CAUVERY COLLEGE FOR WOMEN
(AUTONOMOUS)
NATIONALLY ACCREDITED WITH "A" GRADE BY NAAC
TIRUCHIRAPPALLI

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

M. Sc. COMPUTER SCIENCE

SYLLABUS

2024-2025 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG & RESEARCH DEPARTMENT OF COMPUTER SCIENCE

VISION

To create an ambience for a quality academic erudition which drives technologically adept, innovative and globally competent graduates with ethical values

MISSION

- To have a breath of knowledge across the subject areas of Computer Science
- To professionally enrich the students for successful career in Academic, Industry and Research
- To promote and inculcate ethics and code of professional practice among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR M.Sc. COMPUTER SCIENCE PROGRAMME

PO NO.	Programme Outcome On completion of M.Sc. Computer Science The students will be able to
PO 1	**DOMAIN KNOWLEDGE** Acquire the in-depth computing knowledge both conceptual and applied pertaining to the core discipline
PO 2	**PROBLEM SOLVING** Procure knowledge-based skills to satisfy the needs of society and the industry by providing hands on experience of various technologies in Computer Science
PO 3	**INNOVATION AND CRITICAL THINKING** Critically evaluate global issues, recognize the need and identify sustainable solutions through research capabilities towards Nation building initiatives
PO 4	**LIFE LONG LEARNING** Capable of upgrading and advancing knowledge through innovation and technology as evidenced by current developments
PO 5	**LEADERSHIP AND TEAMWORK** Work in collaborative environment through applications of scientific reasoning and communicate effectively to the stakeholders

PROGRAMME SPECIFIC OUTCOMES FOR M.Sc. COMPUTER SCIENCE PROGRAMME

PSO NO.	Programme Specific Outcomes Students of M.Sc. Computer Science will be able to	PO s Addressed
PSO 1	Identify, formulate and develop solutions for computational challenges	PO 1 PO 2
PSO 2	Inculcate broad knowledge in core areas of Computer Science and emerging technologies in related domains	PO 1 PO 2
PSO 3	Integrate computing knowledge on crafting innovative solutions and to provide a gateway for research.	PO 2 PO 3 PO 4
PSO 4	Develop analytical and technical skills to enhance employment potential and entrepreneurship	PO 3 PO 4 PO 5
PSO 5	Imbibe professional and ethical skills to become a competent citizen for the betterment of society	PO 3 PO 4 PO 5

Cauvery College for Women (Autonomous), Trichy

PG & Research Department of Computer Science

M.Sc. Computer Science

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS- LOCF)

(For the Candidates admitted from the Academic year 2024-2025 and onwards)

Semester	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
						Hrs.	Marks		
							Int.	Ext.	
I	Core Course– I (CC)	Analysis & Design of Algorithms	23PCS1CC1	6	5	3	25	75	100
	Core Course – II (CC)	Object Oriented Analysis and Design & C++	23PCS1CC2	6	5	3	25	75	100
	Core Course –III (CC)	Mathematical and Logical Computing	24PCS1CC3	6	5	3	25	75	100
	Core Practical - I (CP)	Algorithm and OOPS (P)	23PCS1CC1P	6	5	3	40	60	100
	Discipline Specific Elective Course-I (DSE)	A. Advanced Software Engineering	23PCS1DSE1A	6	3	3	25	75	100
		B. Advanced Computer Architecture	23PCS1DSE1B						
		C. Advanced Database Systems	23PCS1DSE1C						
	Total			**30**	**23**	-	-	-	**500**
15 Days INTERNSHIP during Semester Holidays									
II	Core Course– IV(CC)	Data Mining and Warehousing	22PCS2CC4	6	5	3	25	75	100
	Core Course– V(CC)	Compiler Design	23PCS2CC5	6	5	3	25	75	100
	Core Choice Course–I (CCC)	A. Mobile Computing	22PCS2CCC1A	6	4	3	25	75	100
		B. Wireless Sensor Networks	22PCS2CCC1B						
		C. MANET	22PCS2CCC1C						
	Core Practical-II(CP)	Data Mining (P)	22PCS2CC2P	6	5	3	40	60	100
	Discipline Specific Elective Course-II (DSE)	A. Cryptography and Network Security	22PCS2DSE2A	6	3	3	25	75	100
		B. Block chain and Cryptocurrencies	22PCS2DSE2B						
		C. Ethical Hacking	22PCS2DSE2C						
	Internship	Internship	22PCS2INT	-	2	-	25	75	100
	Extra Credit Course	SWAYAM	As per UGC Recommendation						
	Total			**30**	**24**	-	-	-	**600**

The Internal and External marks for theory and practical courses are as follows:

Course	Internal Marks	External Marks
Theory	25	75
Practical	40	60
Project	-	100
Internship	25	75

For Theory courses:

a) The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)

b) The passing minimum for End Semester Examinations shall be 40% out of 75 marks (i.e. 30 marks)

c) The passing minimum not less than 50% in the aggregate

For Practical courses:

a) The passing minimum for CIA shall be 40% out of 40 marks (i.e. 16 marks)

b) The passing minimum for End Semester Examinations shall be 40% out of 60 marks (i.e. 24 marks)

c) The passing minimum not less than 50% in the aggregate

For Project Work:

a) The passing minimum not less than 50% out of 100 marks

For Internship:

a) The passing minimum not less than 50% in the aggregate

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
23PCS1CC1	**ANALYSIS & DESIGN OF ALGORITHMS**	**CORE**	**6**	**5**

Course Objective

- To learn the Elementary Data Structures and algorithms
- To understand the basics of an algorithm, their analysis and design
- To inculcate the knowledge of Basic Traversal and Search Techniques, Greedy method, Divide and Conquer method, Dynamic programming and Backtracking

Prerequisite

Basic concepts of data structures and algorithms

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Get knowledge about algorithms and determine their time complexity	K1
CO2	Demonstrate specific search and sort algorithms using divide and conquer technique	K2
CO3	Apply different methods to analyze the algorithm performance	K3
CO4	Compare the concept of various algorithm technique	K4
CO5	Explore the algorithm technique on Real time applications	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	2	3	3	1	3	2
CO2	3	3	3	2	3	3	3	2	3	3
CO3	3	2	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	2	1	2
CO5	3	3	3	3	3	3	3	2	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"–indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction:** - Algorithm Definition and Specification – Space complexity – Time Complexity –Asymptotic Notation. **Elementary Data Structures:** Stacks and Queues – Binary Trees - Binary Search Trees - Heaps – Heap sort - Graphs.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Basic Traversal And Search Techniques:** Techniques for Binary Trees – Techniques for Graphs. **Divide and Conquer:** General Method – Binary Search – Merge Sort– Quick Sort.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**The Greedy Method**: General Method – Knapsack Problem – Minimum Cost Spanning Trees: Prim's Algorithm – Kruskal Algorithm – Optimal storage on Tapes – Single Source Shortest Paths.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Dynamic Programming:** General Method – Multistage Graphs – All Pair Shortest Path – Optimal Binary Search Trees – 0/1 Knapsack – Traveling Sales person Problem –Flow Shop Scheduling.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Back tracking**: General Method – 8-Queens Problem – Sum of Subsets – Graph Coloring– Hamiltonian Cycles. **Branch And Bound:**-The Method–Traveling Sales person.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** NP Hard and NP Complete Problems: Basic Concept – COOK's theorem – NP Hard Graph Problems – NP Hard Code Generation.		CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekan.(2017). *Fundamentals of Computer Algorithms.* 2nd Edition, University Press.

Reference Books

1. Alfred V. Aho, John E Hopcraft, Jefffrey D. Ullman.(2004). *Data Structures and Algorithms*. Pearson Education.
2. Goodrich. *Data Structures & Algorithms in Java.*3rd Edition, Wiley.
3. Skiena.(2008).*The Algorithm Design Manual*. 2nd Edition,Springer.
4. Anany Levith.(2003). *Introduction to the Design and Analysis of algorithm.* Pearson Education Asia.
5. Robert Sedgewick, Phillipe Flajolet.(1996).*An Introduction to the Analysis of Algorithms.* Addison-Wesley Publishing Company.

Web References

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm
3. https://www.javatpoint.com/daa-tutorial

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar.

Course Designer

Ms.P.Muthulakshmi

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1CC2	OBJECT ORIENTED ANALYSIS AND DESIGN &C++	CORE	6	5

Course Objective

- To Present the object model, classes and objects, object orientation, machine view and model management view
- To learn the basic functions, principles and concepts of object oriented analysis and design
- To understand C++ language with respect to Object Oriented Analysis and Design

Prerequisites

Basics of Programming and Object Oriented Programming Concepts

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand the concept of Object Oriented development and modeling techniques	K1, K2
CO2	Gain knowledge about the various steps performed during object design	K2, K3
CO3	Abstract object-based views for generic software systems	K3
CO4	Link OOAD with C++ language	K4,K5
CO5	Apply the basic concepts of OOPs and familiarize to write C++ program	K5, K6

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	2
CO2	3	2	3	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3" – Substantial (High) Correlation "-" –indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**The Object Model**: The Evolution of the Object Model – Elements of the Object Model – Applying the Object Model. **Classes and Objects**: The Nature of an Object – Relationships among Objects- The Nature of Class – Relationship among Classes – The Interplay of Classes and Objects.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	Introduction to C++-Input and Output in C++- C++ Declarations - Control Structures.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	Functions in C++ - Classes and Objects in C++– Constructors and Destructors–Operator Overloading and Type Conversion.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	Inheritance – Pointers and Arrays-C++ And Memory: the new and Delete operators – Polymorphism and Virtual Functions.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	Applications with Files–Exception Handling – Working with Strings - Overview of Standard Template Library (STL).	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self-StudyforEnrichment:** **(Not included for End Semester Examinations)** **Classification:** The Importance of Proper Classification –Identifying Classes and Objects – Key Abstractions and Mechanisms. **Notation:** The Unified Modeling Language – Component Diagrams-Deployment Diagrams-Use Case Diagrams-Activity Diagrams-Class Diagrams-Object Diagrams.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, BobbiJ.Young, Jim Conallen, Kelli A.Houston.(2014).*Object Oriented Analysis and Design with Applications*.3rdEdition, Pearson Education.**(Unit: I)**
2. Ashok N.Kamthane.(2009),*Object-Oriented Programming with ANSI & TurboC++,7th Impression*, Pearson Education Limited.**(Unit:II - V)**

Reference Books

1. Balagurusamy (2003), *Object Oriented Programming with C++*, Second Edition, TMH.
2. Yashwant Kanetkar .(2019). *Let Us C++* , Third Edition, BPB.

Web References

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs19/
3. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Quiz, Seminar

Course Designer

Ms. K. Pradeepa

Semester I	Internal Marks: 25		ExternalMarks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
24PCS1CC3	**MATHEMATICAL AND LOGICAL COMPUTING**	**CORE**	**6**	**5**

Course Objective

- **Explore** the basic concepts of Discrete Mathematics, Graph Theory.
- **Acquire** the knowledge of Fundamentals in combinatorics.
- **Analyze** the method of logical reasoning to solve variety of problems.

Prerequisite

Basic Knowledge in Relations,Functions and Graph Theory.

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Define the various concepts in Relations, Combinatorics and Graphs.	K1
CO2	Understand the different terminologies of functions, Predicate Calculus, Recurrence Relations and Graphs and Fuzzy sets.	K2
CO3	Analyze the problems in different aspects and give solutions in their respective streams.	K3
CO4	Examine some methodologies for the related area in an effective manner.	K4
CO5	Apply the notions to distinct problems and get solutions in a easy way.	K5

Mapping of COwithPO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	2	2	3	2	2	2	3
CO2	2	2	3	2	2	2	2	2	2	3
CO3	3	2	3	2	2	3	2	2	3	3
CO4	3	2	2	2	2	2	2	2	2	2
CO5	2	2	2	3	3	2	3	3	2	2

"1" – Slight (Low) Correlation "2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation "-" indicates there is no correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Relations:**- Binary Relations-Operations on Relations- Properties of Binary Relations in a Set–Equivalence Relations and Partial Orderings— Representation of a Relation by a Matrix Representation of a Relation by a Digraph. **Functions:**-More on Functions- Some Important Functions.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Foundations:**Logic– **Predicate Calculus:**Well Formed formulas Truth Table of Well Formed Formula –Tautology, Contradiction and Contingency-Equivalence of Formulas-Algebra of Propositions- Normal Forms of Well -Formed Formulas-Rules of Inference for Propositional Calculus**.**	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Combinatorics:**- Permutations-Combinations-Permutations with Repetitions- Combinations with Repetitions -Permutations of sets with indistinguishable objects.**Recurrence Relations:**Formulation as Recurrence Relations-Solving Recurrence Relation by Iteration Solving Recurrence Relations- Solving Linear Homogeneous Recurrence Relations of Order Two.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Graphs** -Connected Graphs –Examples of Special Graphs-Eulerian Graphs-Hamiltonian Circuits and Paths.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**From Classical(Crisp) Sets to Fuzzy Sets:**Fuzzy sets: Basic types – Fuzzy sets: Basic Concepts. **Fuzzy Sets Versus Crisp Sets:**Additional Properties of α – cuts.**Operations on Fuzzy Sets:** Types of Operations– Fuzzy Complement.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examination)** Hashing Functions-Functionally Complete Sets- Solving Linear Non homogeneous Recurrence Relations-**Crisp sets:** An Overview	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Chandrasekaran. N, and Umaparvathi. M(2015), *Discrete Mathematics*, PHI Learning Private Limited, NewDelhi.
2. George. J. Klir and Bo Yuan(2013), *Fuzzy Sets And Fuzzy Logic*, Prentice Hall of India, New Delhi.

Chapters and Sections

UNIT-I Chapter 5: Sections 5.1- 5.5, 5.8, 5.9[1]
UNIT-II Chapter 1: Section1.1[1]Chapter 2:Sections2.1-2.5, 2.7, 2.8[1]
UNIT-III Chapter 3: Sections3.1-3.5[1]Chapter 6: Sections6.1-6.4[1]
UNIT- IV Chapter 10: Sections 10.1-10.4[1]
UNIT- V Chapter 1: Sections 1.3, 1.4 [2]Chapter 2: Sections 2.1 [2]
Chapter 3: Sections 3.1, 3.2 [2]

Reference Books

1. Tremblay, J.P.&Manohar, R. (1997). *Discrete Mathematical Structures with Applications to Computer Science*, Tata McGraw- Hill Publishing Company Limited, New Delhi.
2. Ralph, P.Grimaldi.(2002).*Discrete and Combinatorial Mathematics*, Pearson Asia Education.
3. Narsingh Deo.(1997). *Graph Theory With Applications To Engineering & Computer Science.* Prentice Hall of India, New Delhi.
4. Ganesh, G.J.M. (2006). *Introduction To Fuzzy Sets And Logic*, Prentice-Hall of India, New Delhi.

Web References

1. **https://www.youtube.com/results?search_query=negation+of+the+statement**
2. **https://www.youtube.com/results?search_query=permutation**
3. **https://www.youtube.com/results?search_query=graph+theory+definitions+and+examples**
4. **https://www.youtube.com/results?search_query=trees+in+graph+theory**
5. **https://discrete.openmathbooks.org/pdfs/dmoi-tablet.pdf**
6. **https://www.maths.ed.ac.uk/~v1ranick/papers/wilsongraph.pdf**

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar.

Course Designer

Dr. S. Saridha

Semester: I	Internal Marks: 25		External Mars: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HOURS / WEEK	CREDITS
23PCS1CC1P	ALGORITHM AND OOPS (P)	CORE	6	5

Course Objective

- To learn the applications of the data structures using various techniques
- To understand C++ language with respect to Object Oriented Analysis and Design (OOAD) concepts
- T build application of OOPS concepts

Prerequisites

Basic understanding of C++ Programming

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Identify and apply the suitable data structure for the given real world problem	K2, K3
CO2	Able to understand and implement OOPS concepts.	K2,K3
CO3	Apply the concepts of Stack, Queue, Tree, List using C++	K3
CO4	Analyze the concepts of sorting and searching algorithms using relevant data structures.	K4
CO5	Interpret and Solve problem involving graphs, trees and heaps	K6

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	2
CO2	3	2	3	3	2	3	3	2	3	2
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" –indicates there is no Correlation.

Exercises

1. Write a program to solve the Tower of Hanoi using recursion.
2. Write a program to traverse through Binary Search Tree using traversals.
3. Write a program to perform various operations on Stack using Linked list.
4. Write a program to perform various operations in a circular queue.
5. Write a program to sort an array of elements using Quick sort.
6. Write a program to solve the number of elements in ascending order using Heap sort.
7. Write a program to solve the knapsack problem using Greedy method
8. Write a program to search an element in a tree using Divide & Conquer strategy.
9. Write a program to place the 8 queens on an 8 x 8 matrix so that no two queens Attack.
10. Write a C++ program to perform Virtual Function
11. Write a C++ program to perform Parameterized Constructor
12. Write a C++ program to perform Friend Function
13. Write a C++ program to perform Function Overloading
14. Write a C++ program to perform Single Inheritance
15. Write a C++ program to perform Employee Details using files.

Web References

1. https://onlinecourses.nptel.ac.in/noc19_cs48/preview
2. https://www.tutorialspoint.com/object_oriented_analysis_design/ooad_object_oriented_analysis.htm
3. https://www.geeksforgeeks.org/c-plus-plus/?ref=shm
4. https://www.tutorialspoint.com/cplusplus-program-to-implement-stack-using-linked-list
5. https://webeduclick.com/cpp-program-tower-of-hanoi-using-recursion/

Pedagogy

Power Point Presentation, Live Demonstration

Course Designer

Ms. S.Saranya

Semester: I	Internal Marks:25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
23PCS1DSE1A	**ADVANCED SOFTWARE ENGINEERING**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To learn the concepts of Software Engineering
- To provide the idea of decomposing the given problem into Analysis, Design, Testing and Maintenance phases
- To inculcate knowledge on Software Project Management, Software Design &Testing

Prerequisites

Basics of Software Engineering &Software Project Management

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand about Software Engineering process	K1, K2
CO2	Make use of Software Project Management Skills, Design and Quality Management	K3
CO3	Analyze on Software Requirements and Specification	K4
CO4	Analyze and Compare Software Testing, Maintenance and Software Re-Engineering	K4, K5
CO5	Design and conduct various types and levels of software quality or a software project	K5, K6

Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	2	2	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1" – Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3" – Substantial (High) Correlation
"-" indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction:** The Problem Domain – Software Engineering Challenges - Software Engineering Approach. **Software Processes:** Software Process – Characteristics of a Software Process – Software Development Process Models – Other software processes.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Requirements Analysis and Specification**: Requirements Gathering and Analysis- Software Requirements Specification (SRS) - Formal System Specification – Axiomatic Specification – Algebraic Specification. **Software Quality Management:** Software Quality-Software Quality Management System-ISO 9000 - SEI Capability Maturity Model.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Software Project Management:** Responsibilities of a Software Project Manager – Project Planning – Metrics for Project Size Estimation – Project Estimation Techniques – Empirical Estimation Techniques – COCOMO – Halstead's Software Science – Staffing Level Estimation – Scheduling– Organization and Team Structures – Staffing – Risk Management – Software Configuration Management.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Software Design:** Outcome of the Design Process – Characteristics of a good software design – Cohesion and Coupling -Layered Arrangement of Modules- Function Oriented Design – Object Oriented Design. **Function Oriented SoftwareDesign**: Structured Analysis-Structured Design-Detailed Design-Design Review.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**Software Testing:** Basic concepts and Terminologies – Design Test Cases: Functional testing– Structural testing – Levels of testing: Unit testing, Integration Testing and System Testing – Debugging–Program Analysis tools-Some General Issues Associated with Testing: Regression testing. **Software Maintenance:** Characteristics of Software Maintenance – Software Reverse Engineering – Software Maintenance Process Models: Software Re-engineering.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self-Study for Enrichment:** (Not included for End SemesterExaminations) Requirement engineering -Strategy of Design-IEEE Recommended Practice for Software Design Descriptions - Reliability Estimation. Case Study: Student Result Management System.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Pankaj Jalote, (2005). *An Integrated Approach to Software Engineering*, 3rd Edition, Springer Science + Business Media. (**Unit: I**)
2. Rajib Mall,(2018).*Fundamentals of Software Engineering*,5thEdition, PHI Learning Private Limited. (**Unit: II - V**)

Reference Books

1. K.K.Aggarwal and Yogesh Singh,(2005). *Software Engineering*. Revised 2nd Edition, New Age International Publishers.
2. R.S.Pressman(2010).*A Practitioner's Approach-Software Engineering*. McGraw-Hill Higher Education.
3. Carlo Ghezzi.M, Jazayeri, D.Mandrioli (2010).*Fundamentals of Software Engineering*, PHI Publication

Web References

1. https://www.javatpoint.com/software-engineering-tutorial
2. https://onlinecourses.swayam2.ac.in/cec20_cs07/preview
3. https://onlinecourses.nptel.ac.in/noc19_cs69/preview
4. https://www.google.co.in/books/edition/FUNDAMENTALS_OF_SOFTWARE_ENGINEERING_FIF/-
5. https://www.google.co.in/books/edition/_/pJc3xKQfD-MC?hl=en&gbpv=1

Pedagogy

Chalk & Talk, PPT, Group Discussion, Seminar and Assignment

Course Designer

Dr.K.Reka

Semester: I	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
23PCS1DSE1B	**ADVANCED COMPUTER ARCHITECTURE**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To understand the micro-architectural design of processors
- To learn about the various techniques used to obtain performance improvement and power savings in current processors
- To gain knowledge in distributed and Parallel Computing Architecture

Prerequisites

Basic Knowledge about Microprocessor

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Remember and Understand the computer architecture	**K1, K2**
CO 2	Interpret and Experiment with different pipelined processor	**K2, K3, K5**
CO 3	Organize and Analyze the architectural features of advanced processors	**K3, K4**
CO 4	Examine and Evaluate the cache and memory related issues in multiprocessors	**K4, K5**
CO 5	Assess the historical and current developments in computer architecture and adopt to the needs	**K5, K6**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	3	3	3	3	3	3	3
CO 2	3	2	3	2	3	2	3	2	2	3
CO 3	2	3	2	3	2	3	3	3	3	3
CO 4	3	3	3	2	3	3	3	3	2	2
CO 5	2	3	3	3	2	2	3	3	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Fundamentals of Quantitative Design and Analysis:** Classes of Computers - Defining Computer Architecture-Trends in Technology, Power, Energy and Cost – Dependability- Measuring, Reporting, and summarizing Performance - Quantitative Principles of Computer Design	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Instruction-Level Parallelism:** Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Reducing Branch Costs with Advanced Branch Prediction - Overcoming Data Hazards with Dynamic Scheduling-Hardware-Based Speculation - Exploiting ILP Using Dynamic Scheduling, Multiple Issue, and Speculation	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Data-Level Parallelism in Vector SIMD and GPU Architectures:** Vector Architecture - SIMD Instruction Set Extensions for Multimedia -Graphics Processing Units- Detecting and Enhancing Loop-Level Parallelism	19	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Thread-Level Parallelism:** Centralized Shared-Memory Architectures-Performance of Symmetric Shared-Memory multiprocessor-Distributed Shared-Memory and Directory-Based Coherence-Synchronization-Models of Memory Consistency	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**Warehouse-scale Computers to Exploit Request Level and Data-Level Parallelism:**Programming Models and Workloads for Warehouse- Computer Architecture of Warehouse-Scale Computers – The Efficiency and cost of Warehouse-Scale Computers	17	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Historical Perspectives Quantitative Design and Analysis:** Limitations of Instruction-Level Parallelism and Its Exploitation-Fallacies and pitfalls of Data-Level Parallelism in Vector-Cross Cutting Issues in Thread - Level Parallelism-Using Energy Efficiency inside the server.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Book

1. John L Hennessey, David A Patterson (2019).*Computer Architecture A Quantitative Approach.* Sixth Edition, Morgan Kaufmann Elsevier.

Reference Books

1. Kai Hwang, Faye Brigg(2000). *Computer Architecture And Parallel Processing*. International Edition, McGraw-Hill.
2. SimaD, Fountain T, Kacsuk P(2000). *Advanced Computer Architectures: A Design Space Approach*. Addison Wesley.

Web References

1. www.cs.iiie.edu.in/
2. https://passlab.githlub.io/CSE565/note

Pedagogy

Chalk and talk & Seminar

Course Designer

Ms. A. Jabeen

Semester: I	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
23PCS1DSE1C	**ADVANCED DATABASE SYSTEMS**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To inculcate knowledge in Transaction Management with ACID properties
- To learn about advanced concepts of Database Management System
- To gain Knowledge in Information retrieval using XML and Internet Databases

Prerequisites

Basic knowledge about Relational Database Management Systems.

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Remember and Understand the concepts of databases	**K1, K2**
CO2	Demonstrate and make use of different kinds of databases	**K2, K3**
CO3	Identify and analyze databases for real life applications	**K3, K4**
CO4	Compare and evaluate the performance of databases based on its transaction and concurrency control feature	**K4, K5**
CO5	Interpret and develop parallel, distributed, object oriented And advanced databases for handling real time data	**K5, K6**

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	2	3	2	3	3	3	2	2	3
CO3	2	3	2	3	2	3	3	3	3	3
CO4	3	3	3	2	3	2	3	3	2	2
CO5	2	3	3	3	2	3	3	3	3	3

"1"–Slight (Low) Correlation
"2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation
"-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Transactions Management:** Transaction Concepts – A Simple Transaction Model - Transaction Atomicity and Durability – Transaction Isolation- Serializability Transaction Isolation and Atomicity. **Concurrency Control:** Lock based Protocols – Deadlock Handling – Multiple Granularity – Timestamp - Based Protocols – Validation - Based Protocols.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Parallel Databases:** I/O Parallelism – Interquery Parallelism - Intraquery Parallelism - Intraoperation Parallelism-Interoperation Parallelism- Query Optimization - Design of Parallel Systems - Parallelism on Multicore Processors	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Distributed Databases:** Homogeneous and Heterogeneous Databases – Distributed Data Storage - Distributed Transactions - Commit Protocol – Concurrency Control in Distributed Databases- Availability - Distributed Query Processing- Heterogeneous Distributed Databases-Cloud Based Databases - Directory Systems	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Object Based Databases:** Complex Data Types – Structured types and Inheritance in SQL – Table Inheritance - Array and Multiset Types in SQL – Object Identity and Reference Types in SQL - Implementing O-R features–Object Relational Mapping - Object-Oriented versus Object-Relational.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**XML: Extensible Markup Language:** Structured, Semi Structured and Unstructured Data – XML Hierarchical (Tree) Data Model – XML Documents, DTD, XML Schema - Storing and Extracting XML documents from Databases–XML Languages - Extracting XML documents from Relational Databases.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Case Studies:** SQL - MYSQL -Oracle - PostgreSQL- NOSQL -DynamoDB- MongoDB .	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Books

1. Abraham Silberschatz., Henry F. Korth. S. Sudarshan (2013). *Database System Concepts*.6thEdition, McGraw Hill.**(Unit I - IV)**
2. Ramez Elmasri, Shamkant. B. Navathe (2015). *Fundamentals of Database Systems.* 6th Edition, Pearson Education.**(Unit V)**

Refernce Books

1. Thomas Connolly, Carolyn Begg. (2015). *Database Systems, A Practical Approach to Design, Implementation and Management*. 6thEdition, Pearson Education.
2. Raghu Ramakrishnan, Johannes Gehrke. (2007). *Database Management System*. 3rd Edition, McGraw Hill Higher Education.

Web References

1. https://www.exploredatabase.com/p/advanced-database-concepts
2. https://www.wideskills.com/introduction-to-database

Pedagogy

Chalk and talk, Lecture, Discussion, Quiz, Demonstration, and PPT

Course Designer

Ms. R. Sridevi

SEMESTER II

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2CC4	**DATA MINING AND WAREHOUSING**	**CORE**	**6**	**5**

Course Objective

- Able to understand the data sets and data preprocessing
- Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification, clustering and regression
- Exercise the data mining techniques with varied input values for different parameters
- Ability to apply mining techniques for realistic data
- To prepare the students for building career in data warehousing and data mining areas

Prerequisites

Basic knowledge in Probability, Programming Languages and Database concepts

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Recognize the basic concepts and functionality of data mining and warehousing.	K1, K2
CO 2	Identify and Choose appropriate data mining techniques	K2, K3
CO 3	Apply and Analyse the suitable solution to the problem	K3, K4
CO 4	Build and Justify the results produced by data mining	K3, K5
CO 5	Categorize and evaluate skills in selecting the appropriate data mining algorithm for solving practical problems	K4, K5

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	2	2	3	3	3	2	2
CO2	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1"-Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"-Substantial (High) Correlation "-"-indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction**: Data mining – Kinds of data to be mined– Kinds of patterns to be mined– Kinds of Applications to be targeted-Major Issues in Data mining –**Data mining Trends and Research Frontiers:** Other Methodologies – Data mining Applications –Data mining Trends.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
II	**Data Pre-Processing**: Data Cleaning–Data Integration-Data Reduction: Overview of Data Reduction Strategies – Wavelet Transforms – Principle Component Analysis – Attribute Subset Selection –Data Transformation and Data Discretization: Data Transformation Strategies Overview – Data Transformation by Normalization. **Mining Frequent Patterns, Associations and Correlations**: Basic concepts – Frequent Itemset Mining Methods- Pattern Evaluation Methods.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
III	**Advanced Pattern Mining**: Pattern Mining: A Road Map – Pattern Mining in Multilevel, Multidimensional Space-Constraint-Based Frequent Pattern Mining. **Data Warehousing**: Basic Concepts – Data Warehouse Modeling: Data cube and OLAP – Data Warehouse Design and usage.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
IV	**Classification:** Basic concepts- Decision Tree Induction - Bayes Classification Methods – Rule Based Classification – Model Evaluation and Selection-Techniques to improve Classification Accuracy - Classification using Frequent Patterns.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
V	**Cluster analysis**: **Basic concepts and methods –** Cluster analysis – Partitioning methods - Hierarchical Methods – Density Based Methods-Grid Based Methods-Evaluation of Clustering.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Classification**: **Advanced Methods**: Classification by Back Propagation – Support Vector Machines –K - Nearest-Neighbor Classifiers – Genetic algorithms. **Advanced Cluster Analysis**: Clustering High Dimensional data. **Outlier Detection**: Outlier and Outlier Analysis.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5, K6

Text Book

1. Jiawei Han, Micheline Kamber, JianPei. (2019).*Data Mining: Concepts and Techniques*.Third Edition, Morgan Kaufman Publishers.

Reference Books

1. Margaret H. Dunham. (2006).*Data Mining Introductory and Advanced Topics*. Pearson Education.
2. C. S. R. Prabhu (2010). *Data Warehousing: Concepts, Techniques, Products and Applications*, Second Edition, PHI Learning Private Ltd.
3. K.P.Soman, Shyam Diwakar, V.Ajay. (2010).*Insight into Data Mining Theory andPractice*. First Edition, PHI Learning Private Ltd.

Web References

1. www.tutorialride.com/data-mining/data-mining-tutorial.htm
2. https://hanj.cs.illinois.edu/bk3/bk3_slidesindex.htm
3. www.guru99.com/datawarehouse-architecture.htm
4. www.tutorialpoint.com/dwh/dwh_data_warehousing.htm

Pedagogy

Chalk and Talk, Group discussion, Seminar& Assignment.

Course Designer

Ms**.** S. Udhaya Priya

Semester: II	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS3CC6 / 23PCS2CC5	**COMPILER DESIGN**	**CORE**	**6**	**5**

Course Objective

- To enrich the knowledge in various development phases of compiler and its uses
- To learn Code optimization techniques, machine code generation and use of symbol table
- To identify the similarities and differences among various parsing techniques and grammar transformation techniques

Prerequisites

Basic Knowledge in Programming Languages, Data Structures and Discrete Mathematics

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO1	Understand the structure of compiler, applications of finite automata, regular expressions, Grammar and identify the significance of different phases of the compiler.	K1, K2
CO2	Demonstrate the construction of finite automaton, various parsing, intermediate, target code generation and code optimization techniques.	K2
CO3	Construct the finite automaton, various parsing tables and develop intermediate and target code by using storage Allocation strategies.	K3, K4
CO4	Analyze and explain the relationship among the phases of compiler, various parsing and code optimization techniques	K4, K5
CO5	Assess and Recommend tools, methods, and techniques to build compiler	K4, K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	2
CO4	3	3	3	3	2	3	3	3	3	2
CO5	3	3	3	3	2	3	3	3	3	2

"1"– Slight (Low) Correlation
"2" – Moderate (Medium) Correlation
"3"– Substantial (High) Correlation
"-"indicates there is no correlation

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction** to Compiler– The Structure of a Compiler – **Lexical Analysis:** The Role of the Lexical Analyzer – Specification of Tokens–Finite Automata- Nondeterministic Finite Automata- Deterministic Finite Automata- From Regular Expressions to Automata-Conversion of an NFA to a DFA-Construction of an NFA from Regular Expression	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Syntax Analysis**: The Role of the Parser-Context Free Grammars-Verifying the language generated by a grammar-Context Free Grammars versus Regular Expressions-Writing a Grammar-Eliminating ambiguity -Elimination of Left Recursion-Left Factoring – Top-Down Parsing-Recursive Descent Parsing – Nonrecursive Predictive Parsing- Bottom-Up Parsing- Shift-Reduce Parsing	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	LR Parsers- The LR-Parsing algorithm-Constructing SLR Parsing tables-Canonical LR(1) Parsing tables-Constructing LALR Parsing tables. **Syntax-Directed Translation:** Inherited and Synthesized Attributes – Dependency Graphs – S-Attributed Definitions – L-Attributed Definitions – Construction of syntax trees- Syntax Directed Translations Schemes	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Intermediate-Code Generation:** Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type Checking - Control Flow – Back patching - Switch Statements – Intermediate Code for Procedures.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Code Generation**: Issues in the design of a Code Generator - Basic Blocks and Flow graphs– Optimization of Basic Blocks- The DAG Representation of Basic Blocks - Peephole Optimization	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment:** **(Not included for End Semester Examinations)** Compiler Construction tools -Input buffering- Recognition of tokens- Symbol Tables - Lexical analyzer Generator Lex-Parser Generator YACC. Error recovery in Parsing – Run time Environments- Storage organization- The target machine - A simple code generator.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman,(2013). "*Compilers - Principles, Techniques and Tools*", Second Edition, Pearson Education.

Reference Books

1. Kennath C. Louden,(2006). "*Compiler Construction: Principles and Practice",* Vikas publishingHouse.
2. S. Godfrey Winster, S.Aruna Devi, R.Sujatha,(2020). "*Compiler Design*", Second Edition, Yesdee Publishers.
3. Raghavan V, (2017). "*Principles of Compiler Design*" Tata McGraw Hill Education Pvt. Ltd.

Web References

1. https://www.geeksforgeeks.org/introduction-of-finite-automata/
2. https://www.slideshare.net/appasami/cs6660-compiler-design-notes?next_slideshow=1
3. https://www.javatpoint.com/lr-parser
4. https://www.tutorialspoint.com/compiler_design/compiler_design_phases_of_compiler.htm
5. https://byjus.com/gate/intermediate-code-generation-in-compiler-design-notes/
6. https://www.youtube.com/watch?v=F9ZoFP7D474
7. https://www.codingninjas.com/codestudio/library/code-generation-4403

Pedagogy

Chalk & Talk, PPT, Group Discussion, Seminar and Assignment

Course Designer

Ms. K. Sangeetha

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2CCC1A	**MOBILE COMPUTING**	**CORE CHOICE**	**6**	**4**

Course Objective

- To understand Wireless networks GSM, UMTS and WAP Architecture
- To gain basic knowledge about Android Application Development
- To create real time application using Content Providers

Prerequisites

Java, Computer Fundamentals and Networking

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Define and Outline the Mobile Computing frameworks	**K1, K2**
CO 2	Demonstrate the network concepts and Identify Routing protocols	**K2, K3**
CO 3	Identify and Analyze the basics of Android Programming	**K3, K4**
CO 4	Examine and Assess the Interfaces for the Android platform	**K4, K5**
CO 5	Explain and Build the key Android programming concepts	**K5, K6**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	3	2	3	3	3	2	3
CO 2	3	3	3	3	3	3	3	2	3	3
CO 3	3	3	3	3	3	3	3	3	2	3
CO 4	3	3	3	2	3	3	2	3	3	3
CO 5	3	3	2	2	3	3	3	2	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-" indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction:** Applications- Simplified Reference Model – **Wireless Transmission:** Signal Propagation-Path Loss of Radio Signals-Multipath Propagation-Multiplexing – Modulation- Cellular Systems-**Telecommunication Systems:** GSM – System Architecture- Handover – Security. **Satellite Systems:** Applications– Basics.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Wireless LAN:** Advantages- Disadvantages- Design Goals- IEEE 802.11 – System Architecture-MAC Frames – MAC Management –Synchronization - Power Management – Roaming -Bluetooth - Architecture. **Mobile Network Layer:** Mobile IP-Goals –Entities and Terminology–IP Packet Delivery –Agent Advertisement and Discovery-Registration – Adhoc Networks – Routing - Routing Strategies-Destination Sequence Distance Vector – Dynamic Source Routing- Hierarchical Algorithms - Alternative Metrics.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Getting started with Android Programming:** Introduction to Android – Obtaining the Required Tools-Creating an Android Application-Anatomy of an Android Application. **Activities, Fragments, and Intents:** Understanding Activities-Applying styles and Themes to an activity-Hiding the activity title-Displaying a dialog window-Displaying a progress dialog-Linking Activities Using Intents –Resolving Intent Filter collision-Returning Intents from an Intent-Fragments.	21	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Getting to know the Android User Interface**: Understanding the Components of a Screen-Adapting to Display Orientation - Managing Changes to Screen Orientation -**Designing user interface with views**: Using Basic Views - Using Picker Views-Using List Views to Display Long Lists.	21	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Displaying Pictures and Menus with Views**: Using Image views to display Pictures-Some additional views. Content Providers: Sharing Data in Android-**Messaging**: SMS Messaging-Sending SMS messages programmatically- Getting feedback after sending a message-Receiving SMS message- Sending E-mail– **Location Based Services**: Displaying Maps	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Data Persistence:** Creating and using databases**.** **Content Providers:** Sharing data in Android-Using Content Provider. **Developing Android services:** Creating own services-Establishing communication between a service and an activity-Binding activity to services.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Jochen H.Schiller.(2014). *Mobile Communications*.2nd Edition, Addison Wesley Pearson Education.
2. Wei Meng Lee.(2012). *Beginning Android 4 Application Development*.1st Edition, Wiley India Pvt Ltd.

Reference Books

1. Raj Kamal.(2012),*Mobile Computing*,2nd Edition, Oxford University Press.
2. Asoke K Talukder, Hasan Ahmed, Roopa R Yavagal(2010).*Mobile Computing*. 2nd Edition, Tata McgrawHill Publishing Company Limited.

Web References

1. https://www.tutorialspoint.com/gsm/gsm_architecture.html
2. https://www.geeksforgeeks.org/advantages-and-disadvantages-of-wlan
3. http://developer.android.com/guide/
4. http://developer.android.com/reference/packages.html

Pedagogy

Chalk and Talk, Lecture, Group Discussion, e-Contents-Power point, Demonstration

Course Designer

Ms.K.Pradeepa

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2CCC1B	**WIRELESS SENSOR NETWORKS**	**CORE CHOICE**	**6**	**4**

Course Objective

- To get a thorough knowledge about sensors and its architecture
- To learn the characteristics of wireless transmission
- To understand the working of MAC and Routing Protocols for sensor networks
- To gain knowledge in Transport layer, QoS and Security for sensor networks

Prerequisites

Basic knowledge in Data Communication Networks

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	List and Summarize the applications, challenges of wireless sensor networks	**K1, K2**
CO 2	Interpret and Make use of the architecture for the wireless networks	**K2, K3**
CO 3	Apply and Correlate the concepts in sensor networking	**K3, K4**
CO 4	Categorize and compare the different routing protocols	**K4, K5**
CO 5	Evaluate and Conclude the QoS in wireless networks	**K5**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	3	2	3	3	3	2	3
CO2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	2	3	3	2	3	3	3
CO5	3	3	2	2	3	3	3	2	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction:** Application Examples-Types of Applications -Challenges for Wireless Sensor Networks-Why are sensor networks different-**Single-node architecture**: Hardware components	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Single-Node Architecture:** Energy Consumption of Sensor Nodes - Operating Systems and Execution Environments- **Network Architecture**: Sensor Network Scenarios-Design principles of WSNs.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**MAC Protocols:** Fundamentals of MAC Protocol - Low Duty Cycle Protocols and Wakeup Concepts-Contention-based protocols -The IEEE 802.15.4 MAC protocol	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Routing protocols:** Energy efficient unicast-Broadcast and multicast-Geographic routing. **Data-centric and content based Networking:** Data centric routing	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Transport Layer and Quality of Service:** QoS-Transport protocols-Sensing models-Coverage measures-Reliable data transport-Single packet delivery-Congestion situations in sensor networks. **Advanced application support**: Security Fundamentals-Security considerations in wireless sensor networks -DoS Attacks	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Link Layer Protocols:** Fundamentals-Tasks and requirements-Error control-Framing-Link Management	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. Holger Karl, Andreas Willig (2015). *Protocols and Architectures for Wireless Sensor Networks.* Student Edition, John Wiley & Sons.

Reference Books

1. Waltenegus Dargie, Christian Poellabauer (2010). *Fundamentals of Wireless Sensor Networks Theory and Practice.*1st Edition, John Wiley and Sons.
2. Xiang-Yang Li (2008). *Wireless Ad Hoc and Sensor Networks: Theory and Applications*. Illustrated Edition, Cambridge University Press.
3. Feng Zhao, Leonidas J.Guibas (2007).*Wireless Sensor Networks-An Information Processing*. 1st Edition, Elsevier.
4. Kazem Sohraby, Daniel Minoli,TaiebZnati (2007). *Wireless Sensor Networks Technology, Protocols, and Applications*. Student Edition, John Wiley and sons.
5. Anna Hac (2003). *Wireless Sensor Network Designs.*1st Edition, John Wiley and sons.

Web References

1. https://www.intechopen.com/chapters/38793
2. https://www.geeksforgeeks.org/wireless-sensor-network-wsn/
3. https://nptel.ac.in/courses/106105160
4. http://www.tfb.edu.mk/amarkoski/WSN/Kniga-w02

Pedagogy

Chalk and Talk, PPT, Discussion, Assignment, Quiz and Seminar

Course Designer

Dr. D. Radhika

Semester II	Internal Marks: 25		External Marks:75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2CCC1C	**MANET**	**CORE CHOICE**	**6**	**4**

Course Objective:

- To understand the principles of adhoc networks
- To get a knowledge of routing protocols and their performance
- To gain knowledge about battery management schemes
- To identify the issues and solutions of transport layer

Prerequisites

Computer Networks

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Recall and Understand the fundamentals of Mobile ad-hoc Networks.	**K1, K2**
CO 2	Identify and analyze the current features of MANET and WSN	**K3, K4**
CO 3	Determine and Classify the functions of various routing protocols and their implications	**K3, K4**
CO 4	Identify the issues of architecture and its protocol, and Design solutions to overcome the issues	**K3, K5**
CO 5	Discriminate the current trends in MANETs and WSNs from industry and research point of views.	**K5**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	3	3	3	1	3	3	2	3	1
CO2	2	3	3	2	2	3	3	2	3	2
CO3	2	3	3	2	2	3	2	2	2	2
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction:** Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio Propagation Mechanisms – Characteristics of the Wireless Channel – IEEE 802 Networking Standard – **Ad Hoc Networks:** Introduction – Issues in Ad Hoc Wireless Networks – Ad Hoc Wireless Internet	14	CO1, CO2, CO4, CO5	K1, K2, K3, K4 K5
II	**Routing Protocols for Ad Hoc Wireless Networks:** Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols – Table–Driven Routing Protocols – On-Demand Routing Protocols - Hybrid Routing Protocols.	16	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Multicast Routing in Ad Hoc Wireless Networks:** Issues in Designing a Multicast Routing Protocol – Classifications of Multicast Routing Protocols – Tree–Based Multicast Routing Protocols– Mesh–Based Multicast Routing Protocols– Energy–Efficient Multicasting.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Transport layer and Security Protocols for Ad Hoc Wireless Networks:** Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks - Classification of Transport Layer Solutions – Network Security Requirements - Security in Ad Hoc Wireless Networks - Network Security Attacks - Secure Routing in Ad Hoc Wireless Networks – **Quality of Service in Ad Hoc Wireless Networks:** Network Layer Solutions	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Energy Management in Ad Hoc Wireless Networks:** Battery Management Schemes-Transmission Power Management Schemes-**Recent advances in Wireless Networks:** Ultra-Wide-Band Radio Communication-Wireless Fidelity Systems.	20	CO1, CO2, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Wireless Sensor Networks:** Sensor Network Architecture – Data Dissemination – Data Gathering – MAC Protocols for Sensor Networks – Location Discovery – Quality of Sensor Networks – Evolving Standards – Other Issues.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. C.Siva Ram Murthy, B.S.Manoj (2014).*Ad hoc Wireless Networks Architectures and protocols.* Pearson Education.

Reference Books

1. Stefano Basagni, Marco Conti, Silvia Giordano (2015). *Mobile Ad Hoc Networking: The Cutting Edge Directions*. 2nd Edition, Wiley India.
2. Mohamad Taha Sultan (2018). *Wireless Technologies in Mobile Ad-Hoc Networks.* Globe Edit.

Web References

1. https://www.tutorialspoint.com/what-is-ad-hoc-network
2. https://www.javatpoint.com/mobile-adhoc-network
3. https://www.geeksforgeeks.org/introduction-of-mobile-ad-hoc-network-manet/
4. http://et.engr.iupui.edu/~dskim/manet/

Pedagogy

Chalk and Talk, Group discussion, Seminar & Assignment

Course Designer

Ms. R. Sangeetha

Semester II	Internal Marks: 40		External Marks: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2CC2P	**DATA MINING (P)**	**CORE**	**6**	**5**

Course Objective

- Exposure on Solving of data science problems
- Analyze real life data sets for analysis and prediction.
- Able to explore data using Python and R

Prerequisites

Data Mining, Python and R languages

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Interpret on data insights to evaluate preprocessing techniques	**K2**
CO 2	Identify various algorithms used in information analysis of data mining Techniques	**K3**
CO 3	Evaluate the performance of various data mining algorithms	**K5**
CO 4	Visualize the results produced by data mining techniques	**K6**
CO 5	Formulate library functions of Python and R	**K6**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	2	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	2	2

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Exercises

R

1. Built in functions
2. Operators
3. Looping statements
4. Reading and Writing Different Types of Datasets
5. Correlation and Covariance
6. Classification
7. Clustering
8. Visualizations

PYTHON

1. To compute central tendency and dispersion measures.
2. Implement python libraries.
3. Data Preprocessing
4. Implement Simple Linear and Multiple Linear Regressions.
5. Implement decision tree
6. Implement KNN
7. Implement K-means clustering
8. Implement Association Rule Mining

Web References

1. https://www.springboard.com/blog/data-science/data-mining-python-tutorial/
2. https://dzone.com/refcardz/data-mining-discovering-and
3. https://www.rdatamining.com/
4. https://edisciplinas.usp.br/pluginfile.php/

Pedagogy

Demonstration

Course Designer

Ms. S.Udhaya Priya

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2DSE2A	**CRYPTOGRAPHY AND NETWORK SECURITY**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To overview the principles of Network Security
- To inculcate the encryption standards and techniques
- To gain knowledge in establishing IP security

Prerequisites

Computer Networks

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Understand and state the Network security concepts	**K1, K2**
CO 2	Classify and apply network security principles	**K2, K3**
CO 3	Interpret and analyze network security protocols	**K3, K4**
CO 4	Examine and Defend network security threat	**K4, K5**
CO 5	Interpret with various network security applications	**K5**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	3	3	3	2	2	3	3	3	3	3
CO2	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	2	2	3	3	2	3	2
CO5	3	3	3	2	3	3	3	3	3	3

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Computer and Network Security concepts:** Computer security concepts-The OSI Security architecture-Security Attacks – Security Services – Security Mechanisms-A model for Network Security**. Classical Encryption Techniques**: Symmetric Cipher Model-Substitution Techniques -Transposition Techniques –Steganography.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Block Ciphers and the Data Encryption Standard:** Traditional Block Cipher Structure-The Data Encryption Standard-A DES Example -The Strength of DES-Block cipher design Principles- **Public key cryptography and RSA:** Principles of Public Key Cryptosystems – The RSA Algorithm.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Digital Signatures:** Digital signatures-**Mutual Trust**: X.509 Certificates-Public Key Infrastructure. **User Authentication:** Remote User-Authentication Principles-Remote User-Authentication Using Symmetric Encryption-Kerberos-Remote User-Authentication Using Asymmetric Encryption.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	**Network Access Control and Cloud Security:** Cloud Computing-Cloud Security Risks and Countermeasures. **Transport–Level Security:** Web Security Considerations-Transport layer Security**-Wireless Network Security:** Wireless Security – Mobile Device Security.	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Electronic Mail Security**: Internet Mail Architecture-Email Formats- S/MIME-Pretty Good Privacy - **IP Security**: IP Security Overview –IP Security Policy-Encapsulating Security Payload- Combining Security Associations.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **System Security:** Malicious Software: Viruses and Related Threats-Distributed Denial of Service Attacks. **Intruders:** Intrusion Detection – Password Management-**Firewalls**: Need for Firewalls-Types of Firewalls.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Book

1. William Stallings. (2017).*Cryptography and Network Security-Principles and Practices*. 7th edition,Pearson Education, New Delhi.

Reference Books

1. Behrouz.A.Forouzan(2020).Cryptography and Network Security.5th Edition. Tata McGraw Hill, New Delhi.
2. Atul Kahate (2017). *Cryptography and NetworkSecurity*.3rd Edition, Tata McGraw Hill, NewDelhi.
3. Charles P Fleeger, Shari Lawrence P Fleeger.(2011). *Security in Computing*. 4th Edition, Pearson Education, New Delhi.

Web References

1. https://www.open.edu/openlearn/science-maths-technology/computing-and ict/systems-computer/network-security/scs.carleton.ca/~paulv/5900wBooks.html
2. scs.carleton.ca/paulv/5900wBooks.html
3. https://en.wikipedia.org/wiki/Network_security
4. https://www.slideshare.net/HatemMahmoud/network-security-applications-4562405
5. https://www.intechopen.com/books/security-enhanced-applications-for-information-systems/cybersecurity-in-the-real-world

Pedagogy

Chalk and Talk ,PPT, Discussion, Assignment

Course Designer

Ms.G.Sujatha

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS/ WEEK**	**CREDITS**
22PCS2DSE2B	**BLOCKCHAIN AND CRYPTOCURRENCIES**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

- To assess blockchain applications in a structured manner
- To impart knowledge in block chain techniques and able to present the concepts clearly and structured
- To get familiarity with future currencies and to create own crypto token

Prerequisites

Basic knowledge in Cryptography, Data Structures, Distributed Systems and networking

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Understand the various technologies and its business use	**K1**
CO 2	Summarize the blockchain applications in a structured manner	**K2**
CO 3	Make use of the modern concepts of blockchain technology	**K3**
CO 4	Compare the modern currencies	**K4**
CO 5	Interpret the applications in real world scenario	**K5**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	2	3	2	2	2	2	2	2	2
CO2	2	2	3	2	2	2	2	2	2	2
CO3	3	2	3	2	2	2	2	2	3	2
CO4	3	2	2	2	2	3	2	2	2	2
CO5	2	2	2	3	3	3	2	2	2	2

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Basic Concepts:** Decentralized society - Distributed Database, Byzantine General problem - Fault tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete - P2P network - Private key - Public key - Cryptography - Hash Function - Digital Signature - ECDSA - Memory Hard Algorithm - Zero Knowledge Proof	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5
II	**Blockchain:** Introduction-Advantage over conventional distributed database - Network and protocols - Block chain network - Mining - Mechanism - Life Cycle of Block chain - Distributed consensus - Merkle Patricia Tree - Gas Limit - Transactions and Fee - Anonymity - Reward - Chain policy- Life of Block chain applications -Soft and Hard Fork - Private and Public blockchain.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5
III	**Distributed Consensus:** Nakamoto consensus - Proof of work - Proof of Stake - Proof of Burn - Difficulty level - Sybil Attack - Energy Utilization and alternate - Fabric model - SDKs - Components of Fabric Model - Architecture of Hyperledger fabric.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5
IV	**Cryptocurrency:** History - Distributed ledger - Bitcoin protocols - Mining strategy and rewards - Ethereum - construction - Truffle - DAO - dApps - Smart Contract - Boot strapping - GHOST Vulnerability - Attacks - Sidechain - Namecoin	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5
V	**Applications:** Payment Channels and State Channels - State Channels—Basic Concepts and Terminology - Simple Payment Channel Example-Routed Payment Channels- Bitcoin Transactions- Transaction Outputs and Inputs-Wallet Technology details	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Cryptocurrency Regulations**: Stakeholders - Roots and Bitcoin - Legal Aspects - Crypto currency exchange - Black market and Global economy	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3 K4, K5

Text Books

1. Daniel Drescher(2017). *Blockchain Basics A Non-Technical Introduction in 25 steps*, 1st Edition, Apress.
2. Andreas M.Antonopoulos.(2019). *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*.2nd Edition, O'REILLY.

Reference Books

1. Paul Vigna and Michael J.Casey (2016). *The Age of Cryptocurrency*, 1st Edition, Picador St.Martin's Press.
2. Imran Bashir (2018). *Mastering Blockchain*. 1st Edition, Packt, Birmingham.
3. David Hooper, Kevin Solorio (2019). *Hands–On Smart Contract Development with Solidity and Ethereum: From Fundamentals to Deployment*, 1st Edition, O'REILLY.
4. Chris Dannen (2017). *Introducing Ethereum and Solidity*, 1st Edition, Apress.

Web References

1. https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology
2. https://sjce.ac.in/wp-content/uploads/2021/12/Block-Chain-notes.pdf
3. https://mrcet.com/downloads/digital notes.pdf
4. https://www.ibm.com/in-en/topics/what-is-blockchain

Pedagogy

Chalk and Talk, Group discussion, Seminar & Assignment.

Course Designer

Dr. D. Radhika

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2DSE2C	**ETHICAL HACKING**	**DISCIPLINE SPECIFIC ELECTIVE**	**6**	**3**

Course Objective

- To understand and analyze information security threats and countermeasures
- To gain knowledge about security audit and testing
- To study the issues related to hacking and types of attacks

Prerequisites

Basic knowledge in Operating Systems, Networking and Programming Language

Course Outcome and Cognitive Level Mapping

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

CO Number	CO Statement	Cognitive Level
CO 1	Recall and Understand the vulnerabilities in hacking	**K1, K2**
CO 2	Analyze and apply testing for security	**K3, K4**
CO 3	Plan and Execute vulnerability assessment test for a network	**K4, K5**
CO 4	Assess the various kinds of standard attacks	**K5**
CO 5	Determine the target system vulnerability and make use of penetration test using standard hacking methods in an ethical manner	**K5**

Mapping of CO with PO and PSO

CO s	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO1	2	3	3	3	2	3	3	3	3	2
CO2	3	3	2	3	2	3	3	2	3	2
CO3	3	3	2	3	2	3	3	2	3	3
CO4	2	3	3	3	3	3	3	3	3	3
CO5	3	3	2	3	2	3	3	3	3	2

"1"–Slight (Low) Correlation "2"–Moderate (Medium) Correlation
"3"–Substantial (High) Correlation "-"indicates there is no Correlation.

Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	**Introduction to Hacking:** Important terminologies-Categories of Penetration Test-Writing Reports-Structure of a Penetration Testing Report-Vulnerability Assessment Summary-Risk Assessment-Methodology-**Linux Basics:** Major Linux Operating systems-File structure inside of Linux-Linux Scheduler(Cron Jobs)-Users inside of Linux-Common Applications of Linux-What is Back Track-Changing the Default Screen Resolution-Some Unforgettable basics-**Information Gathering Techniques**-Active Information Gathering-Passive Information Gathering-Sources of Information Gathering-Copying Websites Locally-Yougetsignal.com-Intercepting a Response-What Web-Netcraft-Some basic Parameters-TIP regarding Filetype-Xcode Exploit Scanner-Interacting with DNS Servers-Nslookup-DIG-Forward DNS Lookup with Fierce-Reverse DNS Lookup with fierce-What is DNS Cache Snooping-Automating DNS Cache Snooping Attacks-Problem with SNMP-Sniffing SNMP Passwords-SMTP Enumeration	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	**Vulnerability Assessment:** What are Vulnerability Scanners and how do they work?-Pros and Cons of a Vulnerability Scanner-Vulnerability Assessment with Nmap-Updating the database-Testing SCADA environments with Nmap-Nessus Vulnerability Scanner-Installing Nessus on Back Track-Adding a User-creating a new policy-Safe Checks-Silent Dependencies-Port Range **Network Sniffing:** Introduction-Types of sniffing-Hubs versus Switches-Promiscuous versus Non promiscuous Mode-MITM Attacks-ARP Protocol Basics-How ARP works-ARP Attacks- Denial of Service attacks-Tools of the trade-Using ARP Spoof to perform MITM Attacks-Hijacking Session with MITM Attack-Hijacking the session-DNS Spoofing-DHCP Spoofing	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	**Capturing Traffic:** Using Wireshark-ARP Cache Poisoning-DNS Cache Poisoning-SSL Attacks-SSL Stripping-**Password Attacks:** Password management-Online password attacks-offline password attacks-**Client Side Exploitation**-Bypassing filters with Metasploit payloads-Client side attacks-**Social Engineering:** Social Engineering toolkit-Spear Phishing attacks-Web Attacks-Mass E-mail attacks-Multipronged Attacks.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

IV	**Bypassing Antivirus Applications:** Trojans-How Antivirus application works-Microsoft Security essentials-Virustotal-Getting past an antivirus program-**Post Exploitation**: Meterpreter-Meterpreter scripts-Local privilege escalation-Lateral Movement-Pivoting Persistence-**Web Application Testing:** Using Burp proxy-SQL Injection-XPath Injection-Local file inclusion-Remote file inclusion-Command Execution-Cross Site Scripting-Cross site Request forgery-Web application Scanning with w3af.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Wireless Hacking:** Introduction-Requirements-Introducing Aircracks-ng-Uncovering Hidden SSIDs-Turning on the Monitor mode-Monitoring Beacon frames on Wireshark-Monitoring with Airodump-ng-Speeding up the process-Placing your wireless adapter in Monitor mode-Determining the target with Airodump-ng-Cracking a WPA/WPA2 Wireless Network using Aircrack-ng-Capturing packets-Capturing the Four way handshake-Cracking WPA/WPA2-Reducing the delay-**Web Hacking:** Attacking the authentication-Brute Force and Dictionary Attacks-Types of Authentication-Brute Force attack-SSRF Attack-impact-Server hacking-Finding the local root exploit-basic syntax-Updating the password-Finding a WHMCS Server-Symlinking the Configuration file.	18	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not included for End Semester Examinations)** **Using Kali Linux:** Linux Command Line-The Linux filesystem-User privileges-File permissions-Editing files-Data manipulation-Managing Installed Packages-Processes and Services-Managing Networking-Netcat: The Swiss Army knife of TCP/IP Connections	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Rafay Baloch(2014).*Ethical Hacking and Penetration Testing Guide*.1st Edition, CRC Press(for Unit I, II & V)
2. Georgia Weidman(2014).*Penetration testing: A hands-on introduction to hacking*.1st Edition, No Starch Press(for Unit III,IV & VI)

Reference Books

1. Stuttard, Dafydd and Marcus Pinto(2011). *The web application hacker's handbook: Finding andexploiting security flaws* . 2ndEdition, John Wiley & Sons.
2. Himanshu Sharma(2017).*Kali-linux Ethical Hacker's cook book: End-to-End penetration testing solution.*1st Edition, Packt Publishing.
3. Kimberly Graves(2010).*Certified Ethical Hacker Study Guide*.1st Edition, Wiley India Pvt Ltd.
4. Kevin Beaver.(2018). *Ethical Hacking for Dummies*. 6thEdition, Wiley

Web References

1. https://www.elsevier.com/books/
2. https://www.elsevier.com/books/cyber-security-awareness-forlawyers
3. https://books.google.co.in/books
4. https://www.coursera.org/specializations/ethical-hacking
5. https://nptel.ac.in/courses

Pedagogy

Chalk and Talk, Group discussion, Seminar & Assignment

Course Designer

Ms. S. Saranya

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**HOURS / WEEK**	**CREDITS**
22PCS2INT	**INTERNSHIP**	**INTERNSHIP**	**-**	**2**

- At the end of Semester I, the students should undergo an internship in a reputed IT company or IT division ofreputed company
- Minimum number of days for the internship is 15 days
- A project report and a certificate of attendance are to be submitted after completing the internship

EVALUATION PATTERN FOR INTERNSHIP

Internal Components	Marks	External Components	Marks
Institution Profile	5	Regularity	10
Presentation Skill	10	Problem solving	10
Report Evaluation	10	Participation and Hands – on training	20
		Professional Attitude	15
		Report Writing	20
Total	25	Total	75