

PG DEPARTMENT OF COMPUTER SCIENCE

**Nallamuthu Gounder Mahalingam College
(Autonomous)**

(An ISO 9001:2015 Certified Institution)

Accredited with 'A⁺⁺' Grade by NAAC

Pollachi-642001



SYLLABUS

M. Sc. COMPUTER SCIENCE (SF)

BATCH 2026-2028

PG Department of Computer Science

Institute Vision

Our dream is to make the College an institution of excellence at the national level by imparting quality education of global standards to make students academically superior, socially committed, ethically strong, spiritually evolved and culturally rich citizens to contribute to the holistic development of the self and society.

Institute Mission

Training students to become role models in academic arena by strengthening infrastructure, upgrading curriculum, developing faculty, augmenting extension services and imparting quality education through an enlightened management and committed faculty who ensure knowledge transfer, instil research aptitude and infuse ethical and cultural values to transform students into disciplined citizens in order to improve quality of life.

Department Vision

Exploring innovative approaches to enhance learning opportunities through the integration of technology and to develop more responsive strategies for adapting curriculum and changing demands in the Computing Profession.

Department Mission

To provide strong theoretical foundation complemented with extensive practical training. Provide a learning ambience to enhance innovations, problem solving skills, leadership qualities, team-spirit, and ethical responsibilities.

Program Educational Objectives:

PEO1	To provide students with a clear understanding of the course goals and to visualize their needs.
PEO2	Employed in the software sector and attempting to acquire and implement new ideas and concepts as the field progresses.
PEO3	To instill the value of continuous learning and the importance of research and development for the betterment of society and the country as a whole.
PEO4	Enhanced to cope with evolving technologies on the frontiers of computer science and incorporating Industry 5.0 Technologies into their careers based on industry requirements

Program Outcomes (POs)

PO1	Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO2	Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyse and synthesise data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problematising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.
PO7	Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO8	Scientific reasoning: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO10	Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	Self-directed learning: Ability to work independently, identifies appropriate resources required for a project, and manages a project through to completion.

PO12	Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulates a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
PO15	Lifelong learning: Ability to acquire knowledge and skills, including 'learning how to learn', that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development / reskilling.

Program Specific Outcomes:

PSO - 01	Multidisciplinary knowledge: Able to understand, analyze and develop computer programs in the areas related to various domains for efficient design of computer-based systems of varying complexity.
PSO - 02	Enhancing Knowledge: Acquire foundation for research into the theory, practice of programming and apply the knowledge gained during the course of the program from advanced computing and solve real life complex problems faced in society.

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO1 5	PSO 1	PSO 2
CO1	3	2	2	1	1	1	-	-	2	2	1	1	-	-	-	3	2
CO2	2	3	2	2	1	1	-	-	2	2	1	1	-	-	-	3	2
CO3	2	2	3	2	2	1	-	-	2	2	1	1	-	-	-	3	2
CO4	2	2	3	3	2	1	-	-	2	2	1	1	-	-	-	3	2
CO5	2	3	3	3	2	1	1	2	2	2	2	1	1	1	3	3	2

3 Point Scale – 1, 2, 3

(FOR THE CANDIDATES ADMITTED FROM THE ACADEMIC YEAR 2026 - 2028 ONWARDS)**I to IV SEMESTERS****SCHEME OF EXAMINATIONS**

SEMESTER-I									
Subject Code	Title of the Paper	Hrs / Week		Hrs / Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
		L	P	T		Internal	External		
26PCS101	Python Programming for Data Analysis and Web Development	2	4	1	3	40	60	100	4
26PCS102	Advanced JAVA Programming	2	4	-	3	40	60	100	4
26PCS103	Design and Analysis of Algorithms	4	-	1	3	25	75	100	4
26PCS104	Advanced Operating System	5	-	2	3	25	75	100	4
26PCS105	Programming Lab I : Design and Analysis of Algorithms	-	4	-	3	40	60	100	2
26PCS1E1	Elective I: Software Project Management	5	-	-	3	25	75	100	5
26PCS1E2	Elective I: Software Engineering and Testing								
26PCS1E3	Elective I: Object Oriented Analysis and Design with UML								
	Total	18	12	4		195	405	600	23

SEMESTER-II									
Subject Code	Title of the Paper	Hrs / Week		Hrs/ Sem.	Exam Hrs.	Maximum Marks		Total Marks	Credits
		L	P	T		Internal	External		
26PCS206	Data Visualization for Decision Making	4	-	2	3	25	75	100	4
26PCS207	Cloud Computing	4	-	1	3	25	75	100	4
26PCS208	Digital Image Processing	2	4	1	3	40	60	100	4
26PCS209	Advanced Database Management System	2	3	-	3	40	60	100	4
26PCS210	Programming Lab II : Data Visualization using Power BI	-	4	-	3	40	60	100	2
26PCS2E1	Elective II: Advanced Networks	5	-	-	3	25	75	100	5
26PCS2E2	Elective II: Augmented and Virtual Reality								
26PCS2E3	Elective II: Mobile Computing								
26PCS2N1/ 26PCS2N2	Non Major Elective I: Web Designing Lab/ Advanced Internet Technologies Lab	-	2	-	2	40	60	100	2
	Total	17	13	4		235	465	700	25

SEMESTER-III									
Subject Code	Title of the Paper	Hrs / Week		Hrs / Se m.	Exam Hrs.	Maximum Marks		TotalMarks	Credits
		L	P	T		Internal	External		
26PCS311	Full Stack Web Development	2	4	2	3	40	60	100	4
26PCS312	Artificial Intelligence and Machine Learning	4	-	1	3	25	75	100	4
26PCS313	Big Data Analytics	4	-	1	3	25	75	100	4
26PCS314	Internet of Things	2	4	-	3	40	60	100	4
26PCS315	Programming Lab III: Artificial Intelligence and Machine Learning	-	5	-	3	40	60	100	2
26PCS3P1	Pilot Project (Mobile App or Web App Development / AI Based Development)	-	-	-	-	25	75	100	2
26PCS3E1	Elective III: Deep Learning	5	-	-	3	25	75	100	5
26PCS3E2	Elective III: Statistical Data Analytics								
26PCS3E3	Elective III: Robotic Process Automation for Business								
	Total	17	13	4		220	480	700	25

# CO-SCHOLASTIC COURSES					Grade/ Credit
	Teaching Hours	CIA	ESE	TOTAL	
ONLINE COURSES					
Swayam, MOOC Course etc.,	-	-	-	-	Grade
VALUE ADDED COURSES					
Value Added Courses	30	30	70	100	Grade
CERTIFICATE COURSE					
Certificate Course	30	-	-	-	Grade
ADVANCED LEARNER COURSE					
Advanced Learner Course	SS	-	-	-	Grade
The scholastic courses are only counted for the final grading and ranking. However for the award of the degree, the completion of co-scholastic one online course is mandatory. All other co-scholastic courses are optional only.					

S.No.	Semester	Courses	
1	Semester I	SWAYAM/ MOOC	Any Online Course (Compulsory)
2	Semester II	Value Added Course	1.UI & UX Design using Figma 2FOUNDATIONS and Applications of Block chain Technology and Crypto- currency
3	Any Semester	Certificate Course	Software Testing Lab– Selenium (Optional)
4	Any Semester	Advanced Learner Course	Mobile Application development (Optional)

Question Paper Pattern
(Based on Bloom's Taxonomy)

K1-Remember; K2- Understanding; K3- Apply; K4-Analyze; K5- Evaluate

1. Theory Examinations: 75 Marks (Part I, II, & III)

(i) Test- I & II, ESE:

Knowledge Level	Section	Marks	Description	Total
K1 & K2 (Q1 -10)	A (Q1 – 5 MCQ) (Q6–10 Define/Short Answer/MCQ)	10 * 1 = 10	MCQ /Define	75
K3 (Q11-15)	B (Either or pattern)	5 * 5 = 25	Short Answers	
K4 & K5(Q16 – 20)	C (Either or pattern)	5 * 8 = 40	Descriptive/ Detailed	

2. Practical Examinations:

Paper	Maximum Marks	Marks for		Components for CIA		
		CIA	CEE	Tests	Observation Note	Record Note
Practical (Core / Elective)	100	40	60	30	05	05

3. Project:

Paper	Maximum Marks	Marks for		
		CIA	CEE	
			Evaluation	Viva-voce
Pilot Project	100	25	50	25
Project	200	50	100	50

* CIA – Continuous Internal Assessment & CEE – Comprehensive External Examinations

Components of Continuous Internal Assessment (CIA)**THEORY****Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;**

Components		Calculation	CIA Total
Test 1	75	(75+75+15+10)/7	25
Test 2 / Model	75		
Assignment / Digital Assignment	15		
Others*	10		

*Others may include the following: Seminar / Socratic Seminars, Group Discussion, Role Play, APS, Class participation, Case Studies Presentation, Field Work, Field Survey, Term Paper, Workshop / Conference Participation, Presentation of Papers in Conferences, Quiz, Report / Content Writing, etc.

PILOT PROJECT**Maximum Marks: 100; CIA Mark: 25; CEE Mark: 75;**

Components		Calculation	CIA Total
Review I	5	5+5+5+10	25
Review II	5		
Review III	5		
Report Submission	10		

MAIN PROJECT**Maximum Marks: 200; CIA Mark: 50; CEE Mark: 150;**

Components		Calculation	CIA Total
Review I	10	10+ 10+10+20	50
Review II	10		
Review III	10		
Report Submission	20		

* Components for 'Review' may include the following:

Originality of Idea, Relevance to Current Trend, Candidate Involvement, and Presentation of Report for Commerce, Management & Social Work.

Synopsis, System Planning, Design, Coding, Input form, Output format, Preparation of Report & Submission for Computer Science cluster.

Continuous Internal Assessment for Pilot Project**Maximum Marks:** 100 Marks**Components for CIA:** 25 Marks

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments/IoT) / Current technology) Planning Stage	05	25
II	Supporting Diagrams like system flowchart, ER, DFD, Use case and Table Design OR UI and UX Design Application Architect and Prototyping	05	
III	Coding, Input forms, Output format, Testing OR Development, Testing	05	
IV	Preparation of Report & Submission	10	

Components for CEE: 75 Marks

Components for CEE	Marks	Total	Grand Total
Evaluation			75
Title Relevance of the Industry/Institute	10	50	
Technology	10		
Design and Development Publishing	10		
Testing, Report	20		
Viva Voce			
Project Presentation	10	25	
Q&A Performance	15		

Continuous Internal Assessment for Main Project**Maximum Marks:** 200 Marks**Components for CIA: 50 Marks**

Criterion	Mode of Evaluation	Marks	Total
I	Synopsis, Company Profile, System Specification, Existing System, Proposed System OR (For Android Developments) Project Planning Stage	10	50
II	Supporting Diagrams like system flowchart, ER, DFD, Use case and Table Design OR UI and UX Design Application Architect and Prototyping	10	
III	Coding, Input forms, Output format, Testing OR Development, Testing	10	
IV	Preparation of Report & Submission	20	

Components for CEE: 150 Marks

Components for CEE	Marks	Total	Grand Total
Evaluation			150
Title Relevance of the Industry/Institute	20	100	
Technology	20		
Design and Development Publishing	20		
Testing, Report	40		
Viva Voce			
Project Presentation	20	50	
Q&A Performance	30		

COMPUTER SCIENCE PROJECT and VIVA VOCE

Guidelines

Introduction

The title of the project work and the organization will be finalized at the end of the fifth Semester. Each student will be assigned with a Faculty for guidance. The Project work and coding will be carried by using the facility of the computer science lab as well as in the organization. The periodical review will be conducted to monitor the progress of the project work. The project report will be prepared and submitted at the end of the semester. An external examiner appointed by the Controller of Examination will conduct the viva voce examination along with a respective guide.

Area of Work

- Web Based Development
- Mobile app development
- Website development
- IoT Projects
- Big Data and Data Mining Projects
- Cloud Computing Projects
- Networking Projects
- Artificial Intelligence and Machine learning Projects
- Data Analytics Projects using Python, R, Tableau etc..
- System Software
- Web Security Projects
- Image Processing

Methodology

Arrangement of Contents:

The sequence in which the project report material should be arranged and bound as follows:

1. Cover Page & Title Page
2. Bonafide Certificates
3. Declaration
4. Acknowledgement
5. Synopsis
6. Table of Contents
7. Chapters
8. Appendix
9. References

Format of Table of Contents**TABLE OF CONTENTS**

Chapter No.	Title	Page No.
i	Certificates	
ii	Declaration	
iii	Acknowledgement	
iv	Synopsis	
1.	Introduction	
	Introduction	
	Objective of the Project	
	Company Profile	
	System Specification	
	Hardware Specification	
	Software Specification	
2 .	System Study	
	Existing System	
	2.1.2 Drawbacks	
	Proposed System	
	Planning and Scheduling	
3.	System Design	
	Overview of the Project	
	Modules of the Project	
	Input Design Format	
	Output Design	
	Table Design	
	Supporting Diagrams (ER/DFD/Use Case)	
4.	Implementation and Testing	
	Coding Methods	
	Testing Approach	
	Implementation and Maintenance	
5.	Project Evaluation	
	Project Outcome	
	Limitations of the Project	
	Further Scope of the Project	
6.	Conclusion	
7.	Appendix	
	Source Code	
	Screenshots and Reports	
8.	References	

Size of the Project

The Project Report contents should be a maximum of not exceeding 70 pages.

STUDENT SEMINAR EVALUATION RUBRIC

Grading Scale:

A	B	C	D
8-10	5-7	3-4	0-2

CRITERIA	A - Excellent	B - Good	C - Average	D - Inadequate
Organization of presentation	Information presented as an interesting story in a logical, easy-to-follow sequence	Information presented in logical sequence; easy to follow	Most of the information is presented in sequence	Hard to follow; sequence of information jumpy
Knowledge of the subject & References	Demonstrated full knowledge; answered all questions with elaboration & Material sufficient for clear understanding AND exceptionally presented	At ease; answered all questions but failed to elaborate & Material sufficient for clear understanding AND effectively presented	At ease with information; answered most questions & Material sufficient for clear understanding but not clearly presented	Does not have a grasp of information; answered only rudimentary Questions & Material not clearly related to the topic OR background dominated seminar
Presentation Skills using ICT Tools	Uses graphics that explain and reinforce text and presentation	Uses graphics that explain the text and presentation	Uses graphics that relate to text and presentation	Uses graphics that rarely support text and presentation
Eye Contact	Refers to slides to make points; engaged with the audience	Refers to slides to make points; eye contact the majority of the time	Refers to slides to Make points; occasional eye contact	Reads most slides; no or just occasional eye contact
Elocution – (Ability to speak English language)	Correct, precise pronunciation of all terms The voice is clear and steady; the audience can hear well at all times	Incorrectly pronounces a few terms Voice is clear with few fluctuations; the audience can hear well most of the time	Incorrectly pronounces some terms Voice fluctuates From low to clear; difficult to hear at times	Mumbles and/or Incorrectly pronounces some terms Voice is low; difficult to hear

WRITTEN ASSIGNMENT RUBRIC

Grading Scale:

A	B	C	D	F
13-15	10-12	7-9	4-6	0-3

CRITERION	A - Excellent	B - Good	C - Average	D - Below Average	F - Inadequate
Content & Focus	Hits on almost all content exceptionally clear	Hits on most key points and the writing is interesting	Hits in basic content and writing are understandable	Hits on a portion of content and/or digressions and errors	Completely off track or did not submit
Sentence Structure & Style	* Word choice is rich and varies * Writing style is consistently strong * Students own formal language	* Word choice is clear and reasonably precise * Writing language is appropriate to the topic * Words convey intended message	* Word choice is basic * Most writing language is appropriate to the topic * Informal language	* Word choice is vague * Writing language is not appropriate to the topic * Message is unclear	* Not Adequate
Sources	Sources are cited and are used critically	Sources are cited and some are used critically	Some sources are missing	Sources are not cited	Sources are not at all cited
Neatness	Typed; Clean; Neatly bound in a report cover; illustrations provided	Legible writing, well-formed characters; Clean and neatly bound in a report cover	Legible writing, some ill-formed letters, print too small or too large; papers stapled together	Illegible writing; loose pages	Same as below standard
Timeliness	Report on time	Report one class period late	Report two class periods late	Report more than one week late	Report more than 10 days late

SEMESTER I

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS101	Course Title:	Python Programming for Data Analysis and Web Development		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		6	Tutorial Hrs/Sem	1	Semester:	I
					Credits:	4

Course Objective

To understand the core principles of the Python Language and use the tools to produce well designed programs in python and create effective GUI applications.

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember the principles of structured programming recognize and construct common programming idioms: variables, loop, branch, subroutine, and input/output.	PO1(3),PO2(2),PO5(2), PO10(1),PO12(2)
CO2	Understand the common programming idioms: variables, loop, branch, subroutine, and input/output	PO1(3),PO2(2),PO3(2), PO5(2),PO10(1),PO12(2)
CO3	Deploy the concepts of lists, tuples, dictionaries, standard libraries, modular programming and the design of user interfaces	PO1(2),PO2(3),PO3(2),P O4(2),PO5(3),PO10(1), PO12(2)
CO4	Ability to analyze and solve the problems using advanced facilities of the Python language	PO1(2),PO2(3),PO3(2), PO4(3),PO5(3),PO12(2)
CO5	Apply the functions and python libraries to analyze and solve various data analytics problems	PO1(3),PO2(3),PO3(2), PO4(3),PO5(3),PO6(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	–	2	–	–	–	–	–	–	2	3	1	3
CO2	3	2	–	–	2	–	–	–	–	1	–	2	3	1	3
CO3	2	3	2	1	3	–	–	–	–	1	–	2	3	2	2
CO4	2	3	2	3	2	–	–	–	–	–	–	2	3	2	2
CO5	3	3	2	3	3	–	–	–	–	1	–	2	3	3	3

3 Point Scale – 1, 2, 3

Python Programming for Data Analysis and Web Development

Units	Contents	Hrs
UNIT I	Introduction to Python: Introduction – Python overview – Getting started – Comments – Python identifiers – Reserved keywords – Variables – Standard data types – Operators – Statements and Expressions – String operations – Boolean expressions. Classes and Objects: Overview of OOP – Data encapsulation – Polymorphism–Class definition – Creating objects – <i>Inheritance</i> – Multiple inheritances – Method overriding – Data encapsulation –Data hiding.	15
UNIT II	Control Statements and Functions: For loop – While statement – if else and if else statement – Input from keyboard. Functions: Introduction – Built-in functions – Type conversion – Type coercion – Date and time – dir() function – help() function – User defined functions – Parameters & arguments – Function calls – The return statement – Python recursive function. Strings and Lists: Strings – Compound data type – len function – String slices – String traversal – Escape characters – String formatting operator – String formatting functions. Lists – Values and accessing elements – Traversing a list – Deleting elements from list – Built-in list operators –Built-in list methods.	20
UNIT III	Tuples and Dictionaries: Tuples – Creating tuples – Accessing values in tuples – Tuple assignment – Tuples as return values – Basic tuple operations – Built-in tuple functions. Dictionaries – Creating dictionary – Accessing values in dictionary – Updating dictionary – Deleting elements from dictionary – Operations in dictionary Built-in dictionary methods. Files and Exceptions: Introduction to File Input and Output-Using loops to process files-Processing Records-Exception.	20
UNIT IV	Data Analysis with Python: Reading and Writing Data in Text format – Reading Text Files in Pieces- writing data to text formats –Binary data formats-Reading Microsoft Excel Files- Interacting with Web API's-Interacting with Databases. Data Cleaning and Preparation: Handling Missing Data-Filtering Out Missing Data- Filling In Missing Data. Data Transformation: Removing Duplicates. Plotting and Visualization: A Brief mat plot lib API Primer-Figures and Subplots-Colors, Markers, and Line Styles-Annotations and Drawing on aSubplot-Saving Plots to File-mat plot lib Configuration.	20
UNIT V	Numpy Basics: Arrays and Vectorized Computation –The NumPyndarrays: Multidimensional Array Object –Creating ndarrays-Data Types for ndarrays- Arithmetic with NumPy Arrays- Basic Indexing and Slicing-Boolean Indexing –Fancy Indexing-Methods for Boolean Arrays- Mathematical and Statistical Methods-File Input and Output with Arrays- Sorting. Python Web Frameworks: Django Framework: Introduction – Django architecture (Model–View–Template) – Creating a simple web application – Models – Views – Templates – URL routing. FastAPI: Introduction – Creating APIs using FastAPI – Request and response handling – Developing simple REST APIs – Applications in cloud computing and microservices.	15
	Total Contact Hours	90
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.		

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Mark Summerfield	Programming in Python 3: A Complete introduction to the Python Language	Addison-Wesley Professional 2 nd Edition	2009

2	NumPy and IPython by Wes McKinny	Python for Data Analysis: Data Wrangling with Pandas	O'Reilly Media 2 nd Edition	2012
3	Wesley J Chun	Core Python Applications Programming	Prentice Hall 3 rd Edition	2012

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Mark Lutz	Learning Python	O'Reilly 5 th Edition	2013
2	Wesley J. Chun	Core Python Programming	Prentice Hall 2 nd Edition	2001
3	E Balagurusamy	Introduction to computing and Problem Solving using Python	Mc Graw Hill publication Kindle Edition	2016

Web Reference

1. <https://www.python.org/>
2. <https://www.programiz.com/python-programming>
3. <https://ipython.org/>
4. <https://numpy.org/>
5. <https://pandas.pydata.org/>

List of Programs

1. Write a Python program to demonstrate basic input/output operations and arithmetic operators.
2. Write a Python program to demonstrate string operations such as slicing, concatenation, and formatting.
3. Write a Python program to demonstrate Boolean expressions and conditional statements.
4. Write a Python program using for and while loops.
5. Write a Python program to implement user-defined functions with parameters and return values.
6. Write a Python program to implement recursive functions.
7. Write a Python program to perform list operations.
8. Write a Python program to demonstrate built-in list methods.
9. Write a Python program to perform tuple operations.
10. Write a Python program to perform dictionary operations.
11. Write a Python program to demonstrate set operations.
12. Write a Python program to perform file handling operations (read, write, append).
13. Write a Python program to demonstrate exception handling using try-except blocks.
14. Write a Python program to read and process data from a text file using loops.
15. Write a Python program to read data from a CSV/Excel file using pandas.
16. Write a Python program to perform data cleaning operations such as handling missing values.
17. Write a Python program to visualize data using matplotlib (line chart, bar chart, pie chart).
18. Write a Python program to demonstrate NumPy array creation and basic array operations.
19. Develop a simple web application using Django to store and display student details.
20. Develop a REST API using FastAPI to perform CRUD operations.

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code :	M.Sc CS			Programme Title:	Master of Science (Computer Science)	
Course Code:	26PCS102			Title	Batch:	2026-2028
Lecture Hrs/Week	6	Tutorial Hrs/Sem.		Advanced Java Programming	Semester:	I
					Credits:	4

Course Objective

To understand the advanced Java concepts and to develop Java based applications by applying Javacomponents and implementing in web based applications.

Course Outcomes

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Recollect different classes, constructors and methods of Swing components	PO1(3),PO2(1),PO3(2),PO4(1),PO5(1), PO8(2), PO10(2),PO11(1), PO15(1)
CO2	Get an idea to construct an enterprise application using Java Beans	PO1(3),PO2(2),PO3(2),PO4(2),PO5(2), PO6(1),PO7(1),PO8(2),PO10(3),PO11(1), PO14(1),PO15(1)
CO3	Develop RMI programs for real world applications and establishing DATABASE Connectivity using Java.	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3), PO6(3),PO7(1),PO8(3),PO10(3),PO11(2), PO14(1),PO15(2)
CO4	Analyze session tracking using Session objects and Cookies	PO1(2),PO2(2),PO3(3),PO4(2),PO5(2), PO6(1),PO8(3),PO9(1),PO10(2),PO11(1), PO15(1)
CO5	Validate server side java programs using Servlets and JSP	PO1(3),PO2(2),PO3(3),PO4(3),PO5(2), PO6(2),PO7(1),PO8(3),PO9(1),PO10(3), PO11(2),PO13(1),PO14(1),PO15(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	2	1	1	–	–	2	–	2	1	–	–	–	1
CO2	3	2	2	2	2	1	1	2	–	3	1	–	–	1	1
CO3	3	2	3	3	2	2	1	3	–	3	2	–	–	1	2
CO4	2	2	3	2	2	1	–	3	1	2	1	–	–	–	1
CO5	3	2	3	3	2	2	1	3	1	3	2	–	1	1	2

3 Point Scale – 1, 2, 3

Advanced Java Programming

Units	Contents	Hrs
UNIT I	Java Swings: JPanel-JFrame-JApplet-JSplitPane-JTabbedPane-JViewport-JMenu-Items and Labels-JTextField-JTextArea-JButtons-JButtonClasses-JCheckBoxes-JRadioButton - JProgressbar.	17
UNIT II	Advanced Components: Tree - JTable - JInternalFrame - JDesktopPane - JTextPane - JProgressbar.	16
UNIT III	Java Beans: Introduction to Java Bean-Advantages of a Java Bean-Application Builder tools-TheBean Developer Kit (BDK)-Jar files-Introspection-Developing a Simple Bean-Using Bound Properties-Using Bean Info Interface-Constrained Properties-Persistence-Customizers-Java Bean API.	18
UNIT IV	Servlet Overview and Architecture: Movement to Server Side Java-Practical Applications for Java Servlets-Java Servlet Alternatives-Reason to use Java Servlets-Java Server Architecture – Servlet Basics-The Lifecycle of Servlet-A Basic Servlet. Servlet Chaining: Definition for Servlet Chaining-Uses of Servlet Chains-A Practical example using Servlet Chaining-Servlets and JDBC-Two Tier and Three Tier Database access models- JDBC Servlet-Session Tracking-Using Cookies-Using Session Objects.	19
UNIT V	Java Server Page (JSP): Introduction-Server-side programming-Life Cycle of JSP- To create and run JSP- Architecture of JSP-Scripting tag Elements- Implicit Object- Beans - Conditions - Directives - Declarations – Implicit Variables -Expressions. RMI (Remote Method Invocation): Introduction - RMI Architecture-Bootstrapping and RMI Registry - The RMI Compiler - Object Specialization and Parameter Passing - A Simple example.	20
Total Contact Hours		90

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Herbert Schildt	Java-2, The Complete Reference	11 th Edition, Tata McGraw Hill	2019
2	Jim Keogh	The Complete Reference J2EE	Tata McGraw Hill	2017
3	SamsSeries, James GoodWill	Developing Java Servlets	1 st Edition, SAMS Techmedia	2017
4	Sam Series	Java RMI	Tata McGraw Hill	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Brian Cole, Robert Eckstein, James Elliott, Marc Loy, David Wood	Java Swing	2 nd Edition, O'Reilly Publishers	2012
2	Stephen Potts, Mike Kopack	Web Services	Kindle Edition, Pearson Education	2015

Web References

1. <https://www.javatpoint.com/java-swing>
2. <https://www.geeksforgeeks.org/introduction-javaservlets>
3. <https://www.javatpoint.com/servlet-tutorial>
4. <https://www.javatpoint.com/RMI>
5. <https://stackoverflow.com/questions/5658929/what-is-rmi-registry>

List of Programs

1. Create a simple GUI using JFrame and JPanel.
2. Design a form using JLabel, JTextField, JTextArea, and JButton.
3. Implement JTabbedPane with multiple tabs (e.g., Student/Faculty details).
4. Develop a program using JSplitPane to divide two components.
5. Create a menu-driven application using JMenu, JMenuItem.
6. Implement JCheckBox, JRadioButton, JComboBox, and JList with event handling.
7. Create a JTree to represent hierarchical data (e.g., file system).
8. Develop a JTable to display student records.
9. Implement JDesktopPane and JInternalFrame for MDI applications.
10. Create a program using JProgressBar and JTextPane.
11. Develop a simple Java Bean with getter and setter methods.
12. Demonstrate Bound Properties using PropertyChangeListener.
13. Implement Constrained Properties using VetoableChangeListener.
14. Create and package a Bean into a JAR file and use it in an application.
15. Write a Basic Servlet to display “Hello World” using lifecycle methods.
16. Develop a Servlet with JDBC connectivity to insert and retrieve data from a database.
17. Implement Session Tracking using:
 - a. Cookies
 - b. HttpSession
18. Create a JSP page demonstrating:
 - a. Scriptlet
 - b. Expression
 - c. Declaration
 - d. Implicit objects
19. Develop a JSP-based login application with database connectivity.
20. Implement a simple RMI application:
 - a. Define remote interface
 - b. Implement server
 - c. Create client to invoke remote method

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS103	Course Title:	Design and Analysis of Computer Algorithms		Batch :	2026-2028
Lecture Hrs./WeekOr Practical Hrs./Week		4	Tutorial Hrs/ Sem	1	Semester:	I
					Credits:	4

Course Objective

To create an efficient algorithm, or series of steps, that can be used to solve a given problem in the most effective way possible.

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember and Understand the concepts of time and space complexity, worst case, average case and best case complexities and the big-O notation	PO1(3),PO2(1),PO3(2),PO4(1), PO5(2),PO8(2),PO10(1),PO11(1), PO15(1)
CO2	Identify the key characteristics of a given problem and analyses the suitability of a specific algorithm design technique for the problem.	PO1(3),PO2(1),PO3(3),PO4(2), PO5(3),PO6(1),PO8(2),PO10(1), PO11(1),PO15(1)
CO3	Apply important algorithmic design paradigms and methods of analysis.	PO1(3) PO2(1), PO3(3), PO4(3), PO5(3), PO6(1), PO8(2), PO10(2), PO11(2), PO15(1)
CO4	Analyze major graph algorithms and to employ graphs to model engineering problems	PO1(3),PO2(1),PO3(3),PO4(3),PO5(3), PO6(2),PO8(3),PO10(2),PO11(2),PO15(1)
CO5	Analyze worst-case running times of algorithms using various algorithms	PO1(3),PO3(3),PO4(2),PO5(3),PO6(2), PO8(3),PO10(2),PO11(2),PO15(1)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	2	1	2	–	–	2	–	1	1	–	–	–	1
CO2	3	1	3	2	3	1	–	2	–	1	1	–	–	–	1
CO3	3	1	3	3	3	1	–	2	–	2	2	–	–	–	1
CO4	3	1	3	3	3	2	–	3	–	2	2	–	–	–	1
CO5	3	–	3	2	3	2	–	3	–	2	2	–	–	–	1

3 Point Scale – 1, 2, 3

Design and Analysis of Computer Algorithms

Units	Contents	Hrs		
UNIT I	Introduction: Algorithm definition and specification – Performance Analysis – Elementary Data structures:- Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint set- Union – Graphs – Basic traversal and search techniques – Techniques for Binary Tree –Techniques for Graphs: Breadth First Search and Traversal, Depth First Search and Traversal.	11		
UNIT II	Divide – and – Conquer: - General method – Binary search – Merge sort – Quick sort –The Greedy method: - General method – Knapsack problem – Minimum cost spanning tree –SingleSource shortest path.	12		
UNIT III	Dynamic Programming: General method – Multistage graphs – All pair shortest path –Optimalbinary search trees – 0/1 Knapsack – Traveling salesman problem – Flow shop scheduling.	12		
UNIT IV	Backtracking: General method – 8-Queens problem – Sum of subsets – Graph coloring –Hamiltonian cycles – Knapsack problem. Branch and bound: The method – Least Cost (LC) Search – The 15 puzzle: An Example – Control abstractions for LC Search – Bounding – FIFO Branch and Bound – LC Branch and Bound- Traveling salesperson.	12		
UNIT V	Introduction to Vedic Mathematics: History and Origin-Importance in Modern Computation-Basic Sutras and Their Applications. Vedic Math and Algorithmic Paradigms: Divide and Conquer (Nikhilam, Duplex)- Recursion in Vedic Methods-Matrix and Determinant Computation Using Vedic Sutras. Case Studies and Implementation: Coding Vedic Math Algorithms in Python/C++- Comparative Study of Traditional and Vedic Approaches-Research Applications in Computational Mathematics.	13		
	Total Contact Hours	60		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Book				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran	Design and Analysis of Computer Algorithms	2 nd Edition, Galgotia Publications	2008
2	Bharati Krishna Tirthaji Maharaja	Vedic Mathematics	Motilal Banarsidass Publishers	1965
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni	Fundamentals of data structures	Reprinted Edition, Galgotia Publications	2015
2	Alfred V.Aho, John E.Hopcroft& Jeffery D Ullman	Data structures and Algorithms	Reprinted Edition , PHI learning PVT Ltd	2009

3	Adam Drozdek	Data Structures and Algorithms in C++	4 th Edition, Vikas publishing house, New Delhi	2012
---	--------------	---------------------------------------	--	------

Web References

1. https://onlinecourses.nptel.ac.in/noc21_cs22/preview
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/analysis_of_algorithms.htm
3. <https://www.javatpoint.com/daa-tutorial>
4. <http://cs.uef.fi/pages/franti/asa/notes.html>
5. https://vssut.ac.in/lecture_notes/lecture1428551222.pdf
6. VedicMaths.org

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS104	Course Title:	Advanced Operating System		Batch :	2026-2028
Lecture Hrs./WeekOr Practical Hrs./Week		5	Tutorial Hrs/Sem	2	Semester:	I
					Credits:	4

Course Objective

To understand the concepts of operating system, distributed operating systems, real time operating systems, operating system for handheld systems, LINUX OS and iOS.

Course Outcomes

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember the basic concepts of Operating Systems and its applications.	PO1(3),PO2(1),PO3(1),PO4(1),PO5(1),PO8(1),PO10(2),PO11(1),PO15(1)
CO2	Understand the advanced concepts in operating system, the concepts of distributed operating systems, the information about Linux operating system and iOS architecture, layers and its functions.	PO1(3),PO2(3),PO3(3),PO4(3),PO5(3),PO6(1),PO8(2),PO10(3),PO11(1),PO15(1)
CO3	Apply different Operating Systems	PO1(3),PO2(2),PO3(2),PO4(3),PO5(2),PO6(1),PO7(1),PO8(2),PO10(3),PO11(2),PO14(1),PO15(2)
CO4	Analyze deadlock situations, the reason for deadlock, recovery from deadlocks, how to avoid deadlocks, the need for Real time operating system and security issues.	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3),PO6(2),PO8(3),PO9(1),PO10(2),PO11(2),PO13(1),PO14(1),PO15(2)
CO5	Evaluate the use of Palm OS and Android in handheld devices.	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO6(1),PO8(3),PO9(1),PO10(3),PO11(2),PO12(1),PO13(1),PO14(1)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	1	1	1	–	–	1	–	2	1	–	–	–	1
CO2	3	2	2	2	2	1	–	2	–	3	1	–	–	–	1
CO3	3	2	2	3	2	1	1	2	–	3	2	–	–	1	2
CO4	3	2	3	3	3	2	–	3	1	2	2	–	1	1	2
CO5	2	2	3	2	3	1	–	3	1	3	2	1	1	1	-

3 Point Scale – 1, 2, 3

Advanced Operating System

Units	Contents	Hrs		
UNIT I	Process Synchronization : Overview : Introduction – Functions of an operating system – Design approaches – Why Advanced Operating Systems – Types of Advanced Operating Systems - Synchronization Mechanisms : Introduction – Concept of a Process – Concurrent Processes – The Critical Section Problem – Other Synchronization Problems - Process Deadlocks : Introduction – Preliminaries – Models of Deadlocks.	15		
UNIT II	Distributed Operating Systems : Issues in Distributed Operating Systems – Communication Primitives – Theoretical Foundation : Lamport’s Logical Clocks – Distributed Deadlock. Detection : Deadlock Handling Strategies in Distributed Systems – Issues in Deadlock Detection and Resolution- Distributed File Systems : Design Issues.	15		
UNIT III	Real Time Operating Systems :Introduction – Applications of Real Time Systems – Basic Model ofReal Time System –Characteristics – Safety and Reliability - Real Time Task Scheduling.	15		
UNIT IV	Operating Systems for Handheld Systems : Handheld Systems–The requirements–Technology. Overview – Handheld Operating Systems – Palm OS–Symbian OS - Google Android-Securing Handheld Systems.	15		
UNIT V	Linux and iOS : Linux: Introduction – Linux Kernel Architecture - Process Management and Linux Scheduler: Process management - Process Scheduling – Linux Inter-Process Communication–Linux Memory management–Linux File Systems – iOS : Architecture and SDK Framework - Media Layer -Services Layer - Core OS Layer. Case study – Explore the File system of Linux, Comparative analysis of Linux and iOS, Process Management in Linux.	15		
	Total Contact Hours	75		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	MukeshSinghal and Niranjan G. Shivaratri.(Units– I &II)	Advanced Concepts in Operating Systems –Distributed , Database andMultiprocessor Operating Systems	Tata McGraw-HillPublishers	2017
2	Rajib Mall (Unit –III)	Real-Time Systems: Theory andPractice	Pearson Education India Publishers , First Edition	2009
3	Pramod Chandra P.Bhatt, (Unit – IV &Unit –V)	An Introduction To Operating Systems :Concepts And Practice (GNU / Linux)	PHI Learning Pvt Ltd., Fourth Edition	2019
4	Neil Smyth. (Unit –V)	iPhone iOS 4 Development Essentials –Xcode	Payload media Publishers, FourthEdition	2011

Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBLICATION
1	YoonSeokPyo, HanCheolCho, RyuWoonJung,	ROS Robot Programming from the basic concept to practical	Robotics Co., Ltd., Tae Hoon Lim	2017
2	Andrew S. Tanenbaum	Modern Operating System Programming and Robot Application	Prentice – Hall, Inc, Third Edition	2008
3	Anis Koubaa	Robot Operating Systems (ROS): The Complete Reference (Volume I)	Springer Publishers, First Edition	2016

Web References				
1. http://nptel.ac.in/courses/Webcourse-contents/IIScBANG/Operating%20Systems/New_index1.html				
2. https://www.tutorialspoint.com/operating_system/index.htm				
3. https://www.coursera.org/courses?languages=en&query=operating+system				
4. https://in.udacity.com/course/advanced-operating-systems--ud189				
5. http://wiki.ros.org/ROS/Tutorials				
6. https://www.toptal.com/robotics/introduction-to-robot-operating-system .				

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS105	Course Title:	Programming Lab I: Design and Analysis of Algorithms		Batch :	2026-2028
Lecture Hrs./WeekOr Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	2

Course Objective

To deal with a wide variety of computational problems and to provide a thorough knowledge of the most common algorithms and data structures.

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Understand problems by applying appropriate algorithms.	PO1(3),PO2(1),PO3(2),PO4(3),PO5(2), PO8(2), PO10(1),PO11(1), PO15(1)
CO2	Analyze the efficiency of various algorithms.	PO1(3),PO3(3),PO4(2),PO5(3),PO6(1), PO8(3),PO10(2),PO11(2), PO15(1)
CO3	Apply various data structure techniques to solve problems.	PO1(3),PO2(1),PO3(3),PO4(3),PO5(3),PO6(1), PO8(2),PO10(2),PO11(2),PO15(1)
CO4	Solve a program in many ways using different techniques.	PO1(3),PO2(1),PO3(3),PO4(3),PO5(3),PO6(1), PO8(2),PO10(2),PO11(2),PO15(1)
CO5	Identify and evaluate complex problems using principles of mathematics and engineering science.	PO1(3),PO2(0),PO3(3),PO4(3),PO5(3),PO6(2), PO7(0),PO8(3),PO10(2),PO11(2),PO15(1)

Mapping

POs \ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	2	3	2	—	—	2	—	1	1	—	—	—	1
CO2	3	—	3	2	3	1	—	3	—	2	2	—	—	—	1
CO3	3	1	3	3	3	1	—	2	—	2	2	—	—	—	1
CO4	3	1	3	3	3	1	—	2	—	2	2	—	—	—	1
CO5	3	—	3	3	3	2	—	3	—	2	2	—	—	—	1

3 Point Scale – 1, 2, 3

Contents		Hrs		
1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements		7		
2. Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements				
3. Implement a 0/1 Knapsack problem using Dynamic Programming.		8		
4. Obtain the Topological ordering of vertices in a digraph				
5. In a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.		8		
6. Print all the nodes reachable from a starting node in a digraph using BFS method.				
7. Find Minimum Cost Spanning Tree of a undirected graph using Kruskal's algorithm		8		
8. Find Minimum Cost Spanning Tree of a undirected graph using Prim's algorithm				
9. Check whether a given graph is connected or not using DFS method		8		
10. Find a subset of a given set $S = \{s_1, s_2, \dots, s_n\}$ of n positive integers whose sum is equal to a given positive integer d. For example, if $S = \{1, 2, 5, 6, 8\}$ and $d = 9$				
11. Implement N Queen's problem using Back Tracking		10		
12. Implement All-Pairs Shortest Paths problem using Floyd's algorithm				
13. Implement Travelling Sales Person problem using Dynamic programming.		11		
14. Design and implement the presence of Hamiltonian Cycle in an undirected Graph G of n vertices				
	Total Contact Hours	60		
Pedagogy and Assessment Methods:				
Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran	Design and Analysis of Computer Algorithms	2 nd Edition, Galgotia Publications	2008
2	Anany Levitin	Introduction to the Design and Analysis of Algorithms	Pearson Education, Delhi, 2nd Edition	2007
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ellis Horowitz, Sartaj Sahni	Fundamentals of Data Structures	Reprinted Edition, Galgotia	2015
2	AdamDrozdek	Data Structures and Algorithms in C++	Vikas Publishing House , New Delhi	2012

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

ELECTIVE -I

S.No	COURSE CODE	COURSE TITLE
1	26PCS1E1	Software Project Management
2	26PCS1E2	Software Engineering and Testing
3	26PCS1E3	Object Oriented Analysis and Design with UML

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS1E1	Course Title:	Elective I: Software Project Management		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	4

Course Objectives

To provide in depth knowledge about the basic concepts of software project management, project planning, step wise framework in project planning and cost benefit.

Course Outcomes (CO)

On the successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember the model from the conventional software product to the modern.	PO1(3),PO2(2),PO3(1),PO4(1),PO9(1),PO10(1)
CO2	Understand various estimation levels of cost and effort.	PO1(2),PO2(3),PO3(2),PO4(1),PO9(1),PO10(1)PO11(2)PO12(1)
CO3	Deploy various artifacts sets for better understanding of software development.	PO1(2),PO2(2)PO3(3),PO4(2),PO5(1),PO9(2),PO10(2),PO11(1),PO12(1)
CO4	Analyze and design the software architecture.	PO1(2),PO2(2)PO3(3),PO4(3),PO5(2),PO9(2),PO10(2),PO11(1),PO12(1)
CO5	Validate appropriate project management approach through an evaluation of the business context and scope of the project.	PO1(2),PO2(2)PO3(3),PO4(3),PO5(2),PO6(2),PO7(2),PO8(2),PO9(2),PO10(2),PO11(1),PO12(1),PO13(2),PO14(2),PO15(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	1	-	-	-	-	1	1	-	-	-	-	-
CO2	2	3	2	1	-	-	-	-	1	1	2	1	-	-	-
CO3	2	2	3	2	1	-	-	-	2	2	1	1	-	-	-
CO4	2	2	3	3	2	-	-	-	2	2	1	1	-	-	-
CO5	2	3	2	3	2	2	2	2	2	2	2	2	2	2	2

3 Point Scale – 1, 2, 3

Elective I: Software Project Management

Units	Contents	Hrs
UNIT I	Introduction: Software Project Management - Software Project Versus Other Project – Requirement Specification –Information and Control in Organization – Introduction to step wise Project Planning –Select –Identify Scope and Objectives – Identify Project Infrastructure –Analyze Project Characteristics –Products and Activities –Estimate Effort for each Activity –Identify Activity Risks –Allocate Resources –Review / Publicize Plan –Execute Plan and Lower Levels of Planning.	15
UNIT II	Project Evaluation: Introduction –Strategic Assessment –Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting –Cost Benefit Evaluation Techniques – Risk Evaluation –Selection of an Appropriate Project Approach –Choosing Technologies – Choice of Process Models –Structured Methods – Rapid Application Development – Waterfall Model –V-Process Model –Spiral Model – Software Prototyping –Ways of Categorizing Prototypes –Tools –Incremental Delivery – Selection Process Model.	15
UNIT III	Software Effort Estimation : Introduction –where estimation done-problem with over and under estimation-basics for software estimation-software effort estimation techniques- basics of software estimating-software effort estimation techniques-estimation by analogy- albrecht's function point analysis-function point mark II-procedural code oriented approach-COCOMO a parametric model-publishing resource schedules-cost scheduling-Scheduling sequence.	15
UNIT IV	Monitoring and Control: Introduction – creating the framework-collecting the data-visualizing progress-cost monitoring-earn values-priority monitoring-getting the project back to target-change control Discussion on case study - Expert lectures - Online seminars– Webinars – Workshops.	15
UNIT V	Managing Contracts: Introduction –Types of Contract –Stages in Contract Placement – Terms of Contract –Contract Management –Acceptance –Managing People and Organizing Teams –Organizational Behavior Background –Selecting the Right Person for the Job –Instruction in the Best Methods – Motivation –Decision Making – Leadership – Organizational Structures –Software Quality –Importance –Practical Measures –Product.	15
Total Contact Hours		75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Bob Hughes , Mike Cotterell , Rajib Mall	Software Project Management	6th Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Walker Royce	Software Project Management: A Unified Framework	Addison Wesley	1998
2	Derrell Ince, H. Sharp and M. Woodman	Introduction to Software Project Management and Quality Assurance	Tata McGraw Hill,	1995

Web References

1. <https://www.wrike.com/project-management-guide/faq/what-is-software-project-management/>
2. https://www.tutorialspoint.com/software_engineering/software_project_management.htm
3. <https://www.geeksforgeeks.org/software-engineering-software-project-management-spm/>
4. <https://www.forecast.app/blog/benefits-of-using-project-management-software>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS1E2	Course Title:	Elective – I: Software Engineering and Testing		Batch	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	4

Course Objective

To learn all the software development approaches, design methodologies, test metrics, measurements, tools in software development process and testing

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Recollect basic software process models to ensure that software designs, development and maintenance meet or exceed applicable standards.	PO1(3),PO2(1),PO3(2),PO5(1),PO12(2),PO13(3),PO14(1),PO15(3)
CO2	Understand concepts of software management activities, requirement gathering, design, analysis and maintenance.	PO1(3),PO2(2),PO3(2),PO4(1),PO5(1),PO10(1),PO11(1),PO12(2),PO13(3),PO14(1),PO15(3)
CO3	Apply advanced software projects in designing, testing, cost estimation and risk management.	PO1(2),PO2(3),PO3(3),PO4(2),PO5(2),PO10(1),PO11(2),PO12(2),PO13(3),PO14(2),PO15(2)
CO4	Analyze and implement the design by types of testing, scenarios, process, methodologies and architecture for automation, using testing tools and solve challenges in testing.	PO1(2),PO2(3),PO3(2),PO4(3),PO5(3),PO10(1),PO12(2),PO13(3),PO14(3),PO15(2)
CO5	Access verification and validation, integrate functional and non-functional testing, to perform regression testing, framework for test tools, testing an application using WinRunner tool.	PO1(2),PO2(3),PO3(2),PO4(3),PO5(3),PO10(1),PO12(2),PO13(3),PO14(3),PO15(2)

Mapping

COs / Pos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	2	–	1	–	–	–	–	–	–	2	3	1	3
CO2	3	2	2	1	1	–	–	–	–	1	1	2	3	1	3
CO3	2	3	3	2	2	–	–	–	–	1	2	2	3	2	2
CO4	2	3	2	3	3	–	–	–	–	1	–	2	3	3	2
CO5	2	3	2	3	3	–	–	–	–	1	–	2	3	3	2

3 Point Scale – 1, 2, 3

Elective – I: Software Engineering and Testing

Units	Contents	Hrs
UNIT I	Software Engineering: Defining software, Software Application Domains, Process models: A generic process model– Defining a framework activity, identifying a Task Set, Process Patterns. Requirement Modeling: Requirement Analysis, Data modeling concepts, Class-based modeling, Requirement modeling strategies, Flow oriented modeling. Creating a data flow model, Creating a control flow model.	15
UNIT II	Design Concepts: The evolution of software design – Abstraction, Architecture, <i>Patterns</i> , Separation of concerns, Modularity, information hiding, Functional Independence, refinement, Aspects, Refactoring, Object Oriented design concepts- Design classes , The Design Model – Data Design elements, Architectural Design elements, Interface Design Elements, Component-Level, Design elements, Deployment level Design elements.	15
UNIT III	Software Quality Assurance: SQA tasks, Goals and metrics, Formal approaches to SQA, Statistical Software quality assurance- SQA plan. Project Management concepts: The management spectrum. Estimation for software projects: The project planning process, Software project estimation, Decomposition techniques, Empirical estimation models, Project scheduling. Risk management: Risk identification, Risk projection, The RMMM plan.	15
UNIT IV	Software Development Life Cycle Models -Phases of Software Project - Quality – Assurance – Control –Testing - Verification- SDLC Models - TYPES OF TESTING: White Box Testing-Static Testing-Structural Testing. Black Box Testing-Integration Testing - Scenario Testing-Defect Bash. System and Acceptance Testing –Functional System Testing-Non Functional Testing-Regression Testing-Internalization testing-Ad hoc tests. Performance Testing: Methodology-Tools-Process-Challenges.	15
UNIT V	Software Test Automation: Design and Architecture for Automation-Generic requirements for Test Tools Framework-Selecting a Test Tool-Challenges. Test Metrics and Measurements: Metrics in Testing-Types of Metrics. Introduction to Selenium – Overview of Selenium – Components of Selenium (Selenium IDE, Selenium WebDriver, Selenium Grid) – Installing Selenium – Writing simple test scripts – Locating web elements (id, name) – Performing basic actions such as click and typing – Advantages of Selenium – Use of Selenium for automated web application testing.	15
Total Contact Hours		75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Pressman S. Roger	Software Engineering A Practitioner's Approach	McGraw Hill, International Editions, 8 th edition	2019
2	SrinivasanDesikan, Gopalaswamy Ramesh	Software Testing Principles and Practices	Pearson Education- 10 th impression	2015
3	DrK.V.K.KPrasad	Software testing tools	Dream tech press, New Delhi	2007

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Sommerville Ian	Software Engineering	Addison Wesley, 10 th Edition	2015
2	Rumbaugh, James	Object Oriented Modeling and design	Pearson Education, New Delhi Evaluation Pattern.	2005

3	Roger S.Pressman	Software Engineering	Tata McGraw Hill Publication, 6 th Edition.	2009
Web References 1. https://www.youtube.com/watch?v=WxkP5KR_Emk&list=PLrjkTql3jnm9b5nr-ggx7Pt1G4UAHeFlJ 2. https://www.youtube.com/watch?v=dce6oaUHdyM 3. https://www.youtube.com/watch?v=WnHOgMeszWI&list=PLYwpaL_SFmcCB7zUM0YSD R- 1mM4KoiyLM 4. https://www.youtube.com/watch?v=HylDB3bN6hQ 5. https://www.youtube.com/watch?v=0DWOT9KNtHQ				

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS1E3	Course Title:	Elective I: Object Oriented Analysis and Design with UML		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	I
					Credits:	4

Course Objective

To prepare the students for job in developing the area of system analysis and design concepts using object-oriented approach

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember and Understand OOAD concepts and various UML diagrams	PO1(3),PO2(2),PO3(1),PO10(1),PO15(2)
CO2	Identify the classes and responsibilities of the problem domain	PO1(1),PO2(3),PO3(2),PO10(1),PO15(2)
CO3	Apply the concepts of architectural design for deploying the code for software.	PO1(3),PO2(2),PO3(3),PO4(2),PO5(2),PO9(1),PO10(1),PO15(2)
CO4	Analyze the systems, various components and collaborate them interchangeably.	PO1(2),PO2(3),PO3(2),PO4(2),PO9(2),PO10(1),PO15(2)
CO5	Ability to Construct projects using UML diagrams	PO1(2),PO2(2),PO3(3),PO4(2),PO5(2),PO9(2),PO10(2),PO15(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	–	–	–	–	–	–	1	–	–	–	–	2
CO2	3	3	2	–	–	–	–	–	–	1	–	–	–	–	2
CO3	3	2	3	2	2	–	–	–	1	1	–	–	–	–	2
CO4	2	3	2	2	–	–	–	–	2	1	–	–	–	–	2
CO5	2	2	3	2	2	–	–	–	2	2	1	–	–	–	2

3 Point Scale – 1, 2, 3

Elective I: Object Oriented Analysis and Design with UML

Units	Contents	Hrs		
UNIT I	An overview of Object-oriented systems development – introduction- two orthogonal views of the software – object oriented systems development methodology – why an object orientation? – Overview of the unified approach. Object-oriented systems development life cycle: Introduction – the software development process- building high-quality software. Object-oriented system development a use-case driven approach-reusability	15		
UNIT II	Object-oriented methodologies-introduction toward unification too many methodologies-survey of some of the object-oriented methodologies- Rumbaugh object modeling technique-the Booch methodology-the Jacobson methodologies-patterns-frameworks-the unified approach.	15		
UNIT III	UML overview: UML history -goals of UML- UML concept areas –syntax of expression and diagrams – nature and purpose of models: a model, levels of models, meaning of mode. UML walkthrough: UML views, static view-use case view-interaction view-state machine view-activity view-physical view-model management view-extensibility constructs. Static view: overview-classifiers-relationship-associations-generalization-realization-dependencies, constraints-instances. Use case view: overview, actor, use case.	15		
UNIT IV	Static machine view; overview: state machine-event state-transition-composite state. Activity view: overview-activity diagram-activities and other views activation-collaboration-interaction-sequence diagram-physical view: overview, component - node.	15		
UNIT V	Model management view-packages-dependencies on packages- access and import dependency- model and subsystem. Extension mechanism: constraints-tagged view, stereo types-tailoring with uml. Uml environment-semantics-responsibilities-notation responsibilities-programming language responsibilities- modeling with tools	15		
	Total Contact Hours	75		
Pedagogy and Assessment Methods: Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Ali Bahrami	Object Oriented System Development using the unified modeling language	Tata McGraw-Hill EducationPvt. Ltd, First Edition	2008
2	Ivar Jacobson, James Rumbaugh, Grady Booch	The UML Reference Manual	Addison Wesley LongmanInc., Second Edition	2010
3	Grady Booch, James Rumbaugh, Ivar Jacobson	The Unified Modeling Language User Guide	Addison Wesley LongmanInc., Second Edition	2005
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Mahesh P.Matha	Object-Oriented Analysis and Design	PHI Learning Private Limited,	2012

		Using UML	Second Edition	
2	Craig Larman	Applying UML and Patterns,	2nd Edition, Pearson	2002

Web References

1. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_uml_behavioural_diagrams.htm
2. https://people.ucalgary.ca/~far/Lectures/SENG401/PDF/OOAD_with_UML.pdf
3. <https://www.uml-diagrams.org/uml-object-oriented-concepts.html>
4. <https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/>
5. <https://www.uml-diagrams.org/index-examples.html>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

SEMESTER II

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS206	Course Title:	Data Visualization for Decision Making		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/ Sem	2	Semester:	II
					Credits:	4

Course Objective

Utilize . BI to seamlessly import, transform, visualize, and share data. Create dynamic dashboards for interactive and insightful data analysis for business optimization and decision making

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Learn to use Power BI for analyzing data, creating reports, and sharing insights effectively.	PO1(3),PO2(2),PO10(1)
CO2	Explore Power BI refresh, Desktop usage, and connecting to databases for efficient data analysis, reporting, and visualization	PO1(2),PO(2),PO3(3),PO5(3)
CO3	Enhance data skills by utilizing Power BI for service integration, content packs, and advanced data modeling techniques.	PO2(3),PO3(3),PO4(2),PO5(3)
CO4	Master Power BI visuals, both standard and custom, leverage DAX for effective data models, and create high-density reports	PO2(2),P3(2),PO3(3),PO5(3)
CO5	Navigate Power BI connections, databases on-premises and in the cloud, security management, and real-time data publishing for enhanced analytics.	PO2(2),PO4(2),PO5(3),PO10(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	2	2	1	2	3	–	–	–	–	1	–	2	3	3	2
CO2	2	2	1	2	3	–	–	–	–	1	–	2	3	3	2
CO3	2	3	2	2	3	–	–	–	–	1	–	2	3	3	2
CO4	2	3	2	3	3	–	–	–	–	1	–	2	3	3	2
CO5	2	3	2	3	3	–	–	–	–	1	–	2	3	3	2

3 Point Scale – 1, 2, 3

Data Visualization for Decision Making

Units	Contents	Hrs		
UNIT I	Introduction to Data Visualization and Power BI : Introduction to Data Visualization – Importance of visualization in data analytics – Types of visualizations (bar chart, line chart, pie chart, scatter plot, heat map, tree map) – Principles of effective visualization – Dashboard concepts – Storytelling with data. Introduction to Power BI and Dashboard: Introduction of Power BI- Power BI Desktop- Power BI service- Comparing Power BI Desktop and the service- Uploading Data to Power BI- Introducing Natural-language Queries- Quick Insights- Working with Reports- Visual Interactions- Decorating the Report- Refreshing the budget workbook- Filtering a report- Sharing the dashboard with others- Sharing outside your organization- Creating a group workspace in Power BI- Turning on sharing with Microsoft OneDrive for Business- Viewing reports and dashboards on mobile devices.	12		
UNIT II	Data Refresh and Power BI Desktop: Power BI Refresh- Architecture of Power BI Refresh- Introducing Power BI Desktop- Publishing to Power BI- Installing the Power BI Personal Gateway- Configuring automatic refresh- Connecting to a Database- Loading from multiple sources- Using Query Editor- Hiding or removing tables- Handling seasonality and sorting months.	12		
UNIT III	Working with Data and Building Data Model: Getting data from services and content packs- consuming a service content pack- creating a custom dataset from a service- creating a content pack for your organization- Consuming an organizational content pack- Updating an organizational content pack- Building a data model- Loading individual tables- Implementing measures- Creating calculated columns- Improving the report by using measures- Integrating budget information- Reallocating the budget.	12		
UNIT IV	Improving Power BI reports: Choosing the right visualizations- choosing between standard visuals- Using custom visualizations- First steps with custom visualizations- Improving reports by using custom visualizations- Identifying conditions when custom visualizations are required- Using DAX in data models- Creating high density reports.	12		
UNIT V	Using Microsoft Power BI in Company: Understanding Difference between Data Refresh and Live Connections- Using Relational Databases on-premises and on cloud- Using Live Connection to Analysis Services- Integrating Power BI with Office- Managing Security to Access Data- Extending and customizing Power BI – Custom Visualization- Power BI REST- Publishing Real time data to Dashboard.	12		
	Total Contact Hours	60		
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THEBOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION
1	Alberto Ferrari and Marco Russo	Introducing Microsoft Power BI	Microsoft Press	2016
2	Devin Knight	Microsoft Power BI Quick Start	Packt Publishing	2022
Reference Books				
S.NO	AUTHOR	TITLE OF THEBOOK	PUBLISHER S/EDITION	YEAR OF PUBICATION
1	Brett Powell	Microsoft Power BI Cookbook	Packt Publishing	2022

Web References

1. <https://learn.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-types-for-reports-and-q-and-a>
2. <https://www.youtube.com/watch?v=5TS2s6gXO1k>
3. https://www.youtube.com/watch?v=l6XzIu_hnWI
4. <https://www.youtube.com/watch?v=GPf0YS-Xbyo>

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS207	Course Title:	Cloud Computing		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	1	Semester:	II
					Credits:	4

Course Objective

This course gives students an insight into the basics of cloud computing along with virtualization- cloud computing is one of the fastest growing domain from a while now. It will provide the students basic understanding about cloud and virtualization along with it how one can migrate over it.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand the concepts of Cloud computing Paradigms.	PO1(3),PO2(2)
CO2	Collaborate Cloud Service Architecture and its Service models	PO1(3),PO3(2),PO5(3)
CO3	Analyze the Virtualization Concepts	PO2(2),PO4(3),PO5(2)
CO4	Analyze Cloud Computing simulators	PO2(3),PO4(3),PO5(2)
CO5	Explore VM ware	PO3(2),PO5(3)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	–	–	1	–	–	–	–	–	–	2	3	1	3
CO2	3	2	2	1	2	–	–	–	–	1	–	2	3	2	3
CO3	2	3	2	2	2	–	–	–	–	–	–	2	3	2	2
CO4	2	3	1	3	3	–	–	–	–	–	–	2	3	3	2
CO5	2	2	2	2	3	–	–	–	–	–	–	2	3	3	2

3 Point Scale – 1, 2, 3

Cloud Computing

Units	Contents	Hrs
UNIT I	Cloud Computing Overview: Origins of Cloud computing – Cloud components - Essential characteristics – On-demand self service- Broad network access- Location independent resource pooling - Rapid elasticity - Measured service- Comparing cloud providers with traditional IT service providers- Roots of cloud computing.	12
UNIT II	Cloud Insights Architectural influences: High-performance computing- Utility and Enterprise grid computing- Cloud scenarios – Benefits: scalability -simplicity -vendors - security- Limitations – Sensitive information - Application development- security level of third party - security benefits- Regularity issues: Government policies.	12
UNIT III	Cloud Architecture: Layers and Models Layers in cloud architecture- Software as a Service (SaaS)- features of SaaS and benefits- Platform as a Service (PaaS)- features of PaaS and benefits- Infrastructure as a Service (IaaS)- features of IaaS and benefits- Service providers- challenges and risks in cloud adoption. Cloud deployment model: Public clouds – Private clouds – Community clouds - Hybrid clouds - Advantages of Cloud computing.	12
UNIT IV	Cloud Simulators: CloudSim and GreenCloud Introduction to Simulator- understanding CloudSim simulator- CloudSim Architecture(User code- CloudSim- GridSim- SimJava) Understanding Working platform for CloudSim- Introduction to GreenCloud	12
UNIT V	Concept of virtualization – Types of virtualization – Hypervisors and virtual machines – Advantages of virtualization – Creating and managing virtual machines using VMware Workstation – Creating a new virtual machine – Cloning virtual machines – Virtualizing a physical machine – Starting and stopping virtual machines.Introduction to containerization – Basics of Docker – Overview of cloud platforms such as Amazon Web Services, Microsoft Azure, and Google Cloud Platform. Introduction to VMWare :Simulator Basics of VMWare- advantages of VMware virtualization- using VMware workstation-creating virtual machines-understanding virtual machines- create a new virtual machine on local host- cloning virtual machines- virtualize a physical machine- starting and stopping a virtual machine.	12
Total Contact Hours		60
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.		

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Anthony T.Velte - Toby J. Velte Robert Elsenpeter	Cloud computing a practical approach	Tata McGraw Hill	2010

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Michael Miller	Cloud Computing: Web- Based Applications That Change the Way You Work and Collaborate	Que (Online)	2008
2	RajkumarBuyya - James Broberg-	Cloud Computing : Principles and Paradigms	Wiley Publication - FirstEdition	2013

	AndrzejGoscinski			
--	------------------	--	--	--

Web References

1. <https://www.allabout-engineering.com/mastering-cloud-computing-by-rajkumar-buyya/>
2. <http://docshare04.docshare.tips/files/3693/36931147.pdf>
3. https://www.tutorialspoint.com/cloud_computing/index.htm
4. <https://www.javatpoint.com/cloud-computing> Tutorial
5. <https://nptel.ac.in/courses/106/105/106105167/>
6. <https://www.youtube.com/watch?v=FxI9wQBOMco>

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS208	Course Title:	Digital Image Processing		Batch :	2026-2028
Lecture Hrs./WeekOr Practical Hrs./Week		6	Tutorial Hrs/Sem	1	Semester:	II
					Credits:	4

Course Objective

To prepare the students for solving real problems- knowledge in Image transformation- Image Enhancement techniques- Image compression and Segmentation procedures.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Get broad exposure and understanding of various applications of image processing in industry- medicine- and defense and other applications.	PO1(3),PO2(2),PO3(2),PO4(1), PO5(1),PO8(2),PO10(2),PO15(1)
CO2	To be familiar with basic concepts of two-dimensional signal acquisition- sampling- and quantization.	PO1(3),PO2(1),PO3(2),PO4(2), PO5(2),PO8(2),PO10(2),PO15(1)
CO3	To implement the fundamental image enhancement algorithms such as histogram Modification- contrast manipulation- and edge detection.	PO1(2),PO2(1),PO3(2),PO4(3), PO5(2),PO8(2),PO10(2),PO11(1), PO15(1)
CO4	To analyze programming skills in image compression- segmentation and restoration Techniques.	PO1(2),PO2(1),PO3(3),PO4(3), PO5(3),PO6(2),PO8(2),PO10(2), PO11(1),PO15(1)
CO5	To access digital images and process using MATLAB.	PO1(2),PO2(1),PO3(2),PO4(2), PO5(2),PO8(2),PO10(3),PO11(2), PO15(1)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	2	1	1	–	–	2	–	2	–	–	–	–	1
CO2	3	1	2	2	2	–	–	2	–	2	–	–	–	–	1
CO3	2	1	2	3	2	–	–	2	–	2	1	–	–	–	1
CO4	2	1	3	3	3	2	–	2	–	2	1	–	–	–	1
CO5	2	1	2	2	2	–	–	2	–	3	2	–	–	–	1

3 Point Scale – 1, 2, 3

Digital Image Processing

Units	Contents		Hrs	
UNIT I	Introduction: What is Digital image processing – the origin of DIP – Examples of fields that use DIP – Fundamentals steps in DIP – Components of an image processing system. Digital Image Fundamentals: Elements of Visual perception – Light and the electromagnetic spectrum – Image sensing and acquisition – Image sampling and Quantization– Some Basic relationship between Pixels – Linear & Nonlinear operations.		18	
UNIT II	Image Enhancement in the spatial domain: Background – some basic Gray levelTransformations – Histogram Processing – Enhancement using Arithmetic / Logic operations –Basics of spatial filtering – Smoothing spatial filters – Sharpening spatial filters – combiningSpatial enhancement methods.		18	
UNIT III	Image Restoration: A model of the Image Degradation / Restoration Process – Noise models – Restoration is the process of noise only – Spatial Filtering – Periodic Noise reduction by frequency domain filtering –Modeling the Degradation function –Direct Inverse Filtering-Wiener Filtering-Constrained Least Squares (Regularized) Filtering - Iterative Nonlinear Restoration using the Lucy-Richardson Algorithm-Blind Deconvolution.		18	
UNIT IV	Image Compression: Fundamentals – Image compression models – Elements of Information Theory – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Image compression standards.		18	
UNIT V	Image Segmentation: Point- Line and Edge Detection–Line Detection Using the Hough Transform– Thresholding – Region-Based segmentation – Segmentation by Morphological watershed Transform.		18	
	Total Contact Hours		90	
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Rafael C.Gonzalez- Richard E. Woods	Digital Image Processing	PHI/Pearson Education \ 3 rd Edition	2017
2	Rafael C.Gonzalez- Richard E.Woods-Sтивен L- Eddins	Digital Image Processing Using MATLAB	TataMcGraw-Hill International Editions	2008
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Nick Efford	Digital Image Processing a practical introducing using Java	Pearson Education	2004
2	Chanda.B- DuttaMajumder.D	Digital Image Processir and Analysis	PHI/Pearson Education	2011

Web References

1. <https://www.youtube.com/watch?v=xUCsfKA8bi0>
2. <https://www.youtube.com/watch?v=3qJej6wgezA>
3. <https://www.youtube.com/watch?v=sckLJpjH5p8>
4. <https://nptel.ac.in/courses/117/105/117105079/>
5. <https://nptel.ac.in/courses/117/105/117105135/>

List of Programs

1. Perform the Deblurring with Wiener Filter using MATLAB.
2. Adjust the Contrast in Intensity Image using Simulink in MATLAB.
3. Perform the Arithmetic Operations using MATLAB.
4. Implement Resize an Image Using Simulink in MATLAB.
5. Perform the Crop, Rotate and Resize of an Image using MATLAB.
6. Implement Adjusting the Contrast in Colour Image using Simulink in MATLAB.
7. Perform the Finding Histogram of RGB Image using MATLAB.
8. Implement Rotate of An Image using Simulink in MATLAB.
9. Perform the Image Intensity Slicing technique for Image Enhancement using MATLAB.
10. Perform the Canny Edge Detection Algorithm using MATLAB.
11. Implement Adjusting the Contrast in Color Image using Simulink in MATLAB.
12. Perform the Finding Histogram of Gray and Negative Image in MATLAB.
13. Perform the Canny Edge Detection Algorithm using MATLAB.
14. Perform the Remove Salt and Pepper Noise using MATLAB.
15. Perform the Blurring With Deconvolution Algorithm using MATLAB.
16. Perform the Finding Histogram of Gray and Negative Image using MATLAB.

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

Programme Code :	M.Sc CS			Programme Title:	Master of Science (Computer Science)	
Course Code:	26PCS209			Title	Batch:	2026-2028
Lecture Hrs/Week	5	Tutorial Hrs/Sem.		Advanced Database Management System	Semester:	II
					Credits:	4

Course Objective

To improve the knowledge of database management system and effectively demonstrate the key concepts of advanced SQL and NoSql.

Course Outcomes

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember and Understand the design and creation of tables in databases.	PO1(3),PO2(1),PO3(1),PO4(1),PO8(1),PO10(2),PO11(1),PO15(1)
CO2	Understand Relational data model and design theory with different indexing Structures and physical databases.	PO1(3),PO2(1),PO3(2),PO4(2),PO5(2),PO6(1),PO8(2),PO10(2),PO11(1),PO15(1)
CO3	Remember and Apply advanced SQL- Sub-queries- embedded and dynamic SQL.PL/SQL concepts with triggers.	PO1(3),PO2(2),PO3(2),PO4(3),PO5(2),PO6(1),PO7(1),PO8(2),PO10(3),PO11(2),PO15(2)
CO4	Analyze the history of NoSql with features- DB design- Applying consistency methods- Evaluating keys.	PO1(3),PO2(1),PO3(3),PO4(2),PO5(3),PO6(2),PO8(3),PO9(1),PO10(2),PO12(1),PO14(1),PO15(2)
CO5	Ability to understand features of Document database- Hybrid NoSql.	PO1(2),PO2(1),PO3(2),PO4(2),PO5(2),PO6(1),PO8(2),PO10(2),PO11(1),PO12(1),PO15(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	1	1	–	–	–	1	–	2	1	–	–	–	1
CO2	3	1	2	2	2	1	–	2	–	2	1	–	–	–	1
CO3	3	2	2	3	2	1	1	2	–	3	2	–	–	–	2
CO4	3	1	3	2	3	2	–	3	1	2	1	–	1	–	2
CO5	2	1	2	2	2	1	–	2	–	2	1	1	–	–	2

3 Point Scale – 1, 2, 3

Advanced Database Management System

Units	Contents	Hrs
UNIT I	Introduction: Introduction: Purpose of Database Systems -View of Data - Database Languages - Data Storage and Querying-Transaction Management –Storage Management – Data Mining and Information Retrieval -Specialty Databases -Database Users and Administrators–Relational Databases: Introduction to the Relational Model -Structure of Relational Databases-Database Schema -Keys-Schema Diagrams -Relational Query Languages -Relational Operations.	18
UNIT II	Advanced SQL: Advanced SQL: Constraints- SQL CREATE INDEX- SQL functions-The GROUP BY statement-The HAVING clause- SQL special functions- SQL alias- SQL join – Sub queries- Recursive queries-Data control language-Views and assertion- PL/SQL- a basic introduction-Triggers- Event condition action model-Functions and procedures-Embedded SQL and dynamic SQL- The java way to access RDBMS: JDBC- SQLJ.	18
UNIT III	Transaction Processing and Security: Advanced transaction processing and recovery: Defining a transaction in DBMS-Defining a concurrent transaction in DBMS-Serializability and Recoverability- Enhanced lock-based and time-stamp based concepts-Multiple granularity- Multi version schemes-optimistic concurrency control techniques-Deadlock handling- Recovery in DBMS-Advanced recovery techniques-Use of SQL in recovery -RAID. Data security: Data security issues- Discretionary access control- Mandatory access control- Role based access control.	18
UNIT IV	Distributed DBMS: Distributed Database Management Systems: The Evolution of Distributed Database Management Systems -DDBMS Advantages and Disadvantages - Distributed Processing and Databases -Characteristics of Distributed DBMS -DDBMS Components -Levels of Data and Process Distribution -Distribution Transparency - Transaction Transparency- Distributed Database Design -Client/Server vs. DDBMS.	18
UNIT V	NoSQL Database Concepts: Types of NoSQL databases - NoSQL data Modeling - benefits of NoSQL - Comparison between SQL and NoSQL database system. No SQL using MongoDB: Introduction to MongoDB shell - Running the MongoDB shell - MongoDB client - Basic operations with MongoDB shell - Basic data types – Arrays - Embedded documents - Querying with MongoDB.	18
Total Contact Hours		90
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.		

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Rini Chakrabarti- Shilbadra Dasgupta- Subhash K. Shinde-	Advanced Database Management System	KLSI- Dreamtech press	2014
2	Raghu Ramakrishnan- Johannes Gehrke	Database Management Systems	McGraw Hill- Third Edition	2004
3	Ramez Elmasri and Shamkant B. Navathe	Fundamentals of Database systems	7 th Edition	2017
4	John Wiley and adam fowler	NoSQL For Dummies	1st Edition- Kindle Edition	2015

Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHER S/EDITION	YEAR OF PUBICATION
1	Silberschatz- H.Korth and S.Sudarshan	Database System Concepts	6 th Edition	2011
2	Hector Garcia-Molina- Jeffrey D.Ullman- Jennifer Widom	Database System: The Complete Book	7 th Edition	2019
3	Henry F Korth- Abraham Silberschatz- S. Sudharshan	Database System Concepts	5 th Edition-McGraw Hill	2016
4	Gerardus Blokdyk	NoSQL Databases A Complete Guide	2020 Edition	2021

Web References

1. <https://www.w3schools.in/dbms/database-normalization/>
2. <https://www.guru99.com/indexing-in-database.html>
3. <https://cs.uwaterloo.ca/~tozsu/courses/cs856/F02/lecture-1-ho.pdf>
4. <https://www.youtube.com/watch?v=M-55BmjOuXY>
5. <https://www.youtube.com/watch?v=0buKQHokLK8>
6. <https://www.guru99.com/nosql-tutorial.html>
7. <https://medium.com/@amitvsolutions/mongodb-101-a-practical-guide-to-nosql-databases-4bc47c36cb9e>

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS210	Course Title:	Programming Lab II: Data Visualization using Power BI		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	2

Course Objective

Utilize Power BI to seamlessly import- transform- visualize- and share data. Create dynamic dashboards for interactive and insightful data analysis for business optimization and decision making

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Learn to use Power BI for analyzing data- creating reports- and sharing insights effectively.	PO1(3),P1(3)
CO2	Explore Power BI refresh- Desktop usage- and connecting to databases for efficient data analysis- reporting- and visualization	PO3(2),PO10(3)
CO3	Enhance data skills by utilizing Power BI for service integration- content packs- and advanced data modeling techniques.	PO3(2),PO5(3),PO10(2)
CO4	Master Power BI visuals- both standard and custom- leverage DAX for effective data models- and create high-density reports	PO4(3),PO5(3),PO10(3)
CO5	Navigate Power BI connections- databases on-premises and in the cloud- security management- and real-time data publishing for enhanced analytics.	PO5(3),PO10(3)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	-	-	-	-	-	-	--		3	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	3	-	-	-	-	-
CO3	-	-	2	-	3	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	3	3	-	-	-	-	2	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	3	-	-	-	-	-

3 Point Scale – 1, 2, 3

Data Visualization using Power BI

Contents				Hrs
1. Do product sales data analysis using Power BI.				3
2. Do Inventory data analysis using Power BI.				3
3. Do Supply chain analytics using Power BI.				4
4. Analyze health care data using Power BI.				8
5. Analyze E-Commerce data using Power BI.				8
6. Do employee performance metrics using Power BI.				4
7. Do Social media sentiment analysis using Power BI.				4
8. Do Real estate dashboard using Power BI.				4
9. Do Profit Analysis using Donut Chart in Power BI.				3
10. Do Airport authority data analysis in Power BI.				4
Total Contact Hours				45
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION
1	Jiawei Han- Micheline Kamber& Jian Pei	Data Mining Concepts& Techniques	3rd Edition- Elsevier Publications	2012
2	Margaret H. Dunham	Data Mining Introductory and Advanced Topics	6 th Edition- Pearson Education	2009
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Arun K Pujari	Data Mining Techniques	4 th Edition- Universities (India) Press Private Limited	2016
2	Michael J.A. Berry-Gordon S.Linoff	Data Mining Techniques - For Marketing- Sales- and Customer Relationship Management	Wiley Publishing- Inc.	2004
Web References				
1. https://www.projectpro.io/article/power-bi-microsoft-projects-examples-and-ideas-for-practice/533#mcetoc_1ievvggdm1e				
2. https://www.geeksforgeeks.org/power-bi-practical-applications/				
3. https://www.datacamp.com/blog/8-power-bi-projects-to-develop-your-skills				
4. https://www.microsoft.com/en-us/power-platform/products/power-bi				
5. https://app.powerbi.com/				

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

ELECTIVE II

S.No	COURSE CODE	COURSE TITLE
1	26PCS2E1	Advanced Networks
2	26PCS2E2	Augmented and Virtual Reality
3	26PCS2E3	Mobile Computing

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2E1	Course Title:	Elective II: Advanced Networks		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/ Sem	-	Semester:	II
					Credits:	4

Course Objective

To gain depth knowledge on computer networks and various protocols like Transmission protocol- Internet protocol and their functionalities.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Recollect OSI and TCP/IP layers and their tasks. Interpret and explain physical- logical and port addresses.	PO1(3),PO2(2)
CO2	Comprehend Standard Ethernet and Mapping techniques.	PO1(3),PO3(2),PO5(2)
CO3	Deploy Logical addressing and discuss the format of IPv4 and IPv6 addresses	PO1(2),PO2(2),PO4(2),PO5(3)
CO4	Analyze the problems and solutions associated with delivery and forwarding of packets	PO2(3),PO3(2),PO3(3),PO4(3)
CO5	Present knowledge on Mobile IP and Client-Server interactions	PO4(2),PO10(3)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	-	-	-	-	-	-	-	1	-	-	-	-	-
CO2	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	2	2		2	3	-	-		-	-	-	-	-	-	-
CO4	-	3	2	3	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2		-	-		-	3	-	-	-	-	-

3 Point Scale – 1, 2, 3

Elective II: Advanced Networks

Units	Contents	Hrs
UNIT I	Introduction and overview: TCP/IP internet- Internet Service: Application Level- Network Level. Network Technologies: Two Approaches To network Communication-Wide Area and Local Area Networks-Hardware addressing scheme- Ethernet (IEEE802.3)- WiFi (IEEE 802.11)- ZigBee (IEEE802.15.4) Internetworking Concept and Architectural Model - Protocol Layering	14
UNIT II	Internet Addressing - Mapping Internet Addresses to Physical Addresses (ARP) - Internet Protocol : Connectionless Datagram Delivery(IPV4 - IPV6)	15
UNIT III	Internet Protocol: Forwarding IP Datagram's - Internet Protocol: Error and Control Messages (ICMP) - User Datagram Protocol(UDP)	15
UNIT IV	Reliable Stream Transport Service (TCP): Needs-properties-Reliability-Sliding Window paradigm- TCP Layering- ports- connection and end points-passive and active open-segments- streams and sequence number-variable window size and flow control-TCP segment format- options- checksum- acknowledgment- retransmission and timeouts. Routing among Autonomous Systems (BGP) - Label Switching - Flows - and MPLS - Packet Classification	16
UNIT V	Network Virtualization - Bootstrap And Auto configuration (DHCP - NDP - IPv6 – ND) Electronic Mail (SMTP- POP- IMAP): Introduction -Electronic Mail-Mailbox Names And Aliases-Alias Expansion And Mail Forwarding-TCP/IP Standards For Electronic Mail Service-Simple Mail Transfer Protocol (SMTP)-Mail Retrieval And Mailbox Manipulation Protocols. Case Study: TCP/IP Framework Case Study- Communication- Internet- Infrastructure and Development.	15
	Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Douglas E. Comer	Internetworking with TCP/IP Principles- protocols and Architecture	Volume I- 6 th Edition	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Douglas E. Comer	Internetworking with TCP/IP Volume I	Prentice Hall	2015
2	Douglas E. Comer- David L.Stevens	Internetworking with TCP/IP Volume II	Prentice Hall	2010
3	Uyless Black	TCP/IP & Related Protocols	Tata McGraw-Hill	2005

Web References

1. <https://my.ine.com/ITEssentials/courses/9e5b2567/introduction-to-networking-technologies>
2. <https://nptel.ac.in/courses/106/105/106105183/>
3. <https://www.tutorialspoint.com/The-TCP-IP-Reference-Model>
4. <https://www.javatpoint.com/osi-vs-tcp-ip>
5. <https://youtu.be/rl2ZvdT4hRI>

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2E2	Course Title:	Elective II: Augmented and Virtual Reality		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objective

To understand the concepts of AR and VR- to promote the understanding of this technology- underlying principles- its potential and limits and to learn about the criteria for defining useful applications.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Remember and understand the historical evolution, concepts, and perspectives of Augmented Reality (AR) and Virtual Reality (VR).	PO1(3),PO2(2),PO3(1),PO9(1),PO10(1)
CO2	Understand the fundamentals of human perception, sensation, and perceptual training related to immersive technologies.	PO1(2),PO2(3),PO3(1),PO4(1),PO9(1),PO10(1)
CO3	Apply the scientific, technical, and engineering principles used in the design and development of AR and VR systems	PO1(2),PO2(2),PO3(3),PO4(2),PO5(2),PO9(2),PO10(2),PO11(1),PO12(1)
CO4	Analyze and evaluate virtual reality environments from the perspective of design, usability, and user interaction.	PO1(2),PO2(2),PO3(2),PO4(3),PO5(1),PO9(2),PO10(2),PO11(1),PO12(1)
CO5	Develop and implement basic augmented reality applications using appropriate tools and technologies.	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(2),PO10(2),PO11(2),PO12(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	-	-	-	-	-	1	1	-	-	-	-	-
CO2	2	3	1	1	-	-	-	-	1	1	-	-	-	-	-
CO3	2	2	3	2	2	-	-	-	2	2	1	1	-	-	-
CO4	2	2	2	3	1	-	-	-	2	2	1	1	-	-	-
CO5	2	2	3	2	3	-	-	-	2	2	2	2	-	-	-

3 Point Scale – 1, 2, 3

Elective II: Augmented and Virtual Reality

Units	Contents	Hrs
UNIT I	Introduction: Introduction to Augmented-Virtual and Mixed Reality- Taxonomy- technology and features of augmented reality- difference between AR -VR and MR- Challenges with AR- AR systems and functionality- Augmented reality methods- visualization techniques for augmented reality.	14
UNIT II	VR systems: VR as a discipline- Basic features of VR systems- Architecture of VR systems- VR hardware: VR input hardware: tracking systems- motion capture systems- data gloves- VR output hardware: visual displays.	15
UNIT III	Stereoscopic Vision & Haptic rendering: Fundamentals of the human visual system- Depth cues- Stereopsis- Retinal disparity- Haptic sense- Haptic devices- Algorithms for haptic rendering and parallax- Synthesis of stereo pairs- Pipeline for stereo images.	16
UNIT IV	VR software development : Challenges in VR software development- Master/slave and Client/server architectures- Cluster rendering- Game Engines and available sdk to develop VR applications for different hardware (HTC VIVE- Oculus- Google VR). 3D interaction techniques: 3D Manipulation tasks- Manipulation Techniques and Input Devices- Interaction Techniques for 3D Manipulation.	16
UNIT V	AR software development: AR software- Camera parameters and camera calibration- Marker-based augmented reality- AR Toolkit. Application of VR in Digital Entertainment: VR Technology in Film & TV Production. VR Technology in Physical Exercises and Games. Demonstration of Digital Entertainment by VR.	14
	Total Contact Hours	75
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.		

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBLICATION
1	George Mather	Foundations of Sensation and Perception	Psychology Press; Second edition	2002
2	Jason Jerald	The VR Book: Human-Centered Design for Virtual Reality		
3	Alan B. Craig	Understanding Augmented Reality- Concepts and Applications	Morgan Kaufmann	2013

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBLICATION
1	Alan Craig-William Sherman and Jeffrey Will	Developing Virtual Reality Applications- Foundations of Effective Design	Morgan Kaufmann	2009

Web References

1. <http://msl.cs.uiuc.edu/vr/>
2. <https://www.youtube.com/watch?v=WzfDo2Wpxks>
3. <https://www.geeksforgeeks.org/basics-augmented-reality/>
4. <https://www.youtube.com/watch?v=WzfDo2Wpxks>
5. <https://www.youtube.com/watch?v=04AMaTsXFJU>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2E3	Course Title:	ELECTIVE – II : Mobile Computing		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	4

Course Objective

To enable students to understand Mobile Computing Architecture with the Emerging Technologies- compare and contrast multiple division techniques- mobile communication systems- and existing wireless networks.

Course Outcomes

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Remember the principles and theories of mobile computing technologies	PO1(3),PO2(1),PO3(1),PO4(1),PO8(1),PO10(2),PO11(1),PO15(1)
CO2	Understand the possible future of mobile computing technologies and applications	PO1(3),PO2(1),PO3(2),PO4(2),PO5(2),PO6(1),PO8(2),PO10(2),PO11(1),PO15(1)
CO3	Apply QoS over wireless channels for mobile and wireless LAN.	PO1(3),PO2(2),PO3(2),PO4(3),PO5(2),PO6(1),PO7(1),PO8(2),PO10(3),PO11(2),PO15(2)
CO4	Analyze security- energy efficiency- mobility- scalability- and their unique characteristics in wireless networks.	PO1(3),PO2(1),PO3(3),PO4(2),PO5(3),PO6(2),PO8(3),PO9(1),PO10(2),PO12(1),PO14(1),PO15(2)
CO5	Demonstrate basic skills for cellular networks design.	PO1(2),PO2(1),PO3(2),PO4(2),PO5(2),PO6(1),PO8(2),PO10(2),PO11(1),PO12(1),PO15(2)

Mapping

POs \ COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	1	2	1	2	1	-	2	-	1	1	-	-	-	1
CO2	3	2	2	1	2	1	-	2	1	2	1	1	-	-	2
CO3	3	2	2	3	3	2	1	2	-	3	1	-	-	-	1
CO4	3	2	3	3	3	2	1	3	2	2	1	-	2	1	1
CO5	3	2	2	3	3	2	2	2	1	3	2	-	1	2	1

3 Point Scale – 1, 2, 3

Mobile Computing

Units	Contents	Hrs
UNIT I	Introduction: Mobility of Bits and Bytes – Wireless-the beginning – Mobile computing – Dialog control – Networks – Middle ware and gateways – Application and Services– Developing Mobile computing applications – Security in Mobile computing – Standards – Whyis it necessary? – Standard bodies – Players in the wireless space. Mobile Computing Architecture: History of computers – History of internet– Internet-the Ubiquitous Network – Architecture for mobile computing – Three-Tier architecture – Design considerations for mobile computing – Mobile computing through Internet	14
UNIT II	Mobile Computing Through Telephony: Evolution of telephony – Multiple access procedures – Mobile computing through telephone – Developing an IVR application – Voice XML – Telephony applications programming interface(TAPI). Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identifications (RFID) – Wireless Broadband (WiMAX) – Mobile IP – Internet Protocol Version 6 (IPv6) – Java card.	15
UNIT III	Global System For Mobile Communication (GSM): GSM Architecture –GSM Entities – Call routinginGSM–PLMNInterfaces–GSMAddressandIdentifiers– NetworksaspectsinGSM–GSM frequency allocation – Authentications and Security. Short Message Services (SMS): Mobile computing over SMS – Short Message Services(SMS) – Value added services through SMS – Accessing SMS bearer.	15
UNIT IV	General Packet Radio Service (GPRS): GPRS and Packet data network –GPRS Network architecture GPRS Network operations–Data services in GPRS–Applications for GPRS– Limitations of GPRS Billing and charging in GPRS. Wireless Application Protocol (WAP): WAP – MMS – GPRS applications.	
UNIT V	CDMA and 3G: Spread Spectrum technology – Is-95 – CDMA Vs GSM – Wireless data– 3rd Generation networks – Applications on 3G. Wireless LAN: Introduction- Advantages – IEEE 802.11 Standards – Wireless LAN architecture – Mobility in Wireless LAN – Deploying Wireless LAN –Wireless LAN Security – Wi-Fi Vs 3G. Wireless Devices with Windows CE: Different Flavors of Windows CE – Windows CE Architecture.	
	Total Contact Hours	75
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.		

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Ashoke K Talukder-Hasan Ahmed and Roopa R Yavagal	Mobile Computing	Second Edition- Tata McGraw –Hill	2017

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Rishabh Anand	Mobile Computing	First Edition- KhannaPublishing House	2012

2	Raj Kamal	Mobile Computing	Third Edition- OxfordUniversity Press	2019
3	Prasant Kumar Pattnaik- Rajib Mall	Fundamentals of MobileComputing	Second Edition- Prentice Hall India Learning Private Limited	2012

Web References

1. https://www.tutorialspoint.com/wimax/what_is_wimax.htm
2. <https://searchmobilecomputing.techtarget.com/definition/GSM>
3. <https://memberfiles.freewebs.com/46/92/89279246/documents/MOBILE%20COMPUTING.pdf>
4. <https://www.geeksforgeeks.org/general-packet-radio-service-gprs>
5. <https://www.slideshare.net/bretorio/windows-ce-37163147>

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2N1	Course Title:	Non-Major Elective I: Web Designing Lab		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		2	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	2

Course Objective

To enable the students to develop and design various applications using Web Technology.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Apply critical thinking skills	PO2(3),PO4(2)
CO2	Analyze and write a well formed / valid XML document	PO2(3),PO3(2),PO5(2)
CO3	Access and analyze website performance by interpreting analytics to measure sitetraffic- SEO- engagement- and activity on social media	PO2(3),PO4(2),PO5(3), PO10(1)
CO4	Access XSL transformation- sorting..	PO2(2),PO3(2),PO3(3), PO3(3)
CO5	Design and create websites	PO1(2),PO3(3),PO5(3), PO10(2)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	-	3	-	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	2	3	-	-	-		1	-	-	-	-	-
CO4	-	2	2	3	3	-	-	-	-	-	-	-	-	-	-
CO5	2	-	3	-	3	-	-	-	-	2	-	-	-	-	-

3 Point Scale – 1, 2, 3

Non-Major Elective I: Web Designing Lab

Contents					Hrs
- HTML Tags - Tables - Forms - Frames - CSS Rules- CSS Grouping Style- XML using CSS					15
- Address Book - DTD for Book Information - Resume Creation using DTD - XSL Transformation- XSL Sorting - Event Handling - Filters					15
Total Contact Hours					30
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Assignments.					
Text Book					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION	
1	Kogent Learning Solutions Inc.	Web Technologies: Black Book	Kindle	2015	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION	
1	Prof. Satish Jain and M.Geethalyer	Web Designing and Publishing	BPB Publication	2020	
Web References					
1. https://www.youtube.com/watch?v=alswD2tCc_Q 2. https://www.youtube.com/watch?v=ruYb2C12dA4 3. https://99designs.com/blog/web-digital/best-web-design-tutorials/ 4. https://mdbootstrap.com/education/ 5. https://www.youtube.com/watch?v=3Wd2uEsbc_c					

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2N2	Course Title:	Non-Major Elective I: Advanced Internet Technologies		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		2	Tutorial Hrs/Sem	-	Semester:	II
					Credits:	2

Course Objective

To develop and design fundamentals of Internet- use Google and the Web functions.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand the fundamentals of Internet and the Web concepts.	PO1(3),PO2(2),PO5(1),PO5(1),PO10(2),PO12(1),PO13(3),PO14(2)
CO2	Analyze and apply the online information resources.	PO1(2),PO2(3),PO4(2),PO5(2),PO9(1),PO10(2),PO12(1),PO13(2),PO14(3),PO15(2)
CO3	Inspect and utilize the appropriate Google Apps for education effectively.	PO1(1),PO2(2),PO3(2),PO4(1),PO5(3),PO9(2),PO10(2),PO11(1),PO12(1),PO13(1),PO14(2),PO15(2)
CO4	Analyze the concepts of World wide web	PO1(3),PO2(3),PO4(2),PO5(1),PO10(2),PO12(1),PO13(3),PO14(3)
CO5	Developing Web forms	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(2),PO15(3)

Mapping

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	—	—	1	—	—	—	—	2	—	1	3	2	—
CO2	2	3	2	2	2	—	—	—	1	2	—	1	2	3	2
CO3	1	2	2	1	3	—	—	—	2	2	1	1	1	2	2
CO4	3	3	—	2	1	—	—	—	—	2	—	1	3	3	—
CO5	2	2	3	2	3	—	—	—	2	2	1	2	2	2	3

3 Point Scale – 1, 2, 3

Non-Major Elective I:Advanced Internet Technologies

Contents				Hrs
1 Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated. 2 Create a label and upload bulk contacts using import option in Google Contacts 3 Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials. 4 Create and share a folder in Google Drive using 'share a link' option and set the permission to access that folder by your friends only.				10
5 Create one-page story in your mother tongue by using voice recognition facility of Google Docs. 6 Create a registration form for your Department Seminar or Conference using Google Forms. 7 Create a question paper with multiple choice types of questions for a subject of your choice- using Google Forms. 8 Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after submission.				10
9 Create template for a seminar certificate using Google Slides. 10 Create a mark statement in Google Sheets and download it as PDF- .xls and .csv files				10
Total Contact Hours				30
Pedagogy and Assessment Methods:				
Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Book				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Ian Lamont	Google Drive & Docs in 30 Minutes	2nd Edition.	2015
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Sherry Kinkoph Gunter	My Google Apps	BPB Publication	2012
Web References				
1. https://www.youtube.com/watch?v=hGER1hP58ZE 2. https://www.youtube.com/watch?v=NzPNk44tdlQ 3. https://www.youtube.com/watch?v=PKuBtQuFa-8 4. https://www.youtube.com/watch?v=RKH556u_g0 5. https://www.youtube.com/watch?v=BBFrm-QU8ZE				

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka Chezian	

III SEMESTER

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS311	Course Title:	Full Stack Development		Batch :	2026-2028
Lecture Hrs./WeekOr Practical Hrs./Week		6	Tutorial Hrs/Sem	2	Semester:	III
					Credits:	4

Course Objective

To understand full stack web development and use HTML- CSS and Java script to handle front-end operations and back-end server scripting. MEAN is a full-stack development toolkit used to develop a fast and robust web application.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Remember the basics of HTML- CSS and JavaScript	PO1(3),PO2(2),PO3(1),PO4(1),PO5(1),PO8(1),PO10(3),PO11(2),PO15(2)
CO2	Understand the principles- knowledge and skills for the design and construction of web-enabled internet applications	PO1(3),PO2(2),PO3(2),PO4(2),PO5(2),PO6(1),PO7(1),PO8(2),PO9(1),PO10(3),PO11(2),PO14(1),PO15(2)
CO3	Design- implement and deploy an in-house project using Mongo DB- Express.js-Angular JS and Node.js	PO1(3),PO2(3),PO3(3),PO4(3),PO5(2),PO6(2),PO7(3),PO8(2),PO9(1),PO10(3),PO11(3),PO12(1),PO13(1),PO14(2),PO15(3)
CO4	Analyze and design appropriate database services based on therequirements	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3),PO6(2),PO7(1),PO8(3),PO9(1),PO10(3),PO11(2),PO13(1),PO14(1),PO15(2)
CO5	Evaluate different web application development alternatives and choose the appropriate one for a specific scenario	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3),PO6(2),PO7(1),PO8(3),PO9(2),PO10(3),PO11(2),PO12(1),PO13(2),PO14(2),PO15(3)

Mapping

Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	1	1	-	-	1	-	3	2	-	-	-	2
CO2	3	2	2	2	2	1	1	2	1	3	2	-	-	1	2
CO3	3	3	3	3	2	2	3	2	1	3	3	1	1	2	3
CO4	3	2	3	3	3	2	1	3	1	3	2	-	1	1	2
CO5	3	2	3	3	3	2	1	3	2	3	2	1	2	2	3

3 Point Scale – 1, 2, 3

Full Stack Development

Units	Contents	Hrs
UNIT I	Introduction: Basics of HTML- CSS- and JavaScript HTML- CSS- Bootstrap- JavaScript basics –Variables- functions- and scopes- Logic flow and loops- Events and Document object model-Handling JSON data- Understanding Json callbacks.	18
UNIT II	Node JS: Introduction to Node JS Installation- Callbacks- Installing dependencies with npm- Concurrency and event loop fundamentals- Node JS callbacks- Building HTTP server- Importing and exporting modules- Building chat application using web socket.	18
UNIT III	REST Services: Building REST services using Node JS REST services- Installing Express JS- Express Node project structure- Building REST services with Express framework- Routes- filters- template engines – Jade- ejs.	18
UNIT IV	MongoDB: MongoDB Basics and Communication with Node JS Installation- CRUD operations- Sorting- Projection- Aggregation framework- MongoDB indexes- Connecting to MongoDB with Node JS- Introduction to Mongoose- Connecting to MongoDB using mongoose- Defining mongoose schemas- CRUD operations using mongoose.	18
UNIT V	Angular JS: Building Single Page Applications with Angular JS Single Page Application – Introduction- Two-way data binding(Dependency Injection)- MVC in Angular JS- Controllers- Getting user input- Loops- Client side routing – Accessing URL data- Various ways to provide data in Angular JS – Services and Factories- Working with filters- Directives and Cookies- The digest loop and use of \$apply.	18
	Total Contact Hours	90

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Simon Holmes	Getting MEAN with Mongo-Express- Angular- and Node	Manning Publications- First Edition	2015
2	Jeff Dickey	Write Modern Web Apps with Mean Stack	Peachpit Press	2015
3	Ken Williamson	Learning Angular JS	O'Reilly- First Edition	2015
4	Mithun Satheesh	Web development with MongoDB and Node JS	Packt Publishing Limited-Second Revised Edition	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Laura Lemay-Rafe Colburn- Jennifer Kyrnin	Mastering HTML- CSS & JavaScript Web Publishing	Paperback	2016
2	Jon Duckett	Web Design with HTML- CSS-JavaScript and jQuery	Paperback	2014
3	Mardan- Azat	Full Stack JavaScript: Learn Backbone.js-	Apress	2015

		Node.js and MongoDB		
Web References 1. https://www.tutorialspoint.com/the_full_stack_web_development/index.asp 2. https://www.javatpoint.com/how-to-be-a-full-stack-developer 3. https://www.fita.in/full-stack-developer-tutorial/ 4. https://www.mongodb.com/languages/mean-stack-tutorial 5. https://intellipaat.com/blog/tutorial/angularjs-tutorial/				

List of Programs

- 1.Simple Calculator using HTML,CSS and Javascript
- 2.E-mail Validation using HTML,CSS and Javascript
- 3.Temperature Conversion using HTML,CSS and Javascript
- 4.Button Loading Animation using HTML,CSS and Javascript
- 5.Stop Watch Monitoring using HTML,CSS and Javascript
- 6.Password Strength Checker using HTML,CSS and Javascript
- 7.To-Do List using HTML,CSS and Javascript
- 8.Palindrome Checker using HTML,CSS and Javascript
- 9.Item Selector using HTML,CSS and Javascript
- 10.CAPTCHA Generation and Validation using HTML,CSS and Javascript
- 11.Traffic Signal Creation using HTML,CSS and Javascript
- 12.Random Quotes Generator using HTML,CSS and Javascript
- 13.Finding Odd or Even Number using Node.js
- 14.To-Do List using AngularJS
- 15.Area of a Circle using Express.js and REST APIs

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS312	Course Title:	Artificial Intelligence & Machine Learning		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	1	Semester:	III
					Credits:	4

Course Objective

To provide the knowledge of problem solving using AI techniques- knowledge representations and to understand the concepts of predicate logic & To understand the basic concepts of machine learning- probability theory and also algorithms of supervised learning and unsupervised learning.

Course Outcomes

On successful completion of the course, students will be able to

CO	CO Statement	
CO1	Learn about the artificial intelligence problem and the characteristics of the problem space.	PO1(3),PO2(1),PO3(2),PO4(2),PO5(2),PO6(1),PO8(2),PO9(1),PO10(1),PO11(1),PO13(1),PO15(2)
CO2	Identifies the Heuristics search techniques and issues in representing the knowledge and comprehend the statistical reasoning	PO1(3),PO2(1),PO3(3),PO4(2),PO5(3),PO6(2),PO8(3),PO9(1),PO10(2),PO11(1),PO13(1),PO15(2)
CO3	Understand the problem solving using predicates and infer the knowledge using rules	PO1(2),PO2(1),PO3(3),PO4(3),PO5(3),PO6(2),PO8(3),PO9(1),PO10(2),PO11(1),PO13(1),PO15(2)
CO4	Design a learning model appropriate to the application and recognize the characteristics of machine learning techniques that are useful to solve real-world problems	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3),PO6(3),PO7(1),PO8(3),PO9(2),PO10(3),PO11(2),PO12(1),PO13(2),PO14(1),PO15(3)
CO5	Design and implement various machine learning algorithms in a range of real-world applications	PO1(3),PO2(2),PO3(3),PO4(3),PO5(3),PO6(3),PO7(2),PO8(3),PO9(2),PO10(3),PO11(3),PO12(1),PO13(2),PO14(2),PO15(3)

Mapping

Pos COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	2	2	2	1	–	2	1	1	1	–	1	–	2
CO2	3	1	3	2	3	2	–	3	1	2	1	–	1	–	2
CO3	2	1	3	3	3	2	–	3	1	2	1	–	1	–	2
CO4	3	2	3	3	3	3	1	3	2	3	2	1	2	1	3

CO5	3	2	3	3	3	3	2	3	2	3	3	1	2	2	3
-----	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

3 Point Scale – 1, 2, 3

Artificial Intelligence & Machine Learning

Units	Contents	Hrs
UNIT I	Introduction: AI Problems - AI techniques - Criteria for success. Problems- Problem Spaces- Search: State space search - Production Systems - Problem Characteristics - Issues in design of Search. Heuristic Search techniques: Generate and Test - Hill Climbing- Best-First- Problem Reduction- Constraint Satisfaction- Means-end analysis.	12
UNIT II	Knowledge representation issues: Representations and mappings -Approaches to Knowledge representations -Issues in Knowledge representations - Frame Problem.	12
	Statistical Reasoning: Probability and Baye's Theorem – Certainty Factors and Rule-based System – Bayesian Networks – Fuzzy Logic	
UNIT III	Using Predicate logic: Representing simple facts in logic - Representing Instance and ISA relationships - Computable functions and predicates - Resolution - Natural deduction. Representing knowledge using rules: Procedural Vs Declarative knowledge - Logic programming - Forward Vs Backward reasoning - Matching - Control knowledge.	12
UNIT IV	Machine Learning – Types of Machine Learning – Supervised Learning – Unsupervised Learning –Machine Learning Process – Weight Space - Curse of Dimensionality – Testing Machine Learning Algorithms –Turning Data into Probabilities – The Bias-Variance Tradeoff – Linear Regression – Linear Discriminant Analysis - Principal Components Analysis – Nearest Neighbour Methods	12
UNIT V	Support Vector Machine: Optimal Separation – Kernels – Algorithm - Learning with Trees: Constructing Decision Trees – Bagging – Boosting – Random Forest - Unsupervised Learning: K-Means Algorithm - Graphical Models: Bayesian Networks - Deep Learning. Case Study: Implementation of classification algorithm for problem in financial domain	12
	Total Contact Hours	60

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Elaine Rich- Kevin Knight- & Shivashankar B Nair	Artificial Intelligence	Third Edition- McGraw Hill Education (India) Private Limited- New Delhi	2009- Reprint 2016.
2	Stephen Marsland	Machine Learning – An Algorithmic Perspective	Chapman and Hall- CRC Press- Second Edition	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
------	--------	-------------------	---------------------	---------------------

1	Stuart J. Russell- Peter Norvig	Artificial Intelligence - A Modern Approach	Third Edition- Pearson Publishers	2015
2	EthemAlpaydin	Introduction to Machine Learning	Third Edition- PrenticeHall of India	2015
3	P. Flach	Machine Learning: The art and science of algorithms that makesense of data	Cambridge University Press	2012
4	Elaine Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill Publishers company Pvt Ltd- Second Edition	2018

Web References

- 1.<https://www.javatpoint.com/machine-learning>
- 2.https://onlinecourses.nptel.ac.in/noc21_cs24/preview
- 3.https://www.tutorialspoint.com/machine_learning_with_python
- 4.<https://www.upgrad.com/machine-learning-ms>
- 5.<https://www.google.com/search?q=artificial%20intelligence>
- 6.<https://www.ant-pc.com/workstation/ai-and-deep-learning>

Course Designed by	Mrs.S.S.Shanthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Scienc (Computer Science)	
Course Code:	26PCS313	Course Title:	Big Data Analytics		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	1	Semester:	III
					Credits:	4

Course Objective

To possess the skills necessary for utilizing tools (including deploying them on Hadoop/MapReduce) to handle a variety of big data analytics and to learn Hadoop- MapReduce- Hive- HBase and Pig.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Remember how to collect- manage- store- query- and analyze various forms of big data	PO1(3), PO2(2), PO3(2), PO5(2), PO12(2), PO15(1)
CO2	Understand the foundations of Hadoop and Hadoop Distributed File System. Design of HDFS and file-based data structures along with virtualization concept.	PO1(3), PO2(2), PO3(2), PO4(1), PO5(2), PO12(2), PO15(1)
CO3	Analyze the working of Map Reduce and YARN for job scheduling.	PO1(2), PO2(3), PO3(2), PO4(2), PO5(2), PO9(1), PO12(2), PO15(1)
CO4	Analyze un-modeled- multi-structured data using Hadoop- MapReduce	PO1(2), PO2(3), PO3(3), PO4(2), PO5(3), PO9(1), PO12(2), PO15(1)
CO5	Compute basic summary statistics and data analysis using Pig Programming	PO1(2), PO2(2), PO3(3), PO4(2), PO5(3), PO9(1), PO10(1), PO12(2), PO15(1)

MAPPING

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	–	2	–	–	–	–	–	–	2	–	–	1
CO2	3	2	2	1	2	–	–	–	–	–	–	2	–	–	1
CO3	2	3	2	2	2	–	–	–	1	–	–	2	–	–	1
CO4	2	3	3	2	3	–	–	–	1	–	–	2	–	–	1
CO5	2	2	3	2	3	–	–	–	1	1	–	2	–	–	1

3 Point Scale – 1, 2, 3

Units	Contents	Hrs
UNIT I	Fundamentals of Big Data: Understanding Big Data: Concepts and Terminology – Big Data Characteristics – Types of Data – Case Study Background – Drivers for Big Data Adoption: Information and Communication Technology – Big Data Analytics Lifecycle	12
UNIT II	Fundamentals of Hadoop: Core components of Hadoop- Apache Hadoop – HDFS Daemons – MapReduce Daemons – HDFS High Availability Daemons – Benefits and Challenges of HDFS – File Sizes- Block Sizes and Block Abstraction in HDFS – Data Replication – How does HDFS Store- Read- and Write Files? – Data Serialization Options – File System Shell Commands for HDFS	12

UNIT III	HDFS and MapReduce: Choosing Key and Value Types for MapReduce Jobs – The Relationship of Input Keys to Output Keys – Sorting Keys and Values – Sort and Shuffle Process – MapReduce Job Configuration and Submission Hadoop Distributed File System – MapReduce Framework – Setting the Environment – Hadoop Cluster Modes – Running a MapReduce Job with the MR1Framework - Running a MapReduce Job with the Yarn Framework – Running Hadoop Streaming.	12
UNIT IV	Hive and HBase: Apache Hive: Setting the Environment – Configuring Hadoop- Hive – Starting HDFS- Hive Server- CLI – Creating and Using a Database– Creating a Managed Table – Loading data into a Table Creating a Table using LIKE – Adding Data into a Table from Queries – Adding Data using INSERT INTO TABLE - Adding Data using INSERT OVERWRITE – Creating a table using CREATE TABLE AS SELECT – Altering- Truncating and Dropping a Table– Creating an External Table – Apache HBase: Setting the Environment - Configuring Hadoop- Hive and HBase – Starting the HBase and HBase Shell – Creating HBase Table – Adding Data to a Table – Listing all Tables – Getting a Row of Data – Scanning a Table – Counting the Number of Rows in a Table – Altering a Table – Deleting a Table Row- Column – Disabling and Enabling a Table – Truncating and Dropping a Table – Determining If Table Exists – Creating a Hive External Table stored by HBase.	12
UNIT V	Pig: Introduction – Installing and Running Pig – Grunt – Pig’s Data Model – Introduction to Pig Latin – Advanced Pig Latin – Developing and Testing Pig Latin Scripts – Making Pig Fly – Writing Evaluation and Filter Functions – Writing and Loading Store Function	12
Total Contact Hours		60

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Thomas Erl- Wajid Khattak- Paul Buhler	Big Data Fundamental Concepts and Drivers& Techniques	Service Tech Press- 1 st Edition	2016
2	Deepak Vohra	Practical Hadoop Ecosystem: A Definitive Guide to Hadoop-Related Frameworks and Tools	Apress- 1st Edition	2016
3	Alan Gates	Programming Pig	Oreilly Publication- Inc.- 2nd Edition	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Shopper Technology Institute	The little book on Big Data	Outskirts Press- Incorporated	2016
2	Anil Maheshwari	Data Analytics	Kindle Edition	2022

Web References

1. <https://nptel.ac.in/courses>
2. <https://www.edureka.co/blog/big-data-tutorial>
3. <https://www.coursera.org/learn/big-data-introduction>
4. <https://www.tutorialspoint.com/hbase/index.htm>
5. <https://www.guru99.com/hive-query-language-built-operators-functions.html>

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)
Course Code:	26PCS314	Course Title:	Internet of Things		Batch : 2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		4	Tutorial Hrs/Sem	-	Semester: III
					Credits: 4

Course Objective

To explore the fundamentals of Internet of Things (IoT) protocols and apply IoT concepts in real-world scenarios.

Course Outcomes (CO)

On successful completion of the course, Students will be able to

CO	CO Statement	
CO1	Remember the basics of IoT and IIoT	PO1(3),PO2(2),PO3(1),PO9(1),PO10(1)
CO2	Understand IoT reference layer and various protocols of IoT	PO1(2),PO2(3),PO3(2),PO4(1),PO5(1),PO9(1),PO10(1)
CO3	Deploy cloud in the context of IoT	PO1(2),PO2(2),PO3(3),PO4(2),PO5(2),PO9(2),PO10(2),PO11(1),PO12(1)
CO4	Design IoT applications in different domain and be able to analyze their performance	PO1(2),PO2(2),PO3(3),PO4(3),PO5(2),PO6(1),PO9(2),PO10(2),PO11(1),PO12(1)
CO5	Implement basic IOT Applications on Embedded Platforms	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO6(1),PO9(2),PO10(2),PO11(2),PO12(2)

MAPPING

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	-	-	-	-	-	1	1	-	-	-	-	-
CO2	2	3	2	1	1	-	-	-	1	1	-	-	-	-	-
CO3	2	2	3	2	2	-	-	-	2	2	1	1	-	-	-
CO4	2	2	3	3	2	1	-	-	2	2	1	1	-	-	-
CO5	2	2	3	2	3	1	-	-	2	2	2	2	-	-	-

3 Point Scale – 1, 2, 3

Units	Contents
UNIT I	Introduction to IoT: Introduction– Physical Design – Logical Design – IoT Enabling Technologies – IoT Levels & Deployment Templates – Domain Specific IoTs. IoT and M2M: M2M – Difference between IoT and M2M – SDN and – NFV for IoT.

UNIT II	IoT System Management with NETCONF – YANG: Need for IoT Systems Management - Simple Network Management Protocol – Network Operator Requirements – NETCONF – YANG. IoT Platforms Design Methodology: Introduction – Design Methodology. IoT Architecture: M2M high-level ETSI Architecture – IETF Architecture for IoT.
UNIT III	IoT Reference model – Domain model - Information model - Functional model – Communication model - IoT Reference Architecture. IoT Protocols: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols - SCADA and RFID Protocols – Protocols – IEEE 802.15.4 – BACNet Protocol - Modbus – Zigbee Architecture - Network Layer – 6LoWPAN – CoAP – Security.
UNIT IV	Building IoT with RASPBERRY Pi and ARDUINO: Building IoT with RASPBERRY Pi – IoT Systems – Logical Design using Python – IoT Physical Devices and Endpoints – IoT Device – Building blocks – Raspberry Pi – Board – Linux on Raspberry Pi – Raspberry Pi Interfaces Programming Raspberry Pi with Python – Other IoT Platforms - Arduino
UNIT V	Introduction- IIoT- Industry 4.0 – IIoT architecture – IIoT Connectivity- Standardization of IIoT - Opportunities – Challenges. Case studies: Home Automation – Cities – Environment – Agriculture – Productivity Application-Health care- Logistics-Military Tools for IoT: Chef – Chef Case Studies – Puppet – Puppet Case Study. Amazon Web Services for IoT..
	Total Contact Hours

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Book

S.No.	AUTHOR	TITLE OF THE BOOK	PUBLISHERS /EDITION	YEAR OF PUBICATION
1	Arsdeep Bhaga, Vijay Madiseti	Internet of Things- A hands on approach	First Edition, University Press	2015

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISH ERS/ EDITION	YEAR OF PUBICATION
1	Dieter Uckelmann - Mark Harrison- Michahelles-Florian (Eds)	Architecting the Internet of Things	First Edition- Springer	2011
2	Honbo Zhou	The Internet of Things in the cloud: A Middleware Perspective	First Edition- CRC Press	2012
3	Jan Holler- Vlasios Tsiatsis - Catherine Mulligan	Machine – to- Machine to the Internet of Things – Introduction to a New Age of Intelligence	First Edition- Elsevier	2014

Web References

1. tutorialspoint.com/internet_of_things/internet_of_things_overview.htm
2. https://onlinecourses.nptel.ac.in/noc20_cs69/unit?unit=17&lesson=18
3. <http://cdn.ttgtmedia.com/rms/IoTAgenda/PracticalIndustrialInternetofThingsSecurity-Chapter2.pdf>
4. <https://www.maximintegrated.com/en/design/technical-documents/app-notes/6/6142.html>
5. https://profile.iiita.ac.in/bibhas.ghoshal/IoT_2019/Lecture_Slides/Chapter-7_raspberryPi.pdf

List of Programs:

1. Program to implement LED Blink using Arduino.
2. Program to implement PIR sensor using Arduino.
3. Program to implement Ultrasonic Sensor using Arduino.
4. Program to implement Rain Drop Sensor using Arduino.
5. Program to implement IR Sensor using Arduino.
6. Program to implement DHT Sensor using Arduino.
7. Program to implement Gas Sensor using Arduino.
8. Program to implement Moisture Sensor using Arduino.
9. Program to implement Air Quality using NodeMCU.
10. Program to implement Connecting to WiFi using NodeMCU.
11. Program to implement DHT sensor using NodeMCU.
12. Program to implement LED Blink sensor using NodeMCU.
13. Program to implement IR Sensor using Raspberry pi.
14. Program to implement Vibration Sensor using Raspberry pi.

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS315	Course Title:	Programming Lab III : Artificial Intelligence & Machine Learning		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	3

Course Objective

To provide the knowledge of problem solving using AI techniques, knowledge representations and to understand the concepts of predicate logic.

To understand the basic concepts of machine learning, probability theory and also algorithms of supervised learning and unsupervised learning.

Course Outcomes (CO)

On successful completion of the course, students will be able to

CO Number	CO Statement	Knowledge Level
CO1	Learn about the artificial intelligence problem and the characteristics of the problem space.	K2
CO2	Identifies the Heuristics search techniques and issues in representing the knowledge and comprehend the statistical reasoning	K3
CO3	Understand the problem solving using predicates and infer the knowledge using rules	K2,K4
CO4	Design a learning model appropriate to the application and recognize the characteristics of machine learning techniques that are useful to solve real-world problems	K5
CO5	Design and implement various machine learning algorithms in a range of real-world applications	K5

MAPPING

PO/PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO 2
CO1	H	L	L	L	L	L	L	L	L	L	M	M
CO2	M	L	M	M	L	L	L	L	L	L	M	M
CO3	M	L	M	L	M	L	L	L	L	M	M	M
CO4	H	H	H	H	H	H	L	L	L	H	H	H
CO5	H	H	H	H	H	H	L	L	L	H	H	H

H: High; M: Medium; L: Low.

Contents	Hrs
1. Implement A* Search algorithm.	13
2. Implement AO* Search algorithm.	12
3. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.	13

4. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.	12
5. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.	
6. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets. 7. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.	13
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program. 9. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.	12
Total Contact Hours	75

Pedagogy and Assessment Methods:

Direct Instruction, Flipped Class, Digital Presentation, Seminar, Quiz, Assignments, Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Elaine Rich, Kevin Knight, & Shivashankar B Nair	Artificial Intelligence	Third Edition, McGraw Hill Education (India) Private Limited, New Delhi	2009, Reprint 2016.
2	Stephen Marsland	Machine Learning – An Algorithmic Perspective	Chapman and Hall, CRC Press, Second Edition	2014

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Stuart J. Russell, Peter Norvig	Artificial Intelligence - A Modern Approach	Third Edition, Pearson Publishers	2015
2	Ethem Alpaydin	Introduction to Machine Learning	Third Edition, Prentice Hall of India	2015
3	P. Flach	Machine Learning: The art and science of algorithms that make sense of data	Cambridge University Press	2012
4	Elaine Rich and Kevin Knight	Artificial Intelligence	Tata McGraw Hill Publishers company Pvt Ltd, Second Edition	1991

Web References1. <https://www.javatpoint.com/machine-learning>

2.https://onlinecourses.nptel.ac.in/noc21_cs24/preview
3.https://www.tutorialspoint.com/machine_learning_with_python.
4.<https://www.upgrad.com/machine-learning-ms>
5.[https://www.google.com/search?q=artificial%20intelligence%](https://www.google.com/search?q=artificial%20intelligence%20)
6.<https://www.ant-pc.com/workstation/ai-and-deep-learning>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS3P1	Course Title:	Pilot Project-I		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		-	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	2

Course Objective

To understand and develop recent applications based on the student project- also basic information of business processes according to project title.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Apply DBMS concepts	PO1(3),PO2(2),PO3(1),PO5(2),PO10(1),PO12(1),PO13(3),PO14(2),PO15(1)
CO2	Design Techniques like DFD or UML etc.	PO1(2),PO2(2),PO3(3),PO4(2),PO5(2),PO9(1),PO10(2),PO12(1),PO13(2),PO14(2),PO15(3)
CO3	Analyze and developing new app	PO1(2),PO2(3),PO3(3),PO4(2),PO5(2),PO9(2),PO10(2),PO12(1),PO13(2),PO14(3),PO15(3)
CO4	Implementation of entire applications.	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(2),PO15(3)
CO5	Creation of SDLC and models for software engineering	PO1(3),PO2(2),PO3(2),PO4(2),PO5(1),PO9(1),PO10(2),PO11(2),PO12(3),PO13(3),PO14(2),PO15(2)

MAPPING

COs / POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15
CO1	3	2	1	–	2	–	–	–	–	1	–	1	3	2	1
CO2	2	2	3	2	2	–	–	–	1	2	–	1	2	2	3
CO3	2	3	3	2	2	–	–	–	2	2	–	1	2	3	3
CO4	2	2	3	2	3	–	–	–	2	2	1	2	2	2	3
CO5	3	2	2	2	1	–	–	–	1	2	2	3	3	2	2

3 Point Scale – 1, 2, 3

Contents	Hrs
Students are required to develop entire new software system or to enhance/modify functionalities of existing software or to provide customization based on existing technology/framework to fulfill specific requirements	07
Area of Project Work: Using Android	09
DBMS concepts- Design Techniques like DFD or UML etc	08
Testing and Implementation of App	06

Total Contact Hours				30
The Guidelines in which the project report material should be arranged and bound as follows: 1) Cover Page & Title Page 2) Bonafide Certificates from Organization (Mandatory) 3) Declaration 4) Acknowledgement 5) Synopsis 6) Table of Contents 7) Chapters 8) Appendix Reference				
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Assignments- Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Dave MacLean- Satya Komatineni- Grant Allen	Pro Android 5	Apress Publications	2015
2	Ivar Jacobson- James Rumbaugh- Grady Booch	The UML Reference Manual	Addison Wesley Longman Inc.- Second Edition	2010
3	Pressman S. Roger	Software Engineering A Practitioner's Approach	McGraw Hill- International Editions- 7th edition	2014
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Barry Burd	Application Development – All-in-one for Dummies	Wiley India- 2 nd Edition	2016
2	Jerome (J. F) DiMarzio	Android – A Programmer's Guide	McGraw Hill Education- 8 th reprint	2015
3	Mahesh P. Matha	Object-Oriented Analysis and Design Using UML	PHI Learning Private Limited- Second Edition	2012
4	Craig Larman	Applying UML and Patterns-	2nd Edition- Pearson	2002
Web References 1. https://www.uml-diagrams.org/uml-object-oriented-concepts.html 2. https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/ 3. https://www.uml-diagrams.org/index-examples.html 4. https://www.youtube.com/watch?v=HylDB3bN6hQ 5. https://www.forecast.app/blog/benefits-of-using-project-management-software				
Rules for the Project: 1. The students can develop their project individually or in a group of not more than 2 students. Groupsize can be increased with prior approval of head of institution. 2. The project can be developed in any language or platform but it is required to get approved by the head/guide.				

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

ELECTIVE III

S.No	COURSE CODE	COURSE TITLE
1	26PCS3E1	Deep Learning
2	26PCS3E2	Statistical Data Analytics
3	26PCS3E3	Robotic Process Automation for Business

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS3E1	Course Title:	Elective III: Deep Learning		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	4

Course Objective

To understand the concept of deep learning- neural networks- CNN- RNN etc.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand the basic mathematical concepts learning algorithms	PO1(3), PO2(2), PO3(2), PO4(1), PO5(1), PO12(2), PO15(1)
CO2	Illustrate the Deep neural network and layered learning approach	PO1(3), PO2(2), PO3(2), PO4(1), PO5(2), PO9(1), PO12(2), PO15(1)
CO3	Analyze CNN and RNN for deep learning	PO1(3), PO2(3), PO3(3), PO4(2), PO5(2), PO9(1), PO12(2), PO15(1)
CO4	Learn and apply Auto Encoders and its applications	PO1(3), PO2(2), PO3(3), PO4(1), PO5(3), PO9(1), PO12(2), PO15(1)
CO5	Understand the concept of transfer learning and its applications	PO1(3), PO2(2), PO3(2), PO4(1), PO5(3), PO9(1), PO12(2), PO15(1)

MAPPING

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	2	1	1	–	–	–	–	–	–	2	–	–	1
CO2	3	2	2	1	2	–	–	–	1	–	–	2	–	–	1
CO3	3	3	3	2	2	–	–	–	1	–	–	2	–	–	1
CO4	3	2	3	1	3	–	–	–	1	–	–	2	–	–	1
CO5	3	2	2	1	3	–	–	–	1	–	–	2	–	–	1

3 Point Scale – 1, 2, 3

Units	Contents	Hrs
UNIT I	Introduction – Basics - Learning Algorithms - Supervised and Unsupervised Training - Hyper parameters Vs Parameters - validation sets - Estimators- Bias- Variance – Regularization - Challenges Motivating Deep Learning - The Curse of Dimensionality – Perceptron Learning Algorithm – Linear Separability – Multilayer perceptron – Back propagation.	15
UNIT II	Introduction to a simple DNN - Platform for deep learning - requirements to build DNN - Deep learning software libraries - Tensorflow- Keras- PyTorch - Deep – Hyper parameter Tuning- Batch Normalization - Learning XOR - Gradient-Based Learning - Various types of Gradient Descent functions – Early Stopping – Drop out.	15

UNIT III	Introduction to convolution neural network – operation – motivation – pooling – Normalization – sequence modeling – VGGNet - LeNet – Recurrent Neural Network – Topologies – Long Short Term Memory – Bidirectional LSTMs – Bidirectional RNNs – LSTM with Keras.	15
UNIT IV	Encoder – Decoder – Auto Encoder Introduction – Auto Encoders – Under complete Auto Encoder – Regularized Auto Encoder – Stochastic Auto Encoder – Denoising Auto Encoder – Contractive Auto Encoder – Applications – Dimensionality Reduction – classification using Auto encoders.	15
UNIT V	Deep Architecture in Vision – AlexNet to ResNet – GoogleNet - Transfer Learning – Siamese Networks – Metric Learning – Ranking – Triplet Loss – CNN –RCNN – Applications.	15
Total Contact Hours		75

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Ian Goodfellow- Yoshua Bengio- Aaron Courville	Deep Learning	MIT Press- (available at http://www.deeplearningbook.org)	2016
2	Kevin P. Murphy	Machine Learning: A Probabilistic Perspective	MIT Press	2012
3	Michael	Neural Networks and Deep Learning	Nielsen Online book- (http://neuralnetworksanddeeplearning.com/)	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Christopher and M. Bishop	Pattern Recognition and Machine Learning	Springer Science Business Media	2006
2	Jason Brownlee	Deep Learning with Python	ebook	2016

Web References

1. <https://www.youtube.com/watch?v=lhufOy2W3Ps>
2. <https://www.youtube.com/watch?v=FbxTVRfQFuI>
3. <https://www.youtube.com/watch?v=0VH1Lim8gL8>
4. <https://github.com/ChristosChristofidis/awesome-deep-learning>
5. https://www.w3schools.com/ai/ai_neural_networks.asp

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS3E2	Course Title:	Elective III: Statistical Data Analytics		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs/Sem	-	Semester:	III
					Credits:	4

Course Objective

To equip students with statistical concepts and analytical techniques to interpret data, apply inferential methods, and support data-driven decision-making.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand fundamental statistical concepts and data types.	PO1(3), PO2(2), PO3(1), PO5(1), PO12(2), PO15(1)
CO2	Apply descriptive statistical methods to summarize and visualize data.	PO1(2), PO2(2), PO3(2), PO4(1), PO5(2), PO9(1), PO10(1), PO12(2), PO15(1)
CO3	Analyze probability distributions and perform inferential statistics.	PO1(2), PO2(3), PO3(2), PO4(2), PO5(2), PO9(1), PO10(1), PO12(2), PO15(1)
CO4	Conduct hypothesis testing and interpret results for decision-making.	PO1(2), PO2(3), PO3(2), PO4(3), PO5(2), PO9(1), PO10(1), PO11(1), PO12(2), PO15(1)
CO5	Use statistical tools/software to analyze real-world datasets and draw meaningful conclusions.	PO1(2), PO2(2), PO3(3), PO4(2), PO5(3), PO9(2), PO10(2), PO11(1), PO12(2), PO15(1)

MAPPING

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	–	1	–	–	–	–	–	–	2	–	–	1
CO2	2	2	2	1	2	–	–	–	1	1	–	2	–	–	1
CO3	2	3	2	2	2	–	–	–	1	1	–	2	–	–	1
CO4	2	3	2	3	2	–	–	–	1	1	1	2	–	–	1
CO5	2	2	3	2	3	–	–	–	2	2	1	2	–	–	1

3 Point Scale – 1, 2, 3

Units	Contents	Hrs
UNIT I	Introduction to Statistical Data Analytics Definition and importance of data analytics, types of data including structured, unstructured, categorical and numerical data, methods of data collection such as primary and secondary data, data preprocessing techniques including cleaning, transformation and handling missing values, and descriptive statistics such as mean, median, mode, variance and standard deviation.	15
UNIT II	Probability and Distributions Basic concepts of probability, conditional probability and Bayes' theorem, random	15

	variables including discrete and continuous types, probability distributions such as Binomial, Poisson and Normal distributions, and the Central Limit Theorem.	
UNIT III	Statistical Inference Sampling techniques and sampling distributions, estimation methods including point and interval estimation, hypothesis testing with null and alternative hypotheses, statistical tests such as t-test, z-test, chi-square test and ANOVA, and errors in hypothesis testing.	15
UNIT IV	Correlation and Regression Analysis Correlation concepts including types and methods such as Pearson and Spearman correlation, simple linear regression, multiple regression analysis, model evaluation techniques and goodness of fit, and residual analysis.	15
UNIT V	Statistical Tools and Applications Introduction to statistical software such as R, Python and SPSS, data visualization techniques, basics of time series analysis, real-time case studies and applications, and ethical considerations in data analytics.	15

	Total Contact Hours				75
Pedagogy and Assessment Methods:					
Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.					
Text Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBICATION	
1	S.C. Gupta & V.K. Kapoor	Fundamentals of Applied Statistics	Sultan Chand & Sons	2014	
2	Richard I. Levin, David S. Rubin	Statistics for Management	Pearson	2017	
	Murray R. Spiegel,	Introduction to Probability and Statistics	Schaum’s Outline Series.	2000	
Reference Books					
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION	
1	Trevor Hastie, Robert Tibshirani, Jerome Friedman	The Elements of Statistical Learning	Springer	2009	

2	Douglas C. Montgomery , George C. Runger	Applied Statistics and Probability for Engineers	Wiley	2018
---	---	--	-------	------

Web References

1. <https://www.w3schools.com/statistics/>
2. <https://www.geeksforgeeks.org/data-analysis/>
3. <https://onlinecourses.nptel.ac.in/>
4. <https://www.coursera.org/browse/data-science/data-analysis>
5. <https://www.khanacademy.org/math/statistics-probability>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS3E3	Course Title:	Elective III: Robotic Process Automation for Business		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		5	Tutorial Hrs / Sem	-	Semester:	III
					Credits:	4

Course Objective

To gain knowledge on concepts of RPA- its benefits- types and models. Also in applications of RPA in Business Scenarios and identify measures and skills required for RPA.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Remember the benefits and ethics of RPA	PO1(3),PO2(2),PO3(1),PO8(1),PO9(1),PO10(1)
CO2	Understand the Automation cycle and its techniques	PO1(2),PO2(3),PO3(2),PO4(1),PO5(1),PO8(1),PO9(1),PO10(1)
CO3	Apply the of design inferences and information processing of RPA	PO1(2),PO2(3),PO3(2),PO4(1),PO5(1),PO8(1),PO9(1),PO10(1)
CO4	Implement & Apply RPA in Business Scenarios	PO1(2),PO2(3),PO3(2),PO4(3),PO5(2),PO6(1),PO8(1),PO9(2),PO10(2),PO11(1),PO12(1)
CO5	Analyze on Robots & leveraging automation	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO6(1),PO8(1),PO9(2),PO10(2),PO11(2),PO12(2)

Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	-	-	-	-	1	1	1	-	-	-	-	-
CO2	2	3	2	1	1	-	-	1	1	1	-	-	-	-	-
CO3	2	2	3	2	2	-	-	1	2	2	1	1	-	-	-
CO4	2	3	2	3	2	1	-	1	2	2	1	1	-	-	-
CO5	2	2	3	2	3	1	-	1	2	2	2	2	-	-	-

3 Point Scale – 1, 2, 3

Units	Contents	Hrs
-------	----------	-----

UNIT I	INTRODUCTION: Overview of RPA - Benefits of RPA in a business environment - Industries & domains fit for RPA - Identification of process for automation - Types of Robots - Ethics of RPA & Best Practices - Automation and RPA Concepts - Different business models for implementing RPA - Centre of Excellence – Types and their applications - Building an RPA team - Approach for implementing RPA initiatives.	15
UNIT II	AUTOMATION : Role of a Business Manager in Automation initiatives - Skills required by a Business Manager for successful automation - The importance of a Business Manager in automation - Analyzing different business processes - Process Mapping frameworks - Role of a Business Manager in successful implementation – Part 1 - Understanding the Automation cycle – First 3 automation stages and activities performed by different people.	15
UNIT III	AUTOMATION IMPLEMENTATION: Evaluating the Automation Implementation Detailed description of last 3 stages and activities performed by different people - Role of a Business Manager in successful completion – Part 2 - Activities to be performed post- implementation - Guidelines for tracking the implementation success - Metrics/Parameters To be considered for gauging success – Choosing the right licensing option - Sending e-mails- Publishing and Running Workflows.	15
UNIT IV	ROBOT: Ability to process information through scopes/systems - Understand the skill of information processing and its use in business - Leveraging automation - Creating a Robot - New Processes. Establish causality by variable behavior - Understand the skill of drawing inference or establishing causality by tracking the behavior of a variable as it varies across time/referenced variable - Leveraging automation for this skill - Robot & new process creation.	15
UNIT V	ROBOT SKILL: Inference from snapshots of curated terms – Omni-source data curation - Multisource trend tracking - Understand the skill of drawing inference from the behavior of curated terms by taking snapshots across systems in reference to time/variable(s) - Leveraging automation for this skill – Robot creation and new process creation for this Skill - Case Study.	15
Total Contact Hours		75

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Books

S.NO	AUTHOR	TITLE OF THEBOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Alok Mani Tripathi	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool	Packt Publishing Limited	2018
2	Tom Taulli	The Robotic Process Automation Handbook	Apress	2020

Reference Books

S.NO	AUTHOR	TITLE OF THEBOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Steve Kaelble	Robotic Process Automation	John Wiley & Sons-Ltd.-	2018

Web References

1. https://www.tutorialspoint.com/uipath/uipath_robotic_process_automation_introduction.htm
2. <https://www.javatpoint.com/rpa>
3. https://onlinecourses.nptel.ac.in/noc19_me74/preview
4. <https://www.info.com/serp?q=robotic+process+automation+tools&sc=D1P8CkHi8kSP02>
5. <https://irpaai.com/what-is-robotic-process-automation/>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

SEMESTER IV

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS4P2	Course Title:	Project Work and Viva -Voce		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		-	Tutorial Hrs/Sem	2	Semester:	IV
					Credits:	16

Course Objective

To enable the students to understand and select the task based on their core skills- also knowledge about analytical skill for solving the selected task. Students get confidence for implementing the task and solving the real time problems.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand and formulate a real world problem and develop its requirements	PO1(3),PO2(2),PO3(1),PO9(1),PO10(2),PO13(3),PO14(2),PO15(3)
CO2	Analyze the problem requirements	PO1(3),PO2(3),PO3(2),PO4(1),PO9(1),PO10(2),PO13(3),PO14(2),PO15(3)
CO3	Design solution for a set of requirements	PO1(2),PO2(3),PO3(3),PO4(2),PO5(1),PO9(2),PO10(2),PO13(3),PO14(3),PO15(2)
CO4	Apply test cases and validate the conformance of the developed prototype against the original requirements of the problem	PO1(2),PO2(2),PO3(2),PO4(3),PO5(2),PO9(2),PO10(1),PO13(2),PO14(3),PO15(2)
CO5	Responsible member and possibly a leader of a team in developing software solutions	PO1(1),PO2(1),PO3(2),PO4(1),PO5(2),PO6(2),PO7(1),PO8(2),PO9(3),PO10(3),PO11(2),PO12(2),PO13(2),PO14(2),PO15(1)

Mapping

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	–	–	–	–	–	1	2	–	–	3	2	3
CO2	3	3	2	1	–	–	–	–	1	2	–	–	3	2	3
CO3	2	3	3	2	1	–	–	–	2	2	–	–	3	3	2
CO4	2	2	2	3	2	–	–	–	2	1	–	–	2	3	2
CO5	1	1	2	1	2	2	1	2	3	3	2	2	2	2	1

3 Point Scale – 1, 2, 3

Course Designed by	Dr.M.Sakthi	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

VALUE ADDED COURSE

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCS2VA1	Course Title:	VACI:25PCS2VA1- UI & UX Design Using Figma		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		1	Total Hours	30	Semester:	II
					Credits:	2

Course Objective

To impart knowledge on the fundamentals of UI/UX design and get an idea on how to use Figma tools to create wireframes- prototypes and design components.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Explain the fundamentals of UI/UX design and its importance in product development.	PO1(3),PO2(2),PO3(1),PO10(2), P13(2),PO14(1),PO15(3)
CO2	Apply Figma tools to create wireframes- prototypes- and design components.	PO1(2),PO2(2),PO3(3),PO4(1), PO5(3),PO9(1),PO10(2),PO13(3), PO14(3),PO15(2)
CO3	Develop responsive UI designs for websites and mobile apps.	PO1(2),PO2(2),PO3(3),PO4(2), PO5(3),PO9(1),PO10(2),PO13(3), PO14(3),PO15(2)
CO4	Use Figma's prototyping features to create interactive experiences.	PO1(2),PO2(2),PO3(3),PO4(2), PO5(3),PO9(1),PO10(2),PO13(3), PO14(3),PO15(2)
CO5	Evaluate designs based on user feedback and improve usability.	PO1(1),PO2(3),PO3(2),PO4(3), PO5(2),PO9(2),PO10(2),PO13(2), PO14(2),PO15(1)

MAPPING

COs / POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	1	–	–	–	–	–	–	2	–	–	2	1	3
CO2	2	2	3	1	3	–	–	–	1	2	–	–	3	3	2
CO3	2	2	3	2	3	–	–	–	1	2	–	–	3	3	2
CO4	2	2	3	2	3	–	–	–	1	2	–	–	3	3	2
CO5	1	3	2	3	2	–	–	–	2	2	–	–	2	2	1

Units	Contents	Hrs		
UNIT I	Introduction to UI/UX and Figma Basics, Fundamental concepts of UI and UX design- understand the importance of user-centered design in creating digital products. differences between UI and UX- key design principles- and the role of research in UX design. Figma interface- learning about frames- layers- and basic tools. create simple wireframes and understand the importance of usability and accessibility in design.	10		
UNIT II	UI Design Principles and Component-Based Design,UI design principles- exploring typography- color theory- spacing- and layout grids. Design reusable components such as buttons- forms- navigation bars- and cards- ensuring design consistency. The unit also introduces auto-layout and constraints- to create responsive designs adaptable to various screen sizes. develop interactive prototypes and work on a real-world design project- such as a mobile app or a website landing page.	10		
UNIT III	Prototyping- Interaction Design- and Usability Testing Bringing designs to life through prototyping and interaction design. create clickable prototypes- apply animations- and use Figma’s Smart Animate feature for smooth transitions. explore usability testing methods- gathering feedback to refine their designs. final project will develop a fully functional UI/UX prototype- present work- and receive constructive feedback to improve their design skills.	10		
	Total Contact Hours	30		
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Book				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Steve Krug	Don't Make Me Think- Revisited: A Common Sense Approach to Web Usability	New Riders Publication	2013
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS / EDITION	YEAR OF PUBICATION
1	Don Norman	The Design of Everyday Things	Basic Books	2013

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

VALUE ADDED COURSE

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	26PCSVA2	Course Title:	VAC II: Foundations and Applications of Blockchain Technology and Cryptocurrency		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		1	Total Hours	30	Semester:	II
					Credits:	2

Course Objective

To impart knowledge on Block chain and Crypto currency and make the students to design- build and deploy distributed applications by integrating the ideas from Block chain technology.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Remember the basics of cryptography.	PO1(3),PO2(1)
CO2	Understand emerging abstract models for Blockchain technology.	PO1(3),PO2(2),PO4(1),PO13(1)
CO3	Design- build- and deploy a distributed application.	PO1(2),PO2(3),PO3(3),PO4(2),PO5(3),PO9(2),PO10(1),PO13(2),PO14(1),PO15(2)
CO4	Analyze the differences between proof-of-work and proof-of-stake consensus.	PO1(2),PO2(3),PO4(3),PO5(1),PO14(1),PO15(2)
CO5	Evaluate security- privacy- and efficiency of a Blockchain system.	PO1(2),PO2(3),PO3(1),PO4(3),PO5(2),PO6(1),PO12(2),PO13(1),PO14(2),PO15(3)

Mapping

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—
CO2	3	2	—	1	—	—	—	—	—	—	—	—	1	—	—
CO3	2	3	3	2	3	—	—	—	2	1	—	—	2	1	2
CO4	2	3	—	3	1	—	—	—	—	—	—	—	—	1	2
CO5	2	3	1	3	2	1	—	—	—	—	—	2	1	2	3

3 Point Scale – 1, 2, 3

Units	Contents	Hrs
UNIT I	Basics: Distributed Database- Two General Problem- Byzantine General problem and Fault Tolerance- Hadoop Distributed File System- Distributed Hash Table- ASIC resistance- Turing Complete. Cryptography: Hash function- Digital Signature - ECDSA- Memory Hard Algorithm- Zero Knowledge Proof. Blockchain: Introduction- Advantage over conventional distributed database- Blockchain Network- Mining Mechanism- Distributed Consensus- Merkle Patricia Tree- Gas Limit- Transactions and Fee-Anonymity-Reward-ChainPolicy-LifeofBlockchainapplication- Soft&HardFork-Private and Public Blockchain.	10
UNIT II	Distributed Consensus: Nakamoto consensus- Proof of Work- Proof of Stake- Proof of Burn- Difficulty Level- Sybil Attack- Energy utilization and alternate. Cryptocurrency: History- Distributed Ledger- Bitcoin protocols - Mining strategy and rewards- Ethereum - Construction- DAO- Smart Contract- GHOST- Vulnerability- Attacks- Sidechain- Namecoin.	08
UNIT III	Cryptocurrency Regulation: Stakeholders- Roots of Bit coin- Legal Aspects-Crypto currency Exchange- Black Market and Global Economy. Applications: Internet of Things- Medical Record Management System- Domain Name Service and future of Blockchain.	12
Total Contact Hours		30

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Text Book

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/EDITION	YEAR OF PUBLICATION
1	Arvind Narayanan- Joseph Bonneau- Edward Felten- Andrew Miller- and Steven Goldfeder.	Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction	Princeton University Press	2016

Reference Books

S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBLICATION
1	Joseph Bonneau et al- SoK	Research perspectives and challenges for Bitcoin and cryptocurrency	IEEE Symposium on security and Privacy	2015
2	Dr. Gavin Wood	ETHEREUM: A Secure Decentralized Transaction Ledger	Yellow paper	2014
3	William Mougayar	Business Blockchain Promise- Practice and Application of the Next Internet Technology	John Wiley & Sons	2016

Web References

1. <https://www.tutorialspoint.com/blockchain/index.htm>
2. <https://www.javatpoint.com/blockchain-cryptocurrency>
3. <https://www.udemy.com/course/introduction-to-cryptocurrencies/>
4. <https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology>
5. <https://www.coursera.org/learn/cryptocurrency>

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	

CERTIFICATE COURSE

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	-	Course Title:	Software Testing Lab - Selenium		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		1	Total Hours	30	Semester:	Any Semester
					Credits:	2

Course Objective

To understand the basic concepts of software testing over various selenium methods and automation frameworks.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Learn the importance of software testing	PO1(3),PO2(2),PO5(1),PO8(1),PO10(2),PO12(1),PO13(3),PO14(2)
CO2	Understand and use Selenium IDE	PO1(2),PO2(2),PO3(2),PO4(1),PO5(3),PO9(1),PO10(2),PO12(1),PO13(2),PO14(2),PO15(2)
CO3	Create programs using Selenium	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(1),PO10(2),PO11(1),PO12(1),PO13(2),PO14(2),PO15(3)
CO4	Create test beds for software testing	PO1(2),PO2(3),PO3(3),PO4(3),PO5(2),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(3),PO15(3)
CO5	Identify potential problems in software and develop solutions for testing	PO1(2),PO2(3),PO3(3),PO4(3),PO5(2),PO8(1),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(3),PO15(3)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	–	–	1	–	–	1	–	2	–	1	3	2	–
CO2	2	2	2	1	3	–	–	–	1	2	–	1	2	2	2
CO3	2	2	3	2	3	–	–	–	1	2	1	1	2	2	3
CO4	2	3	3	3	2	–	–	–	2	2	1	2	2	3	3
CO5	2	3	3	3	2	–	–	1	2	2	1	2	2	3	3

Contents				Hrs
1. Create a payroll system and test using the tool.				3
2. Create a ration shop management system and test using the tool.				3
3. Create airline reservation system and test using the tool				3
4. Create Library management system and test using the tool.				3
5. Create Banking system and test using the tool.				3
6. Create Book shop management system and test using the tool.				3
7. Create Electricity billing system and test using the tool.				3
8. Create online cinema ticket reservation system and test using the tool.				3
9. Create Music gallery and test using the tool.				3
10. Create trading system and test the tool.				3
Total Contact Hours				30
Pedagogy and Assessment Methods: Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.				
Text Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	AdithyaGarg- Ashish Mishra	A Practitioner's Guide to Test Automation Using Selenium	Tata McGraw Hill Education	2015
2	NavneeshGarg	Test Automation Using Selenium Web Driver with Java	AdactIn Group Pvt Ltd	2014
Reference Books				
S.NO	AUTHOR	TITLE OF THE BOOK	PUBLISHERS/ EDITION	YEAR OF PUBICATION
1	Rex Allen Jones II	Selenium Web Driver for Functional Automation Testing	Test 4 Success- LLC.	2016
2	David Burns	Selenium 1.0 Testing Tools	Packt Publishing	2010
Web References				
1. https://onlinecourses.nptel.ac.in/noc20_cs19/preview				
2. https://www.youtube.com/watch?v=SxrtXHQ-rd0				
3. https://www.guru99.com/introduction-to-selenium.html				
4. https://medium.com/quick-code/top-tutorials-to-learn-selenium-for-beginners-4e1f301585				
5. https://www.guru99.com/first-webdriver-script.html				

ADVANCED LEARNER COURSE

Programme Code:		M.Sc CS	Programme Title:		Master of Science (Computer Science)	
Course Code:	-	Course Title:	Mobile Application Development		Batch :	2026-2028
Lecture Hrs./Week Or Practical Hrs./Week		1	Total Hours	30	Semester:	Any Semester

Course Objective

To ensure learners are exposed to know and develop mobile application.

Course Outcomes (CO)

On successful completion of the course- students will be able to

CO	CO Statement	
CO1	Understand the basics of mobile devices- app store- development environments characteristics- history of mobile application frameworks.	PO1(3),PO2(2),PO5(1),PO10(2),PO12(1),PO13(3),PO14(2)
CO2	Understand the mobile application frameworks and setting up java- eclipse- android development components. Creating user interface design for mobile applications and managing application data	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(1),PO10(2),PO12(1),PO13(2),PO14(2),PO15(3)
CO3	Understanding the enterprise requirements and testing methodologies for mobile applications	PO1(2),PO2(3),PO3(2),PO4(3),PO5(2),PO9(1),PO10(2),PO11(1),PO12(1),PO13(2),PO14(3),PO15(2)
CO4	Understanding the hybrid mobile app development frameworks: CSS3- HTML 5- Ionic- Angular JS- Node.JS and developing the hybrid mobile applications	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(2),PO15(3)
CO5	Understanding the mobile app deployment process- Usage of Sqlite- mongo DB and Mysql and IBM BlueMix.	PO1(2),PO2(2),PO3(3),PO4(2),PO5(3),PO9(2),PO10(2),PO11(1),PO12(2),PO13(2),PO14(2),PO15(3)

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15
CO1	3	2	–	–	1	–	–	–	–	2	–	1	3	2	–
CO2	2	2	3	2	3	–	–	–	1	2	–	1	2	2	3
CO3	2	3	2	3	2	–	–	–	1	2	1	1	2	3	2

CO4	2	2	3	2	3	–	–	–	2	2	1	2	2	2	3
CO5	2	2	3	2	3	–	–	–	2	2	1	2	2	2	3

Contents	
Introduction to Mobile Devices: Introduction - Mobile vs. Desktop devices - App Store- Google Play- Windows Store - Development environments - PhoneGAP	
Native vs. web applications - Mobile Connectivity Evolution - Characteristics of mobile applications - History of mobile application frameworks	
Application models of mobile application frameworks - Setting up an android development environment: setting up java- eclipse- android development components- verify the development environment	
User interface design for mobile applications - Managing application data	
Addressing enterprise requirements in mobile applications: performance- scalability- modifiability- availability- and security	
Testing methodologies for mobile applications - Publishing- deployment- maintenance and management	
Hybrid Mobile App Development Frameworks: Introduction to CSS3.HTML5 - Full-Stack Web Development	
Hybrid Mobile App Development: Ionic and AngularJS - node.JS	
APP deployment: Angular ui-router and Resolve - Using Local Storage(Sqlite) -Databases - mongoDB- MySQL	
Ionic Adding Platforms - Building and Deploying the App - Hybrid Mobile Development and IBM BlueMix	
Total Contact Hours	
Text Book(s)	
1	Bill Phillips- Chris Stewart- Brian Hardy- and Kristin Marsicano- Android Programming: The Big Nerd Ranch Guide- Big Nerd Ranch LLC- 3rd edition- 2017.
2	Rajiv Ramnath- Roger Crawfis- and Paolo Sivilotti- Android SDK 3 for Dummies- Wiley.
3	Brian Fling- Mobile Design and Development- O'Reilly Media- Inc.- 2009.
Reference Book(s)	
1	Maximiliano Firtman- Programming the Mobile Web- O'Reilly Media- Inc.- 2nd ed.- 2013.
Related Online Contents	
1	https://developer.android.com/
2	https://www.w3schools.in/category/android-tutorial/
3	https://www.tutorialspoint.com/android/index.htm

Pedagogy and Assessment Methods:

Direct Instruction- Flipped Class- Digital Presentation- Seminar- Quiz- Assignments- Group Task.

Course Designed by	Dr.M.Rathamani	
Verified by HOD	Dr.M.Sakthi	
Approved by Chairman Academic Council	Dr.R.Manicka chezian	