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

Department : MATHEMATICS
Names of the Faculty : Dr. V. DHANALAKSHMI & Dr. SINDIYA THERESE
Course Title : RESEARCH METHODS AND TOOLS
Course Code : 23MT/PC/RT34
Shift : 1

COURSE OUTCOMES (COs)

COs	Description	CL
CO1	recall and understand the various types of research, the procedures and ethics involved in research design, and the tools required forresearch	K1, K2
CO2	apply various techniques involved in research process with the ethical principles governing research and use the appropriate toolsfor the study	K3
CO3	analyse the structure of typesetting mathematical documents using LaTeX including figures and plots obtained from MATLAB	K4
CO4	execute MATLAB scripts to automate repetitive tasks and perform calculations and present the results using LaTeX	K5
CO5	create applications using MATLAB and LaTeX	K6

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Jun 19 – 26, 2024 (Day Order 1 - 6)	1	Research Methodology 1.1　Introduction – Motivation	K1- K6	7	CO1-5	Lecture & Demonstration	Questioning
	3	Creating a Document Using LaTeX 3.1　Simple Typesetting – Font – Document – Document Class					
	4	Mathematical Software: MATLAB 4.3　Introduction to MATLAB 4.4　Constants, Variables and Expressions					
Jun 27 – July 4, 2024 (Day Order 1 - 6)	1	Research Methodology 1.2　Formulating a Research Problem	K1- K6	7	CO1-5	Lecture & Demonstration	Questioning
	3	Creating a Document Using LaTeX 3.1 Page Style – Page Numbering – Parts of a Document – Dividing the Document					
	4	Mathematical Software: MATLAB 4.5　Vectors and Matrices: Matrix and Array Operations, Matrix Manipulation, Functions with Array Inputs					
July 5 – 12, 2024 (Day Order 1 - 6)	1	Research Methodology 1.3　Data Collection – Analyzing and Processing	K1- K6	7	CO1-5	Interactive Sessions	Quiz
	3	Creating a Document Using LaTeX 3.2　Displayed Text and Tables					
	4	Mathematical Software: MATLAB 4.6　Input – Output Statements: Interactive Inputs – input, menu, pause, Output Commands – format, disp commands					
July 15 – 23, 2024	1	Research Methodology 1.4 Report Writing – Content – Format – Text Layout– Style –	K1- K6	7	CO1-5	Lecture & Demonstration	Seminar – Unit 1

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
(Day Order 1 - 6)		Packaging and Presentation, Characteristics of Good Reporting, Suggestions and Recommendations					(10 marks)
	3	Creating a Document Using LaTeX 3.3 Typesetting Mathematics and Typesetting Theorems					
July 24 – 31, 2024 (Day Order 1 - 6)	2	Ethics in Scientific Research and Research Metrics 2.1 Scientific Integrity and Research Ethics 2.2 Intellectual Honesty and Research Integrity - Environment and Bases of Research Integrity - Promoting Integrity in Research	K1- K6	7	CO1-5	Lecture & Demonstration	Group Projects
	3	Creating a Document Using LaTeX 3.4 Floats – the Figure Environment – Creating Floating Figures – Figure Placement – Customizing Float Placement					
Aug 1 – 5, 2024 (Day Order 1 - 3)		Practice		2	CO1-5	Pair Programming	
Aug 6 – 10, 2024		**C.A. Test – I (Units 1, 3: 3.1-3.3, 4: 4.3-4.6)**					
Aug 12 – 14, 2024 (Day Order 4-6)	3	Creating a Document Using LaTeX 3.5 Bibliography, Footnotes and Cross References in Math	K4- K6	5	CO1-5	Lecture & Demonstration	
Aug 16 – 23, 2024 (Day Order 1-6)	2	Ethics in Scientific Research and Research Metrics 2.3 Scientific Misconduct - Poor Practices vs. Misconduct - Fabrication/Falsification	K1- K6	7	CO1-5	Lecture & Demonstration	Quiz
	4	Drawing, Plotting and Presentation in LaTeX 4.1 Drawing: tikzpicture Environment - Grids – Paths - Coordinate Labels - Colour - Drawing the Path - Line Width - Dash Patterns - Arrows - Filling a Path - Nodes and Node Labels - Node Options - Connecting Nodes - Coordinate Systems & Calculations - \foreach Command					

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Aug 27 – Sep 3, 2024 (Day Order 1-6)	2	Ethics in Scientific Research and Research Metrics 2.4 Publication Ethics - Committee on Publication Ethics (COPE) - Plagiarism: Issue and Facts	K1- K6	7	CO1-5	Lecture & Demonstration	Group Projects
	4	Drawing, Plotting and Presentation in LaTeX 4.2 Beamer Presentations: Frames - Incremental Presentations - Visual Alerts - Adding Some Style					
Sep 4 – 11, 2024 (Day Order 1-6)	2	Ethics in Scientific Research and Research Metrics 2.5 Database and Research Metrics - Bibliometrics - Calculating Journal Impact Factor - SCImago Journal Rankings - H-Index - Web of Science - Scopus - Google Scholar Citations, Profiles, and Rankings	K1- K6	7	CO1-5	Lecture & Demonstration	Questioning
	5	Plotting and Scripting in MATLAB 5.1 Polynomials – Polynomial Evaluation, Roots of a Polynomial, Characteristic Equation of a Matrix, Polynomial Differentiation & Integration, Polynomial Curve Fitting					
Sep 12 - 20, 2024 (Day Order 1-6)	5	Plotting and Scripting in MATLAB 5.2 Two Dimensional Plots – plot, polar, area, bar, barh, hist, pie functions 5.3 Three Dimensional Plots – plot3, bar3, bar3h, pie3, meshgrid, mesh, surf, contour functions	K3- K6	7	CO1-5	Simulation & Modeling	Project – LaTeX (20 marks)
Sep 23 - 26, 2024 (Day Order 1-4)		Practice		4		Pair Programming	
Sep 27 – Oct 3, 2024	**C.A. Test – II (Units 2, 4: 4.1-4.2, 5: 5.1-5.2)**						
Oct 4 – 5, 2024 (Day 5 & 6)		Practice		3		Pair Programming	

Week	Unit No.	Content	Cognitive Level	Teaching Hours	COs	Teaching Learning Methodology	Assessment Methods
Oct 7 - 15, 2024 (Day Order 1 to 6)	5	Plotting and Scripting in MATLAB 5.4 Writing Programs and Functions	K3- K6	7	CO1-5	Presentation	Project – MatLab (20 marks)
Oct 16 - 22, 2024 (Day Order 1 to 6)	4&5	Drawing & Plotting in LaTeX & MATLAB	K3- K6	7	CO1-5	Interactive Sessions	Quiz
Oct 23 - 24, 2024 (Day Order 1 to 2)		**REVISION**					