



MUSLIM ARTS COLLEGE

(Accredited by NAAC with B+ grade & Affiliated to Manonmaniam Sundaranar University,
Tirunelveli; Recognized US 2(f) 12 (B) of UGC Act.)

Thiruvithancode, Kanyakumari District, Tamil Nadu - 629174.

DEPARTMENT OF COMPUTER SCIENCE

CBCS SYLLABUS

Learning Outcome-based Curriculum Framework for

COMPUTER SCIENCE (M.Sc.)

*Applicable for students admitted from June 2026 as per the Resolutions of the Academic Council Meeting held
on 01.06.2026*

Vision

To be a centre of excellence in computer science education and research, fostering innovation, technical expertise, and ethical values to meet global technological challenges

Mission

- To provide quality education in computer science and emerging technologies
- To develop programming, analytical, and problem-solving skills
- To promote research, innovation, and project-based learning
- To prepare students for careers in IT, industry, and entrepreneurship
- To encourage ethical practices and lifelong learning

Academic and Professional Attributes of the Graduates

1. Computational Knowledge and Technical Competence

Demonstrate advanced knowledge of Computer Science, including algorithms, programming, software engineering, databases, artificial intelligence, data science, computer networks, and emerging technologies.

2. Programming and Software Development Skills

Design, develop, test, and maintain efficient, reliable, and scalable software applications using modern programming languages, development tools, and computing platforms.

3. Analytical and Problem-Solving Skills

Analyze complex computational problems, apply appropriate algorithms and data structures, and develop innovative, efficient, and practical solutions.

4. Research and Innovation

Apply scientific methods and research methodologies to investigate computing problems, conduct independent research, and contribute innovative solutions in Computer Science and interdisciplinary domains.

5. Communication and Professional Skills

Communicate technical concepts effectively through oral presentations, technical reports, research papers, and professional documentation while working efficiently as an individual and in multidisciplinary teams.

6. Ethical, Legal, and Social Responsibility

Demonstrate professional ethics, integrity, cybersecurity awareness, and responsible use of technology while understanding the legal, social, and environmental impact of computing solutions.

7. Leadership and Teamwork

Exhibit leadership qualities, collaborative skills, project management abilities, and adaptability to work effectively in academic, industrial, and research environments.

8. Lifelong Learning and Adaptability

Engage in continuous learning to keep pace with advancements in Computer Science, emerging technologies, industry practices, and professional development.

9. Entrepreneurship and Employability

Develop the technical, managerial, and entrepreneurial competencies required for employment, higher education, research, startups, and innovation-driven enterprises.

10. Global Perspective

Understand global trends in information technology and computing, appreciate cultural diversity, and develop technology-driven solutions that address local, national, and global challenges.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Upon completion of the M.Sc. Computer Science Degree Programme, graduates are expected to	Mapping with Mission
PEO1	To prepare the students to understand the core concepts in Computer Science.	M1 & M2
PEO2	Enable students to develop problem-solving and programming skills in the recent technologies thereby developing strong employability.	M2 & M4
PEO3	Empower students to prepare themselves to engage in active research.	M3 & M5
PEO4	Enable students to pursue competitive exams at the National and state levels such as NET/SLET/GATE.	M1 & M5

Programme Outcomes (POs)

POs	Upon completion of the M.Sc. Computer Science Degree Programme, students will be able to	Mapping with PEOs
PO1: Computational Knowledge	Understand the basic foundations of Computer Science, Computing Fundamentals with Basic Mathematics.	PEO1
PO2: Problem Analysis	Analyze and identify customer requirements in multidisciplinary domains, create high-level designs and implement robust software applications using the latest technological skills.	PEO1, PEO2
PO3: Design and Development	Design and develop solutions for complex problems in various domains. Serve as the Programmers or the Software Engineers with sound knowledge of practical and theoretical concepts for developing software.	PEO1, PEO2, PEO3
PO4: Research Activity	Understand the fundamentals of research and inculcate the ability to undertake original research at the cutting edge of computer science & its related areas. Produce researchers who can investigate problems in different application domains and creatively develop, and evaluate computational solutions.	PEO3
PO5: Software tool usage	Adapt and apply modern computing skills and tools to resolve problems with software development tools, software systems, and modern computing platforms.	PEO2, PEO3
PO6: Professional ethics	Understand professional ethics and Cyber regulations and develop systems with social commitments.	PEO2, PEO4
PO7: Individual and Team Leadership	Capability to lead themselves and the team to achieve organizational goals.	PEO2, PEO4

Skill		
PO8: Decision Making Skill	Foster analytical and critical thinking abilities for data-based decision- making.	PEO2, PEO4
PO9: Social Responsibility	Access Social and Environmental issues for local and global needs and give relevant solutions to them.	PEO3, PEO4
PO10: Entrepreneurship	Identify opportunities for entrepreneurship by creating and adding value for the betterment of an individual and society at large.	PEO2, PEO4

Programme Specific Outcomes (PSOs)

PSOs	Upon completion of the M.Sc. Computer Science Degree Programme, students will be able to:	Mapping with POs
PSO1		PO1, PO2, PO8
PSO2	Familiarize the students with suitable software tools of computer science and industrial applications to handle issues and solve problems in mathematics or statistics and real time application related sciences.	PO1, PO2, PO3, PO4, PO5
PSO3	Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.	PO2, PO4, PO8
PSO4	Understand, formulate, develop programming model with logical approaches to a Address issues arising in social science, business and other contexts.	PO1, PO2, PO3, PO4, PO5
PSO5	Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Computer science and Industrial statistics.	PO2, PO3, PO4, PO5
PSO6	Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Computer Science or Applications or Information Technology and its allied areas on multiple disciplines linked with Computer Science.	PO1, PO4, PO5, PO8
PSO7	Equip with Computer science technical ability, problem solving skills, creative talent and power of communication necessary for various forms of employment.	PO2, PO5, PO6, PO7, PO10
PSO8	Develop a range of generic skills helpful in employment, internships& societal activities.	PO6, PO7, PO9, PO10
PSO9	Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of computing sciences.	PO4, PO8, PO9, PO10

Mapping of Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

POs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
PO1: Computational Knowledge	3	3	1	3	1	3	3	2	1
PO2: Problem Analysis	3	3	3	3	3	2	3	2	3
PO3: Design and Development	2	3	2	3	3	2	3	3	1
PO4: Research Activity	1	3	3	3	3	3	2	3	3

PO5: Software tool usage	1	3	2	3	3	3	3	3	2
PO6: Professional ethics	2	2	2	2	2	3	3	3	3
PO7: Individual and Team Leadership Skill	3	3	3	3	3	3	2	3	3
PO8: Decision Making Skill	3	2	3	2	2	3	3	2	3
PO9: Social Responsibility	3	2	2	3	3	1	3	3	2
PO10: Entrepreneurship	3	1	2	3	3	3	3	2	3

●3 – High Correlation

●2 – Moderate Correlation

●1 – Low Correlation

COURSES OFFERED

SEMESTER I

Part	Course Code	Title of the Course	Credits	Hours / Week
Core - I	NMCS11	Analysis & Design of Algorithms	4	5
Core – II	NMCS12	Object Oriented Analysis and Design & C++	4	5
Core – III	NMCS13	Python Programming	4	4
Elective - I	NECS11	Web Services	3	4
Elective – II	NECS12	Mobile Computing	3	4
Core Practical 1	NMCSP1	Algorithm Lab	3	4
Core Practical 2	NMCSP2	Python Lab	3	4
Total			24	30

SEMESTER I

CORE I: ANALYSIS & DESIGN OF ALGORITHMS

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NMCS11	Core	Y	-	-	Y	4	5	25	75	100

Pre-requisite

Basic Data Structures & Algorithms.

Learning Objectives

The course aims to:

1. Enable the students to learn the Elementary Data Structures and algorithms.
2. Presents an introduction to the algorithms, their analysis and design
3. Discuss various methods like Basic Traversal and Search Techniques, divide and conquer method, Dynamic programming, backtracking
4. Understood the various design and analysis of the algorithms.

Course Outcomes (COs)

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Get knowledge about algorithms and determine their time complexity. Demonstrate specific search and sort algorithms using the divide and conquer technique.	K1,K2
CO2	Gain a good understanding of the Greedy method and its algorithm.	K2,K3
CO3	Able to describe graphs using dynamic programming techniques.	K3,K4
CO4	Demonstrate the concept of backtracking & branch and bound technique.	K5,K6
CO5	Explore the traversal and searching technique and apply it to trees and graphs.	K6

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Units	Contents	No. of Hours
I	INTRODUCTION: Introduction - Algorithm Definition and Specification – Space Complexity- Time Complexity- Asymptotic Notations - Elementary Data Structure: Stacks and Queues – Binary Tree - Binary Search Tree - Heap – Heapsort- Graph.	15

II	TRAVERSAL AND SEARCH TECHNIQUES: Basic Traversal and Search Techniques: Techniques for Binary Trees-Techniques for Graphs - Divide and Conquer: - General Method – Binary Search – Merge Sort – Quick Sort.	15
III	GREEDY METHOD: The Greedy Method-General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.	15
IV	DYNAMIC PROGRAMMING: Dynamic Programming-General Method–Multistage Graphs–All Pair Shortest Path–Optimal Binary Search Trees – 0/1 Knapsacks – Traveling Salesman Problem – Flow Shop Scheduling.	15
V	BACKTRACKING: Backtracking -General Method–8-QueensProblem– Sum Of Subsets–Graph Coloring– Hamiltonian Cycles – Branch and Bound: - The Method – Traveling Salesperson.	15
	Total	75

S. No.	Text Book
1	Ellis Horowitz, “Computer Algorithms”, Galgotia Publications.
2	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

S. No.	Reference Books
1	Goodrich, “Data Structures& Algorithms in Java”, Wiley3rd edition.
2	Skiena,” The Algorithm Design Manual”, second edition, Springer,2008
3	Anany Levith,” Introduction to the Design and Analysis of Algorithm”, Pearson Education Asia, 2003.
4	Robert Sedgewick, Phillipe Flajolet,” An Introduction to the Analysis of Algorithms”, Addison-Wesley Publishing Company,1996.

S. No.	Web Resources
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

Mapping with Programme Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	2	3	2	3	3	3	3	3
CO2	2	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	1	2	3	3
CO4	3	3	3	3	3	2	3	3	2	3
CO5	3	3	3	3	3	3	2	3	3	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	2	3	3	3
Weightage	15	15	15	15	15	14	14	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	3.0	3.0	2.8	2.8	3.0	3.0

Core II: OBJECT-ORIENTED ANALYSIS AND DESIGN & C++

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NMCS12	Core	-	-	Y	Y	4	5	25	75	100

Pre-requisite

Basics of C++ and Object-Oriented Concepts

Learning Objectives

The course aims to:

1. Present the object model, classes and objects, object orientation, machine view and model management view.
2. Enables the students to learn the basic functions, principles and concepts of object-oriented analysis and design.
3. Enable the students to understand C++ language concerning OOAD

Course Outcomes

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Understand the concept of Object-Oriented development and modelling 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 concept of OOPs and familiarize students with writing C++ program.	K5,K6

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Units	Contents	No. of Hours
I	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 – Relationship among Objects.	15
II	CLASSES AND OBJECTS: Classes and Object: Nature of Class – Relationship Among classes – The Interplay of classes and Objects. Classification: The importance of Proper Classification –identifying classes and objects – Key Abstractions and Mechanism.	15
III	C++ INTRODUCTION: Introduction to C++-Input and output statements in C++-Declarations-control structures– Functions in C++.	15
IV	INHERITANCE AND OVERLOADING: Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion- Inheritance – Pointers and Arrays.	15
V	POLYMORPHISM AND FILES: Memory Management Operators-Polymorphism–Virtual Functions–Files–Exception Handling – String Handling -Templates.	15

	Total	75
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S. No.	Text Book
1	"Object Oriented Analysis and Design with Applications", Grady Booch, Second Edition, Pearson Education.
2	"Object-Oriented Programming with ANSI & Turbo C++", Ashok N.Kamthane, First Indian Print -2003, Pearson Education.

S. No.	Reference Books
1	Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition, 2003.

S. No.	Web Resources
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.h

Mapping with Programme Outcomes

3 – Strong, 2 – Medium, 1 – Low

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO/PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9	
CO1	3	3	3	3	2	2	3	2	3	3
CO2	2	3	3	3	3	2	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3
Weightage	15	14	14	15	1	1	1	1	1	
					5	4	5	5	5	
Weighted percentage of Course Contribution to POs	3.0	2.8	2.8	3.0	3.0	2.8	3.0	3.0	3.0	

Core III : PYTHON PROGRAMMING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NMCS13	Core	Y	-	-	Y	4	4	25	75	100

Pre-requisite

Basics of any OO Programming Language

Learning Objectives

The course aims to:

1. Presents an introduction to Python, creation of web applications, network applications and working in the clouds.
2. Use functions for structuring Python programs.
3. Understand different Data Structures of Python.
4. Represent compound data using Python lists, tuples and dictionaries.

Course Outcomes

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Understand the basic concepts of Python Programming.	K1,K2
CO2	Understand File operations, Classes and Objects.	K2,K3
CO3	Acquire Object Oriented Skills in Python.	K3,K4
CO4	Develop web applications using Python.	K5
CO5	Develop Client Server Networking applications.	K5, K6

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Unit	Contents	No. of Hours
I	INTRODUCTION : Python: Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets– Comparison.	12
II	CODE STRUCTURES : Code Structures: if, else if, and else – Repeat with while – Iterate with for – Comprehensions – Functions – Generators – Decorators – Namespaces and Scope – Handle Errors with try and except – User Exceptions.	12
III	MODULES, PACKAGES AND CLASSES : Modules, Packages, and Programs: Standalone Programs – Command-Line Arguments – Modules and the import Statement – The Python Standard Library. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super–Inself Defense –Get and Set Attribute Values with Properties –Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.	12
IV	DATA TYPES AND WEB : Datatypes: Text Strings–Binary Data, Storing and Retrieving Data: File Input/Output– Structured Text Files – Structured Binary Files - Relational Databases – NoSQL Data Stores. Web: Web Clients –Web Servers–Web Services and Automation	12
V	SYSTEMS AND NETWORKS : Systems: Files–Directories–Programs and Processes–Calendars and Clocks. Concurrency: Queues– Processes–Threads– Green Threads and event–twisted–Redis. Networks: Patterns – The Publish-Subscribe Model – TCP/IP – Sockets – Zero MQ –Internet Services – Web Services and APIs – Remote Processing – Big Fat Data and MapReduce – Working in the Clouds.	12
	Total	60

S. No.	Text Books
1	BillLubanovic, “Introducing Python”, O’Reilly, FirstEdition-SecondRelease,2014.
2	Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

S. No.	Reference Books
1	David M. Beazley, “Python Essential Reference”, Developer’s Library, Fourth Edition 2009.
2	Sheetal Taneja, Naveen Kumar, “Python Programming-A Modular Approach”, Pearson Publications.

S. No.	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	2	3	3	3
CO3	3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PO	PSO 1	PSO 2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	3	2	3	3	2	3	3
CO3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3
Weightage	15	15	15	14	15	15	14	15	15
Weighted percentage of Course Contribution toPOs	3.0	3.0	3.0	2.8	3.0	3.0	2.8	3.0	3.0

Elective I: WEB SERVICES

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NECS11	Elective-I	Y	-	-	Y	4	4	25	75	100

Pre-requisite

Basics of Distributed Computing

Learning Objectives

The course aims to:

1. Present the Web Services , Building real world Enterprise applications using Web Services with Technologies XML, SOAP , WSDL , UDDI
2. Get overview of Distributed Computing, XML, and its technologies
3. Update with QoS and its features
4. Develop Standards and future of Web Services.

Course Outcomes (COs)

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Understand web services and its related technologies.	K1,K2
CO2	Understand XML concepts.	K2,K3
CO3	Analyze on SOAP and UDDI model.	K4,K5
CO4	Demonstrate the road map for the standards and future of web services.	K5
CO5	Analyze QoS enabled applications in web services.	K5,K6

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Units	Contents	No. of Hours
I	INTRODUCTION: Introduction to web services – Overview of Distributed Computing- Evolution and importance of web services-Industry standards, Technologies and concepts underlying web services-Web services and enterprises-web services standards organization-web services platforms.	12
II	XML FUNDAMENTALS: XMLFundamentals–XMLdocuments-XMLNamespaces-XMLSchema–ProcessingXML.	12
III	SOAP MODEL: SOAP: The SOAP model- SOAP messages-SOAP encoding- WSDL: WSDL structure- interface definitions-bindings-services-Using SOAP and WSDL- UDDI: About UDDI- UDDI registry Specification- Core data structures-Accessing UDDI	12
IV	TECHNOLOGIES AND STANDARDS: Advanced web services technologies and standards: Conversations overview-web services conversation language-WSCL interface components. Workflow: business process management- workflows and workflow management systems Security: Basics-data handling and forwarding-	12

	data storage-errors-Web services security issues.	
V	QUALITY OF SERVICE: Quality of Service: Importance of QoS for web services-QoS metrics-holes-design patterns-QoS enabled web services-QoS enabled applications. Web services management-web services standards and future trends.	12
	Total	60

S. No.	Text Book
1	Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services: An Architects Guide", Prentice Hall, Nov 2003.
2	Keith Ballinger, "NET Web services: Architecture and Implementation with .Net", Pearson Education, First Edition, Feb 2003.

S. No.	Reference Books
1	RameshNagappan, "DevelopingJavaWebServices:Architectinganddevelopingsecure Web Services Using Java", John Wiley and Sons, first Edition Feb 2003.
2	Eric A Marks and Mark J Werrell, " Executive Guide to Webservices" ,John Wiley and sons, March 2003
3	Anne Thomas Manes, "Web Services :A managers Guide", AddisonWesley,June2003.

S. No.	Web Resources
1	https://www.tutorialspoint.com/webservices/index.htm
2	https://www.javatpoint.com/web-services-tutorial
3	https://www.btechguru.com/training--programming--xml--web-services--web-services-part-1-video-lecture--11801--24--147.html

Mapping with Programme Outcomes

ELECTIVE II: MOBILE COMPUTING

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NECS12	Elective - II	Y	-	-	Y	4	4	25	75	100

Pre-requisite

Basics of Mobile Communication

Learning Objectives

The course aims to:

1. Present the overview of Mobile Computing, Applications and Architecture.
2. Describe the futuristic computing challenges.
3. Enable the students to learn the concept of mobile computing.

Course Outcomes (COs)

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Understand the needs and requirements of mobile communication.	K1,K2
CO2	Focus on mobile computing applications and techniques.	K2,K3
CO3	Demonstrate satellite communication in mobile computing.	K4
CO4	Analyze wireless local loop architecture.	K5,K6
CO5	Analyze various mobile communication technologies.	K6

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Units	Contents	No. of Hours
I	INTRODUCTION: Introduction: Advantages of Digital Information - Introduction to Telephone Systems –Mobile Communication: Need for Mobile Communication – Requirements of Mobile Communication – History of Mobile Communication.	12
II	MOBILE COMMUNICATION: Introduction to Cellular Mobile Communication – Mobile Communication Standards –Mobility Management – Frequency Management – Cordless Mobile Communication Systems.	12
III	MOBILE COMPUTING: Mobile Computing: History of data networks – Classification of Mobile data networks - CDPD System – Satellites in Mobile Communication: Satellite classification – Global Satellite Communication – Change over from one satellite to another – Global Mobile Communication – Interferences in Cellular Mobile Communication.	12

IV	MOBILE COMMUNICATION SYSTEM: Important Parameters of Mobile Communication System – Mobile Internet: Working of Mobile IP – Wireless Network Security – Wireless Local Loop Architecture: Components in WLL – Problems in WLL – Modern Wireless Local Loop – Local Multipoint Distribution Service – Wireless Application Protocol.	12
V	COMMUNICATION TECHNOLOGY: WCDMA Technology and Fiber Optic Microcellular Mobile Communication – Ad hoc Network and Bluetooth technology – Intelligent Mobile Communication system – Fourth Generation Mobile Communication systems.	12
	Total	60

S. No.	Text Book
1	T.G. Palani velu, R. Nakkeeran, “Wireless and Mobile Communication”, PHI Limited, 2009.
2	Jochen Schiller, “Mobile Communications,” Second Edition, Pearson Education, 2007.

S. No.	Reference Books
1	Asoke K Talukder, Hasan Ahmed, Roopa Yavagal, “Mobile Computing”, TMH,2010.

S. No.	Web Resources
1	https://www.tutorialspoint.com/mobile_computing/index.htm
2	https://www.javatpoint.com/mobile-computing
3	https://nptel.ac.in/noc/courses/noc16/SEM2/noc16-cs13/

Mapping with Programme Outcomes

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	3	3	3	3	3	3	2	2	3
CO2	3	3	3	3	3	3	3	2	3	3
CO3	3	3	3	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	2	3	3

3 – Strong, 2 – Medium , 1 - Low

Mapping with Programme Specific Outcomes

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	2	3	3	3
CO5	3	3	3	3	3	3	3	3	3
Weightage	15	15	15	15	15	14	15	15	15
Weighted percentage of Course Contribution to POs	3	3	3	3	3	2.8	3	3	2.8

CORE LAB I: ALGORITHM LAB

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NMCSP1	Core	-	-	Y	Y	3	4	50	50	100

Learning Objectives

The course aims to:

1. This course covers the basic data structures like Stack, Queue, Tree, and List.
2. This course enables the students to learn the applications of the data structures using various techniques
3. It also enables the students to understand C ++ language concerning OOAD concepts
4. Application of OOPS concepts.

Course Outcomes

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Understand the concepts of object-oriented concerning C++	K1,K2
CO2	Able to understand and implement OOPS concepts	K3,K4
CO3	Implementation of data structures like Stack, Queue, Tree, and List using C++	K4,K5

CO4	Application of the data structures for Sorting and searching using different techniques.	K5,K6
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Bloom's Taxonomy Levels

K1 – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyse, **K5** – Evaluate, **K6** – Create

Course Content

LIST OF PROGRAMS
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 circular queue. 5) Write a program to sort an array of an elements using quick sort. 6) Write a program to solve number of elements in ascending order using heap sort. 7) Write a program to solve the knap sack problem using greedy method 8) Write a program to search for an element in a tree using divide& conquer strategy. 9) Write a program to place the 8 queens on an 8X8 matrix so that no two queens Attack. 10) Write a C++ program to perform Virtual Function

S. No.	Text Books
1	Goodrich, "Data Structures& Algorithms in Java", Wiley 3rd edition
2	Skiena," The Algorithm Design Manual", Second Edition, Springer,2008
S. No.	Reference Books
1	Anany Levith," Introduction to the Design and Analysis of Algorithm", Pearson Education Asia, 2003.
2	Robert Sedgewick, Phillipe Flajolet," An Introduction to the Analysis of Algorithms", Addison-Wesley Publishing Company,1996.

S. No.	Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
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

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO1	3	3	3	3	3	3	3	3	3	3
CO2	2	3	3	3	2	3	3	3	3	3
CO3	3	3	3	2	3	3	3	2	3	3
CO4	3	3	3	3	3	3	2	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO /PO	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PS O8	PS O9
CO1	3	3	3	3	3	3	2	3	3
CO2	3	3	3	2	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3
Weightage	15	15	15	14	15	15	14	15	15
Weighted percentage of Course Contribution to POs	3.0	3.0	3.0	2.8	3.0	3.0	2.8	3.0	3.0

CORE LAB II: PYTHON LAB

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
NMCSP2	Core	-	-	Y	Y	3	4	50	50	100

Pre-requisite

Basics of any OO Programming Language

Learning Objectives

The course aims to:

1. This course presents an overview of elementary data items, lists, dictionaries, sets and tuples
2. To understand and write simple Python programs
3. To Understand the OOPS concepts of Python
4. To develop web applications using Python.

Course Outcomes

Upon successful completion of the course, students will be able to:

CO No.	Course Outcomes	BT Level
CO1	Able to write programs in Python using OOPS concepts.	K1,K2
CO2	To understand the concepts of File operations and Modules in Python.	K2,K3
CO3	Implementation of lists, dictionaries, sets and tuples as programs.	K3, K4
CO4	To develop web applications using Python.	K5, K6

Bloom's Taxonomy Levels

K1 – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyse, **K5** – Evaluate, **K6** – Create

Course Content

LIST OF PROGRAMS
Implement the following in Python: 1. Programs using elementary data items, lists, dictionaries and tuples 2. Programs using conditional branches, 3. Programs using loops. 4. Programs using functions 5. Programs using exception handling 6. Programs using inheritance 7. Programs using polymorphism 8. Programs to implement file operations. 9. Programs using modules. 10. Programs for creating dynamic and interactive Web Pages using forms.

S. No.	Text Book
1	Bill Lubanovic, “Introducing Python”, O’Reilly, FirstEdition-SecondRelease,2014.
2	Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

S. No.	Reference Books
1	David M. Beazley, “Python Essential Reference”, Developer’s Library Fourth Edition,2009.
2	Sheetal Taneja, Naveen Kumar, ”Python Programming-A Modular Approach”, Pearson Publications.
NOTE: Latest Edition of Textbooks May be Used	

S. No.	Web Resources :Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1	https://www.programiz.com/python-programming/
2	https://www.tutorialspoint.com/python/index.htm
3	https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES (POs)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	1	1	1	2	1	1	2	1
CO2	2	2	3	2	1	2	1	2	2	1
CO3	1	2	3	2	1	2	1	1	3	2
CO4	2	2	3	2	1	2	1	3	2	1
CO5	1	2	2	1	1	2	2	2	3	3

3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES (POs)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	2	1	1	1	2	1	1	2
CO2	2	2	3	2	1	2	1	2	2
CO3	1	2	3	2	1	2	1	1	3
CO4	2	2	3	2	1	2	1	3	2
CO5	1	2	2	1	1	2	2	2	3
Weightage	8	10	12	8	5	10	6	9	12
Weighted Percentage of Course Contribution to POs	1.6	2.0	2.4	1.6	1.0	2.0	1.2	1.8	2.4