STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department   : **Bioinformatics**
Name/s of the Faculty : **R. Sagaya Jansi**
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 22 – 23, 2023 (Day Order 1 & 2)	1	**Unit 1: Structure and Organisation of Genes and Chromosomes** 1.1. DNA-Structure and Conformations, **Chromosomes – Structure and Functions**	K1-K3	2	1-5	Lectures and power point presentation, animations	Case studies
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.2. Cell division - Mitosis and meiosis, Cell cycle regulation, Check points	K2-K4	4	1-5	Lectures, power point presentation, Animations	III Component Assignment
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.3. Organisation of Genomes - Coding Sequences, Repetitive Sequences, transposons	K5-K6	4	1-5	Lectures and power point presentation	Discussion
Dec 8-9, 2023 (Day Order 1, 3)	2	**Unit 2: Organelle, Bacterial and Viral Genome** 2.1. Mitochondrion Genome - Organisation and Function	K1-K3	3	1-5	Lectures and power point presentation	Discussion
Dec 11-15, 2023 (Day Order 2 to 6)	2	2.1. Chloroplast Genome - Organisation and Function	K1-K3	3	1-5	Lectures and power point presentation	Quiz/Puzzle

Date	Unit	Topic	K Level	Hours	CO	Method	Assessment
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.2. Bacteria - Cells structure and bacterial genetics	K2-K4	4	1-5	Lectures and power point presentation	III Component -Tests
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.3. Virus - Structure, Viral genome, Viroids and Prions	K5-K6	3	1-5	Lectures and power point presentation	Quiz/Puzzle
Jan 8 – 12, 2024	**C.A. Test - I**						
Jan 13, 2024 (Day Order 1)	3	**Unit 3: Replication and Transcription** 3.1. DNA replication	K1-K3	3	1-5	Lectures and power point presentation	Discussion
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1. Mutations, DNA damage and repair mechanisms in prokaryotes and eukaryotes	K1-K3	3	1-5	Lectures and power point presentation	III Component
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2. Transcription- Eukaryotes	K2-K4	3	1-5	Lectures and power point presentation	Discussion
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.2. Transcription- Prokaryotes, Transcriptional control by regulatory proteins, RNA polymerases	K2-K4	3	1-5	Lectures and power point presentation	III Component -Tests

Feb 3, 2024 (Day Order 2)	3	3.3. Post Transcriptional Regulation - DNA Methylation, Histone modification - Capping, RNA editing, Splicing, and Polyadenylation	K5-K6	3	1-5	Lectures, power point presentation, practical demonstration	Discussion
Feb 5- 6, 2024 (Day Order 5 to 6)	4	**Unit 4: Translation** **4.1. RNA- Types, structure and functions,** Ribosomes – Structure and Assembly	K1-K3	3	1-5	Lectures, power point presentation, practical demonstration	Group Discussion
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.2. Translational Regulation - Regulation of gene expression in Prokaryotes (Operon)	K2-K4	3	1-5	Lectures, power point presentation, practical demonstration	Discussion
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2. Translational Regulation - Regulation of gene expression in Eukaryotes	K2-K6	3	1-5	Lectures, power point presentation, practical demonstration	III Component -Tests
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.2. Genetic code, Gene Silencing	K2-K6	3	1-5	Lectures, power point presentation, practical demonstration	Quiz/Puzzle
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	4	4.3. Post- translational modifications of proteins	K5-K6	3	1-5	Lectures, power point presentation, practical demonstration	Discussion

Mar 2, 2024 (Day Order 1)	5	**Unit 5: Cell Signalling and Cancer** 5.1. Cell signalling – Signalling molecules, Receptors - Hormones receptors, cell surface receptor, G-protein coupled receptors, signal transduction pathways	K1-K3	5	1-5	Lectures, power point presentation, practical demonstration	Discussion
Mar 4 –8, 2024	**C.A. Test - II**						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	5.2. Cancer Biology-Characteristics and genetic basis of cancers, Proto-oncogene, Oncogenes, Tumor Suppressor Genes	K2-K4	5	1-5	Lectures, power point presentation, practical demonstration	Quiz/Puzzle
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	5.3. Oncogenesis - Cancer Immunotherapy, Regulation of Cell Death, Apoptosis	K5-K6	5	1-5	Lectures, power point presentation, practical demonstration	Discussion
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

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 DNA and 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 22 – 23, 2023 (Day Order 1 & 2)	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 Presentations	Quiz and Puzzles
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.1 Genome Sequencing technologies - Conventional Sequencing techniques **Practical Component:** Genome databases of plants, animals and pathogens,	K1- K3	2	1-5	Lecture and Presentations	Discussions
		Gene Prediction by ORF analysis, Gen scan, UCSC Genome Browser	K1- K2	2	1-5	Demonstration and Practice	Record and Assignment
Dec 1-7, 2023 (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	2	1-5	Lecture and Presentations	Group Discussion
			K1- K2	2	1-5	Demonstration and Practice	Record and Assignment

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Dec 8-9, 2023 (Day Order 1, 3)	1	1.3. File formats- FASTQ, SAM/BAM, VCF, GFF/GTF, and BED. Databases and tools, Variations at the Level of individual Nucleotides, Duplications, Indels, Rates and patterns of Nucleotide substitution, Molecular Clocks	K5- K6	2	1-5	Lecture and Presentations	File format analysis/ puzzles
Dec 11-15, 2023 (Day Order 2 to 6)	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, GATK pipeline	K1, K2 / K1- K2	3 / 2	1-5 / 1-5	Lecture, Presentations and Discussion / Demonstration and Practice	Case Studies / Record and Assignment
Dec 16 – 22, 2023 (Day Order 1 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 Presentations	Discussion

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.2 Logical steps for metagenome analysis, Taxonomical classification- silvaDB, green genes	K3, K4	2	1-5	Lecture and Presentations	III Component
		Practical Component: Metagenomics - In silico -Mg RAST, Kaiju web server, Galaxy server	K5- K6	2	1-5	Demonstration and Practice	Record and Assignment
Jan 8 – 12, 2024	C.A. Test - I						
Jan 13, 2024 (Day Order 1)	2	2.3. Epigenomics, Local chromatin dynamics and epigenetic modifications, analysis of regulatory sequence motifs, transcription factor - DNA interaction	K5, K6	2	1-5	Lecture and Presentations	Group Discussion

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 18 -20, 2024 (Day Order 4 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 Presentations Demonstration and Practice	Discussion Record and Assignment
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2. Guide RNA design, recognition sequences, Best practices in SgRNA design	K3, K4	2	1-5	Lecture and Presentations	III Component
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.2. Repair and data analysis of the edited genome, Therapeutic applications. **Practical Component:** Crispr – sg RNA design- Chop Chop	K3, K4 K3, K4	2 2	1-5 1-5	Lecture and Presentations Demonstration and Practice	Discussion Record and Assignment

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 3, 2024 (Day Order 2)	3	3.3. Targeted mutagenesis-Transcription activator-like effector nuclease (Talens), Zinc Finger Nuclease (ZFNs) Technology.	K5, K6	1	1-5	Lecture and Presentations	Case Study
Feb 5- 6, 2024 (Day Order 5 to 6)	3, 4	3.3. Recent innovations in genome editing in agriculture, diseases and healthcare **Unit 4: Transcriptomics** 4.1. Transcriptomics - microarray technology and gene expression, SAGE	K1, K2	2	1-5	Lecture and Presentations, Practical Demonstration	III Component
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.1. Applications of Microarrays in Medicine, Databases - GEO, array express 4.2. Next generation Sequencing - RNA isolation and purification, RIN number. Bulk RNA sequencing, **Practical Component:** Differential gene expression analysis – RNA seq, microarray datasets-volcano plot, heatmap	K1, K2 K3, K4 K5, K6	2 3 2	1-5 1-5	Lecture and Presentations Demonstration and Practice	Discussion Record and Assignment

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2 single-cell RNA sequencing, small RNA sequencing **Practical Component:** DEGs and annotations – Geo2R, Biojupies	K3, K4 K5, K6	3 2	1-5 1-5	Lecture and Presentations Demonstration and Practice	Discussion Record and Assignment
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.3. Importance of gene silencing, miRNA, siRNA, lncRNA, competing endogenous RNA	K5, K6	3	1-5	Lecture and Presentations	Discussion
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	**Unit 5: Transcriptomic Gene Annotation** 5.1. Data analysis- Quality check- fastqc, multi fastqc and trimming of adapters – trimmomatic, cutadapt **Practical Component:** Fastqc, trimmomatic and assembly	K1, K2 K5, K6	4 2	1-5 1-5	Practical Demonstration Demonstration and Practice	Puzzles & Hands-on practice with biological data Record and Assignment
Mar 2, 2024 (Day Order 1)	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, Presentation and Practical Demonstration	Group Discussion
Mar 4 –8, 2024	**C.A. Test - II**						

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	5.3. Competing endogenous RNA network, Predicting DEGs and ontology analysis, Statistics behind DGE analysis. **Practical Component:** Small RNA network- using cytoscape	K5, K6 K5, K6	2 2	1-5 1-5	Lecture and Presentation Demonstration and Practice	Research article result interpretation and discussion Record and Assignment
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	5.3. Gene annotations and protein interaction network prediction	K5, K6	2	1-5	Lecture and Presentation	Research article result interpretation and discussion
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department   : **Bioinformatics**
Name/s of the Faculty : **Ms. Pujaa B**
Course Title   : **Python and R Programming**
Course Code   : **23BI/PC/PR34**
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 22 – 23, 2023 (Day Order 1 & 2)	1	1.1 Installation of Python and Jupyter notebooks. 1.2 Variables- list, tuples, sets, dictionary, matrix, dataframe.	K1-K4	3	1-5	Lecture and presentation	Assignment and exercise
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.2 Handling strings, Functions, control structures, operators, Pandas, Numpy and Scipy	K2-K4	3	1-5	Lecture and presentation	Exercise and test
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.3 Fasta files, Parsing DNA and protein information, Gene locations splices, extracting all gene locations.	K4-K6	3	1-5	Lecture and presentation	Quiz and puzzles
Dec 8-9, 2023 (Day Order 1, 3)	1	1.3 Object Oriented Programming in Python. Constructors, Type(), Issubclass(), Super().	K4-K6	3	1-5	Lecture	Assignment and exercise
Dec 11-15, 2023 (Day Order 2 to 6)	2	2.1 Getting started and installation of modules and packages, Coding DNA, proteins, extracting translations.	K1-K3	4	1-5	Presentation	III component
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.2 Modules- Bio Import, Bio Seq, Bio Align.	K3-K4	4	1-5	Lecture and presentation	Assignment, III component Written test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.3 Plot ABI traces, Retrieve and Annotate Entrez gene	K5-K6	4	1-5	Lecture and presentation	III component activity
Jan 8 – 12, 2024	C.A. Test – I						
Jan 13, 2024 (Day Order 1)	3	3.1 Getting Started with Pandas, Matplotlib, scki-kit learn.	K1-K3	3	1-5	Lecture	Assignment
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.2 Visualisation using Matplotlib and scikit learn – Line Plots- Scatter Plots- Visualizing Errors	K5-K6	4	1-5	Presentation	III component activity
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2 Density and Contour Plots- Histogram, Binnings and Density –Customizing Color Bars.	K5-K6	4	1-5	Lecture and Power point presentations	Quiz and puzzles
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.3 Customising Plot Legends – Multiple Subplots-Text and Annotation-Customizing Ticks.	K4-K6	4	1-5	Lecture and Power point presentations	Assignment and exercise
Feb 3, 2024 (Day Order 2)	4	4.1 R as a statistical Calculator.	K1	1	1-5	Lecture	III component Written test
Feb 5- 6, 2024 (Day Order 5 to 6)	4	4.1 Creating Objects and Assigning Values.	K1	2	1-5	Lecture	III component Written test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.2 Vectors, matrices, factors, levels, dataframes.	K2-K4	3	1-5	Lecture	Exercise and test
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.3 Graphics: Simple Plotting, Advanced Plotting – ggplot, Using Color in Plots.	K5-K6	3	1-5	Lecture and activity	Assignment and exercise
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.3 Using Subscripts and Superscripts in Graph Labels, Interactive Graphics, Saving Graphical Output, Loops.	K5-K6	4	1-5	Lecture and activity	Quiz and puzzles
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	5.1 Introduction, Bioconductor Packages, Bio strings, Biomart	K1-K3	3	1-5	Lecture	Exercise and test
Mar 2, 2024 (Day Order 1)	5	5.2 Bioconductor packages for protein- protein interaction graphs.	K2-K4	3	1-5	Power point presentations	Quiz and puzzles
Mar 4 –8, 2024	**C.A. Test – II**						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	5.2 Gene variation packages, genomic ranges, genomic alignments, genomic annotations.	K2-K4	3	1-5	Power point presentations	Quiz and puzzles

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	5.3 Biomedical data science in R- BioML(R). Data wrangling with Tidyverse and shiny	K5-K6	4	1-5	Lecture and Power point presentations	Exercise and test
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

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 22 – 23, 2023 (Day Order 1 & 2)		–					
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.1 Creating tuples, lists, sets, dataframes 1.2 Importing Data, Data Frames, Handling Missing Data	K1-K4	3	1-5	Practical	Practical Test
Dec 1-7, 2023 (Day Order 1 to 6)		1.3 Data visualization – volcano, PCA plot, heatmap, Object oriented python – displaying genomic coordinates	K5-K6	3	1-5	Practical	Practical Test
Dec 8-9, 2023 (Day Order 1, 3)		–					
Dec 11-15, 2023 (Day Order 2 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	Practical	Practical Test
Dec 16 – 22, 2023 (Day Order 1 to 6)		2.3 Using BioALign to perform pairwise and multiple sequence alignment	K3-K4	3	1-5	Practical	Practical Test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 3 – 6, 2024 (Day Order 1 to 4)		–					
Jan 8 – 12, 2024	C.A. Test – I						
Jan 13, 2024 (Day Order 1)		–					
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1 Creating vectors, matrix, factors, list, dataframes	K1-K4	3	1-5	Practical	Practical Test
Jan 22-29, 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	Practical	Practical Test
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)		–					
Feb 3, 2024 (Day Order 2)		–					
Feb 5- 6, 2024 (Day Order 5 to 6)	4	4.1 GGplot – geom point, jitter, geom bar, geom line.	K5-K6	3	1-5	Practical	Practical Test
Feb 7 – 14, 2024 (Day Order 1 to 6)		4.2. PCA, heat maps, Clustering	K5-K6	3	1-5	Practical	Practical Test

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 15 – 22, 2024 (Day Order 1 to 6)		4.3. Data analysis - Importing Data, Data Frames, Handling Missing Data	K2-K4	3	1-5	Practical	Practical Test
Feb 23 – 24, 2024 (Day Order 1 & 5)	5	5.1 Bioconductor packages- bioclite, Biostring, Biomart, protein -protein network graphs	K1-K3	3	1-5	Practical	Practical Test
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)		5.2 Microarray data analysis – Limma/edgeR/DESEQ2	K2-K4	3	1-5	Practical	Practical Test
Mar 2, 2024 (Day Order 1)		–					
Mar 4 –8, 2024	**C.A. Test – II**						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)		5.3 Microbiome data analysis- vegan/ phyloseq	K5-K6	3	1-5	Practical	Practical Test
Mar 18 – 19, 2024 (Day Order 2 to 3)		–					
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department : Bioinformatics
Name/s of the Faculty : Dr. M. Sharanya & Ms. Pujaa B.
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 22 – 23, 2023 (Day Order 1 & 2)	1	**Types of Data and research problem identification** 1.1. Data Collection, Sources of Data- Primary, Secondary and Tertiary Sources, Sampling Methods- Probability and non-probability methods	K1- K3	3	1-5	Lecture and Demonstration	Class room activities
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.1 Sample size and Sampling error 1.2. Definition of Research, Types of research, Research Methodology, Principles and Practice of Research	K2– K4	5	1-5	Lecture and Presentation	Discussion
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.2 Identifying The Research Problem 1.3. Research Design: Exploratory, Descriptive and Experimental Research Design	K5- K6	5	1-5	Lecture and Presentation	Group Discussion and Activities
Dec 8-9, 2023 (Day Order 1, 3)	2	**Scientific Communication** 2.1. Literature Review - Its Relevance and Importance in Directing Research. Citations – Types of Citations, Bibliography and End Matters	K1- K3	2	1-5	Lecture and Presentation	Classroom activity

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Dec 11-15, 2023 (Day Order 2 to 6)	2	2.1. Editing and Proofreading 2.2. Action Plan, Design and Pilot Study undertaking a Research Project, Writing a Research grant Proposal	K1- K3	4	1-5	Lecture and Presentation	III Component
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.2. Format of thesis 2.3. Scholarly Communication: IMRaD concepts for papers, and Poster and Oral Presentation,	K2– K4	5	1-5	Lecture and Presentation	Poster and Oral Presentation
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.3. Purpose and the Methods of Paper Critiquing.	K5- K6	4	1-5	Discussion	Paper Critiquing
Jan 8 – 12, 2024	**C.A. Test - I**						
Jan 13, 2024 (Day Order 1)	3	**Writing well** 3.1. Writing for non- native audiences, usage of simple sentences, untangle long noun phrases, make complete sentences	K1- K3	1	1-5	Lecture and Presentation	MCQs
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1. Use of punctuations- comma, colon, semicolon, dash and periods, Creating non-textual information- acquiring, processing and printing illustrations.	K1- K3	3	1-5	Lecture and Presentation	MCQs

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2. Concepts of mind maps. Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science Discipline, Use of tools / techniques for Research: methods to search required information effectively	K2– K4	5	1-5	Lecture and Presentation	Classroom activity
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.3. Reference Management Software like Zotero/ Mendeley, Software for paper formatting like LaTeX/MS Office,	K5- K6	4	1-5	Lecture, Demonstration and Presentation	III Component
Feb 3, 2024 (Day Order 2)	3	3.3. Software for detection of Plagiarism.	K5- K6	1	1-5	Lecture, Demonstration and Presentation	Discussion
Feb 5- 6, 2024 (Day Order 5 to 6)	4	**Bioethics** 4.1. Introduction. Intellectual Property Rights (IPR) and Patents, TRIPS	K1- K3	2	1-5	Lecture and Presentation	Discussion
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.1. Case studies on Patents (Basmati, Turmeric and Neem), ethics in science practicals.	K1- K3	5	1-5	Discussion	Case Study
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2. Plagiarism and Common Errors in Scientific Writing. Misconduct in science.	K2– K4	5	1-5	Lecture and Presentation	III Component

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.3. Ethical issues related to embryonic stem cells, Genetic testing and screening, human clinical trials and drug testing.	K5- K6	5	1-5	Lecture and Presentation	Discussion
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	**IPR, Patent, Copyrights and Trademarks** 5.1. Introduction of IPR, General Agreement on Trade and Tariff (GATT) and World Trade Organizations. Establishment and functions of GATT, World Trade Organization (WTO) and World International Property Organization (WIPO).	K1- K3	5	1-5	Lecture and Presentation	Quiz/ Puzzles
Mar 2, 2024 (Day Order 1)	5	5.2. WTO Summits, Role of Integrated Business Solution Center (IBSC) and Review Committee on Genetic Manipulation (RCGM)	K2– K4	1	1-5	Lecture and Presentation	Discussion
Mar 4 –8, 2024	**C.A. Test - II**						

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	5.2. Production of Plant variety and farmers right act. 5.3. TRIPS, Different types of intellectual property rights (IPR), Patents, Trade mark, Trade secret copyright	K5- K6	5	1-5	Lecture and Presentation	Discussion
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	5.3. Geographical distribution on biological diversity, Obligations, Production of Traditional Knowledge, Impact of GM Crops and GM Foods.	K5- K6	3	1-5	Lecture and Presentation	Case Study
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department   : **Bioinformatics**
Name/s of the Faculty : **Ms. Pujaa B**
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 22 – 23, 2023 (Day Order 1 & 2)	1	1.1 Self-Awareness	K1-K6	1	1-5	Discussion	Presentations and group activity
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.2 Communication Skills –Verbal and Non Verbal	K1-K6	2	1-5	Discussion	Presentations and group activity
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.3 Leadership Qualities	K1-K6	2	1-5	Debate	Presentations and group activity
Dec 8-9, 2023 (Day Order 1, 3)	1	1.4 Etiquette and Good Manners 1.5 Experiential Learning –Based on activities	K1-K6	1	1-5	Discussion	Presentations and group activity
Dec 11-15, 2023 (Day Order 2 to 6)	2	2.1. Interpersonal Skills	K1-K6	1	1-5	Discussion	Presentations and group activity
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.2. People Management	K1-K6	2	1-5	Debate	Presentations and group activity
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.3. Creative Thinking	K1-K6	2	1-5	Debate	Presentations and group activity
Jan 8 – 12, 2024	**C.A. Test – I**						

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 13, 2024 (Day Order 1)	2	2.4. Critical Thinking 2.5. Experiential Learning – Based on activities	K1-K6	1	1-5	Discussion	Presentations and group activity
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1. Importance of time management	K1-K6	1	1-5	Presentations and activity	Presentations and group activity
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2. Planning and Prioritizing 3.3. Organizing skills	K1-K6	2	1-5	Group discussion	Presentations and group activity
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.4. Action Plan 3.5. Experiential Learning – Based on activities	K1-K6	2	1-5	Presentations and activity	Presentations and group activity
Feb 3, 2024 (Day Order 2)	3	_					
Feb 5- 6, 2024 (Day Order 5 to 6)	3	_					
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.1. Reasons for conflict	K1-K6	2	1-5	Group discussion	Presentations and group activity
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2. Consequences of conflict 4.3. Managing emotions	K1-K6	2	1-5	Presentations and activity	Presentations and group activity

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.4. Methods of resolving conflicts 4.5. Experiential Learning – Based on activities	K1-K6	2	1-5	Presentations and activity	Presentations and group activity
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	5.1. Goal Setting and Decision Making	K1-K6	1	1-5	Group discussion	Presentations and group activity
Mar 2, 2024 (Day Order 1)	5	5.2. Career Planning 5.3. Resume Writing	K1-K6	1	1-5	Demo presentations	Presentations and group activity
Mar 4 –8, 2024	**C.A. Test – II**						
Mar 9 – 16, 2024 (Day 6 & 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 group activity
Mar 18 – 19, 2024 (Day Order 2 to 3)	5	_					
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI
COURSE PLAN
November 2023 – April 2024

Department   : Bioinformatics
Name/s of the Faculty : Dr. M. Sharanya
Course Title   : Computer Aided Drug Design
Course Code   : 23BI/PE/CD23
Shift   : II

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	Identify the key elements in drug and explain new methodologies for drug design	K1
CO2	Describe the role and importance of the various disciplines involved in the different phases of drug discovery and development	K2
CO3	Review and evaluate preclinical and clinical pharmaceutical studies	K3
CO4	Follow new ideas in utilizing main approaches of ligand screening methods	K4
CO5	Examine the pharmacodynamic and pharmacokinetic properties for small molecules	K5, K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Nov 22 – 23, 2023 (Day Order 1 & 2)	1	**Drug Discovery and Development** 1.1. Drug Development Process Overview - The Changing Landscape of drugs development	K1-K2	2	1-5	Lecture and Presentation	Discussion
Nov 24-30, 2023 (Day Order 1 to 6)	1	1.2. Drug Discovery Phases	K2-K3	5	1-5	Lecture and Presentation	Discussion
Dec 1-7, 2023 (Day Order 1 to 6)	1	1.3. Preclinical Phase studies	K3-K6	5	1-5	Lecture and Presentation	Case Study
Dec 8-9, 2023 (Day Order 1, 3)	2	**Regulations in Drug Discovery** 2.1. FDA regulations on Drug Development	K1-K2	2	1-5	Lecture and Presentation	Quiz
Dec 11-15, 2023 (Day Order 2 to 6)	2	2.2. Indian Regulatory Systems	K2-K3	5	1-5	Lecture and Presentation	Discussion
Dec 16 – 22, 2023 (Day Order 1 to 6)	2	2.3. Ethical Considerations	K3-K6	5	1-5	Lecture and Presentation	Group Discussion
Jan 3 – 6, 2024 (Day Order 1 to 4)	2	2.3 Special Populations	K3-K6	3	1-5	Lecture and Presentation	Discussion

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jan 8 – 12, 2024	C.A. Test - I						
Jan 13, 2024 (Day Order 1)	3	**Drug Target Identification** 3.1. Computational inferences used to identify	K1-K2	1	1-5	Lecture and Presentation	Discussion
Jan 18 -20, 2024 (Day Order 4 to 6)	3	3.1. validate small molecule drug targets	K1-K2	3	1-5	Lecture, Demonstration and Presentation	III Component
Jan 22-29, 2024 (Day Order 1 to 6)	3	3.2. Databases for Drug targets,	K1-K2	5	1-5	Lecture, Demonstration and Presentation	Discussion
Jan 30 – Feb 2, 2024 (Day Order 1 to 4)	3	3.2. Retrieving protein structure and visualisation 3.3. Target Discovery and Validation	K2-K3	4	1-5	Lecture, Demonstration and Presentation	III Component
Feb 3, 2024 (Day Order 2)	3	3.3. Active Site Prediction	K3-K6	1	1-5	Lecture, Demonstration and Presentation	Classroom Activity
Feb 5- 6, 2024 (Day Order 5 to 6)	4	**Ligand Based Drug Design** 4.1. Screening of lead molecules	K1-K2	2	1-5	Lecture and Presentation	Discussion
Feb 7 – 14, 2024 (Day Order 1 to 6)	4	4.1. Natural products and their analogues	K1-K2	5	1-5	Lecture and Presentation	Discussion

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Feb 15 – 22, 2024 (Day Order 1 to 6)	4	4.2. Chemical Databases – PubChem, Drug Bank	K2-K3	5	1-5	Lecture, Demonstration and Presentation	III Component
Feb 23 – 24, 2024 (Day Order 1 & 5)	4	4.3. Chemical file formats, Retrieving drug molecules	K3-K6	5	1-5	Lecture, Demonstration and Presentation	Classroom activity
Feb 26 – Mar 1, 2024 (Day Order 2 to 6)	5	5.1. Pharmacokinetics -	K1-K2	5	1-5	Lecture and Presentation	Discussion
Mar 2, 2024 (Day Order 1)	5	5.1. ADME Prediction	K1-K2	1	1-5	Lecture, Demonstration and Presentation	Classroom activity
Mar 4 –8, 2024	**C.A. Test - II**						
Mar 9 – 16, 2024 (Day 6 & Day Order 1 to 6)	5	5.2. Pharmacodynamics	K2-K3	6	1-5	Lecture and Presentation	Discussion
Mar 18 - 19, 2024 (Day Order 2 to 3)	5	5.3. Molecular Docking - Scoring and evaluation	K3-K6	2	1-5	Lecture, Demonstration and Presentation	Discussion
Mar 20-22, 2024 (Day Order 4 to 6)	**REVISION**						