)	1	**Introduction to Python** 1.1 Installation of Python and Jupyter notebooks.	K1-K4	4	1-5	Lecture and PowerPoint presentation	Assignment on Jupyter notebooks

		1.2 Variables- list, tuples, sets, dictionary, matrix, dataframe.					
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.2 Handling strings, Functions, control structures, operators, Pandas, Numpy and Scipy	K2-K4	5	1-5	Lecture and PowerPoint presentation	Test on strings and functions
Dec 4-11, 2024 (Day Order 1 to 6)	1	1.3 Fasta files, Parsing DNA and protein information, Gene locations splices, extracting all gene locations.	K4-K6	4	1-5	Lecture and PowerPoint presentation	Quiz and puzzle
Dec 12-19, 2024 (Day Order 1 to 6)	1	1.3 Object Oriented Programming in Python. Constructors, Type(), Issubclass(), Super().	K4-K6	4	1-5	Lecture	Assignment on OOPs
Dec 20, 2024 (Day Order 1)	2	**Biopython** 2.1 Getting started and installation of modules and packages, Coding DNA, proteins, extracting translations.	K1-K3	4	1-5	Google Colab Presentation	III component test - 15 marks
Jan 3 – 7, 2025 (Day Order 3 to 6)	2	2.2 Modules- Bio Import, Bio Seq, Bio Align**.** 2.3 Plot ABI traces, Retrieve and Annotate Entrez gene	K3- K6	4	1-5	Lecture and Google Colab presentation	Code execution test
Jan 8 – 17, 2024 (Day Order 1 to 6)	3	**Data Visualization** 3.1 Getting Started with Pandas, Matplotlib, scki-kit learn. 3.2 Visualisation using Matplotlib and scikit learn – Line Plots- Scatter Plots-Visualizing Errors	K1-K3	5	1-5	Lecture	III component presentation - 20 marks
Jan 18 - 23, 2025	**C.A. Test - I**						

Jan 24 -31, 2025 (Day Order 1 to 6)	3	3.2 Density and Contour Plots-Histogram, Binnings and Density –Customizing Color Bars.	K5-K6	4	1-5	Presentation	Quiz and puzzles
Feb 3-8, 2025 (Day Order 1 to 6)	3	3.3 Customising Plot Legends –Multiple Subplots-Text and Annotation-Customizing Ticks.	K4-K6	4	1-5	Lecture and Google Colab presentation	Code execution test
Feb 10– 18, 2025 (Day Order 1 to 4)	4	**R programming** 4.1 R as a statistical Calculator, Creating Objects and Assigning Values. 4.2 Vectors, matrices, factors, levels, dataframes.	K2-K4	4	1-5	Lecture	Test on matrices and dataframes
Feb 19- 26, 2025 (Day Order 1-6)	4	4.3 Graphics: Simple Plotting, Advanced Plotting – ggplot, Using Color in Plots.	K5-K6	5	1-5	Lecture and group discussion	Assignment on ggplot
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	4.3 Using Subscripts and Superscripts in Graph Labels, Interactive Graphics, Saving Graphical Output, Loops**.**	K5-K6	5	1-5	Lecture and group discussion	Quiz
Mar 7 – 11, 2025 (Day Order 1 to 3)	5	**Bioconductor** 5.1 Introduction, Bioconductor Packages, Bio strings, Biomart. 5.2 Bioconductor packages for protein-protein interaction graphs.	K1-K4	4	1-5	Lecture	III component quiz - 15 marks
Mar 12 –17, 2025	**C.A. Test - II**						

Mar 18 – 20, 2025 (Day 4 to 6)	5	5.2 Gene variation packages, genomic ranges, genomic alignments, genomic annotations.	K2-K4	4	1-5	Google Colab presentations	Quiz
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.3 Biomedical data science in R-BioML(R). Data wrangling with Tidyverse and shiny	K5-K6	5	1-5	Lecture and Google Colab presentations	Code execution test
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Ms. Pujaa B**

Course Title : **Python and R Programming - Practical**

Course Code : **23BI/PC/P122**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Relate the necessity for programming in biology, Handling biological concepts with Python and R scripts	K1
CO2	Perform and distinguish genomic and transcriptomic data analysis	K2
CO3	Apply programing to analyze genomic sequences and process the information	K3
CO4	Gain efficient programming skills by solving biological problems	K4
CO5	Perform biological data analysis using python and R language	K5,K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Nov 18 – 25, 2024 (Day Order 1-6)	1	1.1Creating tuples, lists, sets, dataframes 1.2 Importing Data, Data Frames, Handling Missing Data	K1-K4	3	1-5	Presentation using colab notebook	Test on variables
Nov 26- Dec 3, 2024 (Day Order 1 to 6)		1.3 Data visualization – volcano, PCA plot, heatmap**,** Object oriented python – displaying genomic coordinates	K5-K6	3	1-5	Learning by doing	Test on OOPs
Dec 4-11, 2024 (Day Order 1 to 6)	2	2.1 Counting the base frequency**,** Plotting ABI traces**,** To transcribe and translate a sequence 2.2 Biopython- using Bioseq –Sequence reading and writing**,** Biopython using Bio.Genbank – reading entries	K1-K6	3	1-5	Presentation using colab notebook	III component test - 15 marks
Dec 12-19, 2024 (Day Order 1 to 6)		2.3 Using BioALign to perform pairwise and multiple sequence alignment	K3-K4	3	1-5	Presentation using colab notebook	Test – using colab notebook
Dec 20, 2024 (Day Order 1)		-	-	-	-	-	-
Jan 3 – 7, 2025 (Day Order 3 to 6)	3	3.1 Creating vectors, matrix, factors, list, dataframes	K1-K4	3	1-5	Presentation using jupyter notebook	Test using jupyter notebooks
Jan 8 – 17, 2024 (Day Order 1 to 6)		3.2 Plots – simple –bar, pie, line etc., 3.3. Setting up axis and labels	K1-K6	3	1-5	Learning by doing	Test using Colab notebooks
Jan 18 - 23, 2025	**C.A. Test - I**						

Jan 24 -31, 2025 (Day Order 1 to 6)	4	4.1 GGplot – geom point, jitter, geom bar, geom line.	K5-K6	3	1-5	Presentation using jupyter notebook	Assignment on ggplot
Feb 3-8, 2025 (Day Order 1 to 6)		4.2. PCA, heat maps, Clustering	K5-K6	3	1-5	Group presentation	III component test - 15 marks
Feb 10– 18, 2025 (Day Order 1 to 4)		-	-	-	-	-	-
Feb 19- 26, 2025 (Day Order 1-6)		4.3. Data analysis - Importing Data, Data Frames, Handling Missing Data	K2-K4	3	1-5	Presentation using colab notebook	Test using colab notebooks
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	5	5.1 Bioconductor packages- bioclite, Biostring, Biomart, protein -protein network graphs	K1-K3	3	1-5	Group presentation	Test on Bioconductor packages
Mar 7 – 11, 2025 (Day Order 1 to 3)		-	-	-	-	-	-
Mar 12 –17, 2025	**C.A. Test - II**						
Mar 18 – 20, 2025 (Day 4 to 6)		5.2 Microarray data analysis – Limma/edgeR/DESEQ2	K2-K4	3	1-5	Group discussion	III component test - 20 marks
Mar 21 - 28, 2025 (Day Order 1 to 6)		5.3 Microbiome data analysis- vegan/ phyloseq	K5-K6	3	1-5	Presentation using colab notebook	Group discussion on metagenomic analysis

Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Dr. R. Sagaya Jansi**

Course Title : **Research Methodology, Bioethics and IPR**

Course Code : **23BI/PE/RM15**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Better understanding of the research methods	K1
CO2	Design an action plan of research	K2
CO3	Acquire skills of writing a research manuscript	K3
CO4	Application of statistical study in research	K4
CO5	Understand the ethics in writing research work	K5, K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 18 – 25, 2024	1	**Types of Data and Research Problem**	K1- K3	3	1-5	Lecture and	Discussion

(Day Order 1-6)		**Identification** 1.1. Data Collection, Sources ofData- Primary, Secondary and Tertiary Sources, Sampling Methods- Probability and non- probability methods				Demonstration	
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.1 Sample size and Samplingerror 1.2. Definition of Research, Typesof research, Research Methodology, Principles and Practice of Research	K2-K4	5	1-5	Lecture and PowerPoint presentation	Discussion
Dec 4-11, 2024 (Day Order 1 to 6)	1	1.2 Identifying The ResearchProblem 1.3. Research Design: Exploratory, Descriptive and Experimental Research Design	K5- K6	5	1-5	Lecture and PowerPoint presentation	III Component - Group Discussion (5 marks)
Dec 12-19, 2024 (Day Order 1 to 6)	2	**Scientific Communication** 2.1. Literature Review - Its Relevance and Importance in Directing Research. Citations – Types of Citations, Bibliographyand End Matters	K1- K3	2	1-5	Lecture and PowerPoint presentation	Classroom activity
Dec 20, 2024 (Day Order 1)	2	2.1. Editing and Proofreading 2.2. Action Plan, Design and PilotStudy undertaking a Research Project, Writing a Research grant Proposal	K1- K3	4	1-5	Lecture and PowerPoint presentation	III Component- Paper critiquing (10 marks)
Jan 3 – 7, 2025	2	2.2. Format of thesis 2.3. Scholarly Communication: IMRaD	K2–K4	5	1-5	Lecture and PowerPoint	III Component-

(Day Order 3 to 6)		concepts for papers, andPoster and Oral Presentation,				presentation	Poster and Oral Presentation (15 marks)
Jan 8 – 17, 2024 (Day Order 1 to 6)	2	2.3. Purpose and the Methods of Paper Critiquing.	K5- K6	4	1-5	Discussion	III Component- Poster and Oral Presentation (15 marks)
Jan 18 - 23, 2025	**C.A. Test - I**						
Jan 24 -31, 2025 (Day Order 1 to 6)	3	**Writing well** 3.1. Writing for non- native audiences, usage of simple sentences, untangle long noun phrases, make complete sentences, Use of punctuations- comma,colon, semicolon, dash and periods, Creating non-textual information- acquiring, processing and printing illustrations.	K1- K3	1	1-5	Lecture and PowerPoint presentation	Discussion
Feb 3-8, 2025 (Day Order 1 to 6)	3	3.2. Concepts of mind maps. Use of Encyclopedias, Research Guides, Handbook etc., AcademicDatabases for Computer Science Discipline, Use of tools / techniques for Research: methodsto search required information effectively	K1- K3	3	1-5	Lecture and PowerPoint presentation	Discussion

Feb 10– 18, 2025 (Day Order 1 to 4)	3	3.3. Reference Management Software like Zotero/ Mendeley, Software for paper formatting like LaTeX/MS Office, Software for detection ofPlagiarism.	K2-K4	5	1-5	Lecture and PowerPoint presentation	III Component-Proposal writing (10 marks)
Feb 19- 26, 2025 (Day Order 1-6)	4	**Bioethics** 4.1. Introduction. IntellectualProperty Rights (IPR) and Patents, TRIPS, Case studies on Patents (Basmati, Turmeric and Neem),ethics in science practicals.	K5- K6	4	1-5	Lecture and PowerPoint presentation	III Component
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	4.2. Plagiarism and Common Errors in Scientific Writing. Misconduct in science. 4.3. Ethical issues related to embryonic stem cells, Genetictesting and screening, human clinical trials and drug testing.	K1- K3	2	1-5	Lecture and PowerPoint presentation	Discussion
Mar 7 – 11, 2025 (Day Order 1 to 3)	5	**IPR, Patent, Copyrights andTrademarks** 5.1. Introduction of IPR, GeneralAgreement on Trade and Tariff (GATT) and World Trade Organizations. Establishment andfunctions of GATT, World TradeOrganization (WTO) and World International Property Organization (WIPO).	K1- K3	5	1-5	Discussion	III Component-Case Study (10 marks)
Mar 12 –17, 2025	**C.A. Test - II**						
Mar 18 – 20, 2025	5	5.1. WTO Summits, Role of Integrated Business Solution Center (IBSC) and Review	K5- K6	5	1-5	Lecture and PowerPoint	Discussion

(Day 4 to 6)		Committee on Genetic Manipulation (RCGM) 5.2. Production of Plant varietyand farmers right act.				presentation	
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.3. TRIPS, Different types of intellectual property rights (IPR),Patents, Trade mark, Trade secret, copyright. Geographical distribution onbiological diversity, Obligations, Production of Traditional Knowledge, Impact of GM Cropsand GM Foods.	K5- K6	3	1-5	Lecture and PowerPoint presentation	Case Study
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Dr. M. Sharanya**

Course Title : **Applications of Bioinformatics**

Course Code : **23BI/PE/AP23**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Examine factors that affect drug response and the application of pharmacogenetics to drug development and drug treatment	K1
CO2	Apply the immunological data and to the sophisticated computational solutions available for immunological research	K2
CO3	Emphasis the application of bioinformatics and biological databases to problem solving in real research problems	K3
CO4	Investigate the immune cells types, activities and access the database for epitope prediction	K4
CO5	Ability to interpret the 2D and 3D chemical structures and access them computationally.	K5, K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods

Nov 18 – 25, 2024 (Day Order 1-6)	1	**Introduction to Bioinformatics** Classification of biological data, and different data formats	K1-K2	3	1-5	Lecture and PowerPoint Presentation	Discussion
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	Introduction to single letter codes of amino acids, symbols, used in nucleotides	K2-K3	2	1-5	Lecture and PowerPoint Presentation	MCQ's
Dec 4-11, 2024 (Day Order 1 to 6)	1	Bioinformatics Perspectives on Human Diseases	K3-K6	2	1-5	Lecture and PowerPoint Presentation	Discussion
Dec 12-19, 2024 (Day Order 1 to 6)	2	**Bioinformatics Databases** Overview of Biological Sequence Databases - NCBI, EMBI, DDBJ	K1-K2	3	1-5	Demonstration and Discussion	III Component-Practice database (20 Marks)
Dec 20, 2024 (Day Order 1)	2	Sequence Retrieval Systems (Entrez & SRS), Sequence, Submission Methods and Tools (Sequin, Sakura, Bankit)	K2-K3	2	1-5	Lecture and PowerPoint Presentation	Discussion
Jan 3 – 7, 2025 (Day Order 3 to 6)	2	Finding Scientific Articles Using PubMed, Identification of disease genes, OMIM database	K3-K6	3	1-5	Demonstration and Discussion	III Component-Assignment (15 Marks)
Jan 8 – 17, 2024 (Day Order 1 to 6)	3	**Pharmacogenomics** Introduction to Basic Concept of Pharmacogenomics, Application and Challenges in Pharmacogenomics, Personalized Medicine	K1-K2	3	1-5	Lecture and PowerPoint Presentation	Debate

Jan 18 - 23, 2025	**C.A. Test - I**						
Jan 24 -31, 2025 (Day Order 1 to 6)	3	Genetic Variation, Types of Variants, SNPs, Insertion/Deletions	K3-K6	3	1-5	Lecture and PowerPoint Presentation	Test
Feb 3-8, 2025 (Day Order 1 to 6)	3	Databases - Pharmacogenomics Knowledge Base (PharmGKB)	K4-K6	2	1-5	Lecture and PowerPoint Presentation	Discussion
Feb 10– 18, 2025 (Day Order 1 to 4)	4	**Computational Immunology** Introduction to Immune System - Adaptive and Innate Immunity, Cells of the Immune System	K1-K3	3	1-5	Lecture and PowerPoint Presentation	III Component-Chart Preparation (15 Marks)
Feb 19- 26, 2025 (Day Order 1-6)	4	Major Histocompatibility Complex (MHC) its Polymorphism, Principles of B-cell and T-cell Epitope Prediction	K3-K4	3	1-5	Lecture and PowerPoint Presentation	MCQ's
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	Databases in Immunology, IMGT immunoinformatics	K4-K6	2	1-5	Demonstration and Discussion	Practice – immunology tools
Mar 7 – 11, 2025 (Day Order 1 to 3)	5	**Applications of Cheminformatics Tools in Drug Design** Definition of drugs - 2D and 3D Molecular Structures	K1-K3	2	1-5	Discussion	Identification of the structures
Mar 12 –17, 2025	**C.A. Test - II**						

Mar 18 – 20, 2025 (Day 4 to 6)	5	Searching for Chemicals on the Internet (PubChem, eMolecules)	K4-K6	3	1-5	Demonstration and Discussion	Practice with databases
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	Chemical structure drawing tools	K2-K3	3	1-5	Demonstration and Discussion	Discussion
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI

COURSE PLAN (November 2024 – April 2025)

Department : **Bioinformatics**

Name/s of the Faculty : **Dr. M. Sharanya**

Course Title : **Soft Skills**

Course Code : **23BI/PK/SS22**

Shift : **II**

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Communicate with confidence and poise	K1
CO2	Accept themselves and improve on their weaknesses	K2
CO3	Work more effectively and complete activities on time	K3
CO4	Work more effectively and complete activities on time	K4
CO5	Plan their future with clarity and focus	K5,K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 18 – 25, 2024	1	1.1 Self-Awareness	K1-K6	1	1-5	Discussion	Presentations

(Day Order 1-6)							and games activity
Nov 26- Dec 3, 2024 (Day Order 1 to 6)	1	1.2 Communication Skills –Verbal and Non Verbal	K1-K6	2	1-5	Discussion	Presentations and games activity
Dec 4-11, 2024 (Day Order 1 to 6)	1	1.3 Leadership Qualities	K1-K6	2	1-5	Debate	Presentations and games activity
Dec 12-19, 2024 (Day Order 1 to 6)	1	1.4 Etiquette and GoodManners 1.5 Experiential Learning –Based on activities	K1-K6	1	1-5	Discussion	Presentations and games activity
Dec 20, 2024 (Day Order 1)	2	2.1. Interpersonal Skills	K1-K6	1	1-5	Discussion	Presentations and games activity
Jan 3 – 7, 2025 (Day Order 3 to 6)	2	2.2. People Management	K1-K6	2	1-5	Debate	Presentations and games activity
Jan 8 – 17, 2024 (Day Order 1 to 6)	2	2.3. Creative Thinking	K1-K6	2	1-5	Debate	Presentations and games activity
Jan 18 - 23, 2025	**C.A. Test - I**						
Jan 24 -31, 2025 (Day Order 1 to 6)	2	2.4. Critical Thinking 2.5. Experiential Learning – Based on activities	K1-K6	1	1-5	Discussion	Presentations and games activity
Feb 3-8, 2025	3	3.1. Importance of time	K1-K6	1	1-5	Presentations and	Presentations and

(Day Order 1 to 6)		management				activity	games activity
Feb 10– 18, 2025 (Day Order 1 to 4)	3	3.2. Planning and Prioritizing 3.3. Organizing skills	K1-K6	2	1-5	Group discussion	Presentations and games activity
Feb 19- 26, 2025 (Day Order 1-6)	3	3.4. Action Plan 3.5. Experiential Learning – Based on activities	K1-K6	2	1-5	Presentations and activity	Presentations and games activity
Feb 27- Mar 6, 2025 (Day Order 1 to 6)	4	4.1. Reasons for conflict 4.2. Consequences ofconflict	K1-K6	2	1-5	Group discussion	Presentations and games activity
Mar 7 – 11, 2025 (Day Order 1 to 3)	4	4.3. Managing emotions 4.4. Methods of resolvingconflicts 4.5. Experiential Learning– Based on activities	K1-K6	2	1-5	Presentations and activity	Presentations and games activity
Mar 12 –17, 2025	**C.A. Test - II**						
Mar 18 – 20, 2025 (Day 4 to 6)	5	5.1. Goal Setting and Decision Making Career Planning 5.2. Resume Writing	K1-K6	1	1-5	Demo presentations	Presentations and games activity
Mar 21 - 28, 2025 (Day Order 1 to 6)	5	5.4. Handling Interviews 5.5. Experiential Learning – Based on activities	K1-K6	2	1-5	Demo presentations	Presentations and games activity
Mar 29- April 2, 2025 (Day Order 1 to 3)	**REVISION**						