MANONMANIAM SUNDARANAR UNIVERISTY,
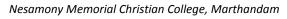TIRUNELVELI-12
SYLLABUS
UG - COURSES – AFFILIATED COLLEGES
Course Structure for M. Sc. Computer Science
(Choice Based Credit System)

(with effect from the academic year 2024-2025 onwards)

Semester-I				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	CORE I	ANALYSIS & DESIGN OF ALGORITHMS	VCSC11	4
III	CORE II	OBJECT ORIENTED ANALYSIS AND DESIGN & C++	VCSC12	4
III	CORE III	PYTHON PROGRAMMING	VCSC13	4
III	CORE PRACTICAL I	ALGORITHM LAB	VCSL11	3
III	CORE PRACTICAL II	PYTHON LAB	VCSL12	3
III	ELECTIVE I	ADVANCED SOFTWARE ENGINEERING	VCSE11	3
III	ELECTIVE II	ADVANCED COMPUTER NETWORK	VCSE15	3

Total Marks: 100   Internal Exam: 25 marks + External Exam: 75 marks

A. **Scheme for internal Assessment**:
Maximum marks for written test: **20 marks**
3 internal tests, each of **I hour** duration shall be conducted every semester.
To the average of the **best two** written examinations must be added the marks scored in. The **assignment** for 5 marks.

The break up for internal assessment shall be:
Written test- 20 marks; Assignment -5 marks   Total - 25 marks

B. **Scheme of External Examination**
3 hrs. examination at the end of the semester
A – Part : 1 mark question two - from each unit
B – Part : 5 marks question one - from each unit
C – Part : 8 marks question one - from each unit

➢ **Conversion of Marks into Grade Points and Letter Grades**

S.No	Marks	Letter Grade	Grade point (GP)	Performance
1	90-100	O	10	Outstanding
2	80-89	A+	9	Excellent
3	70-79	A	8	Very Good
4	60-69	B+	7	Good
5	50-59	B	6	Above Average
6	40-49	C	5	Pass
7	0-39	RA	-	Reappear
8	0	AA	-	Absent

➢ **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{\Sigma\,(GP \times C)}{\Sigma C}$$

- **GP** = Grade point, **C** = Credit
- CGPA is calculated only for Part-III courses
- CGPA for a semester is awarded on cumulative basis

➢ **Classification**
a) First Class with Distinction   : CGPA $\geq$ 7.5**
b) First Class   : CGPA $\geq$ 6.0
c) Second Class   : CGPA $\geq$ 5.0 and $<$ 6.0
d) Third Class   :   CGPA$<$ 5.0

ANALYSIS & DESIGN OF ALGORITHMS

Course Objectives:

The main objectives of this course are to:

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

Unit:1 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.

Unit:2 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.

Unit:3 GREEDY METHOD

The Greedy Method: -General Method–Knapsack Problem–Minimum Cost Spanning Tree– Single Source Shortest Path.

Unit:4 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.

Unit:5 BACKTRACKING

Version Backtracking: -General Method–8-QueensProblem–Sum Of Subsets–Graph Coloring– Hamiltonian Cycles – Branch and Bound: - The Method – Traveling Salesperson.

Unit:6 Contemporary Issues

Expert lectures, online seminars– webinars

Text Books

1. Ellis Horowitz, "Computer Algorithms", Galgotia Publications.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms".

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.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
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

OBJECT-ORIENTED ANALYSIS AND DESIGN & C++

Course Objectives:

The main objectives of this course are to:

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

Unit:1 OBJECT MODEL

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 – Relationship among Objects.

Unit:2 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.

Unit:3 C++ INTRODUCTION

Introduction to C++-Input and output statements in C++-Declarations-control structures– Functions in C++.

Unit:4 INHERITANCE AND OVERLOADING

Classes and Objects–Constructors and Destructors–operators overloading–Type Conversion- Inheritance – Pointers and Arrays.

Unit:5 POLYMORPHISM AND FILES

Memory Management Operators-Polymorphism–Virtual Functions–Files–Exception Handling – String Handling -Templates.

Unit:6 Contemporary Issues

Expert lectures, online seminars – webinars

Text Books

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.

Reference Books

1. Balagurusamy "Object Oriented Programming with C++", TMH, Second Edition,2003.

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

PYTHON PROGRAMMING

Course Objectives:

The main objectives of this course are to:

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

Unit:1 INTRODUCTION

Python: Introduction–Numbers–Strings–Variables–Lists–Tuples–Dictionaries–Sets–Comparison.

Unit:2 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.

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Unit:3 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.

Unit:4 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

Unit:5 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.

Unit:6 Contemporary Issues

Expert lectures, online seminars –webinars

Text Books

1. BillLubanovic, "Introducing Python", O'Reilly, FirstEdition-SecondRelease,2014.
2. Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

Reference Books

1. David M. Beazley, "Python Essential Edition, 2009. Reference", Developer's Library, Fourth
2. Sheetal Taneja, Naveen Kumar,Approach", Pearson Publications. "Python Programming-A Modular

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

CORE LAB I: ALGORITHM AND OOPS LAB

Course Objectives:

The main objectives of this course are to:

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

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 operation 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
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.

Text Books

1. Goodrich, "Data Structures& Algorithms in Java", Wiley 3rd edition.
2. Skiena," The Algorithm Design Manual", Second Edition, Springer,2008

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.

Related Online Contents [MOOC, SWAYAM, NPTEL, Web sites 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

CORE LAB II: PYTHON PROGRAMMING LAB

Course Objectives:

The main objectives of this course are to:

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

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.

Text Books

1. Bill Lubanovic, "Introducing Python", O'Reilly, FirstEdition-SecondRelease,2014.
2. Mark Lutz, "Learning Python", O'Reilly, Fifth Edition, 2013.

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.

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

ADVANCED SOFTWARE ENGINEERING

Course Objectives:

The main objectives of this course are to:

- Introduce Software Engineering, Design, Testing and Maintenance.
- Enable the students to learn the concepts of Software Engineering.
- Learn about Software Project Management, Software Design & Testing.

Unit:1 INTRODUCTION

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.

Unit:2 SOFTWARE REQUIREMENTS

Software Requirements Analysis and Specification: Requirement engineering – Type of Requirements – Feasibility Studies – Requirements Elicitation – Requirement Analysis – Requirement Documentation – Requirement Validation – Requirement Management – SRS - Formal System Specification – Axiomatic Specification – Algebraic Specification - Case study: Student Result management system. Software Quality Management –Software Quality, Software Quality
Management System, ISO 9000, SEI CMM.

Unit:3 PROJECT MANAGEMENT

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 – Miscellaneous Plan.

Unit:4 SOFTWARE DESIGN

Software Design: Outcome of a Design process – Characteristics of a good software design – Cohesion and coupling - Strategy of Design – Function Oriented Design – Object Oriented Design – Detailed Design - IEEE Recommended Practice for Software Design Descriptions.

Unit:5 SOFTWARE TESTING

Software Testing: A Strategic approach to software testing – Terminologies – Functional testing– Structural testing – Levels of testing – Validation testing - Regression testing – Art of Debugging– Testing Tools- Metrics-Reliability

Estimation. Software Maintenance -Maintenance Process – Reverse Engineering – Software Re-engineering - Configuration Management Activities.

Unit:6 Contemporary Issues
Expert lectures, online seminars –webinars

Text Books
1. An Integrated Approach to Software Engineering – Pankaj Jalote, Narosa Publishing House, Delhi, 3rd Edition.
2. Fundamentals of Software Engineering –Rajib Mall, PHI Publication,3rdEdition.

Reference Books
1. Software Engineering– K.K. Aggarwal and Yogesh Singh, New Age International Publishers, 3rd edition.
2. A Practitioner Approach-Software Engineering, - R.S. Pressman, McGraw Hill.
3. Fundamentals of Software Engineering Carlo Ghezzi, M Jarayeri, D. Manodrioli, PHI Publication.

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
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

ADVANCED COMPUTER NETWORKS

Course Objectives:
The main objectives of this course are to:
- Have a detailed knowledge of the concept of networks
- Know the idea of protocols, OSI layers and their functions.
- Get knowledge of protocols used in different layers.
- Know about the function of the Internet

Unit:1 INTRODUCTION
Introduction- data communications – networks – The internet – Protocols and standards – OSI model – layers in OSI model – TCP/IP protocol suite – addressing – guided media – Unguided media

Unit:2 DATA LINK LAYER
Switching – Circuit switched networks – datagram networks – virtual circuit networks – Framing – Flow and error control Multiple access – random access – wired Lan – wireless Lan – Cellular telephony – satellite networks

Unit:3 NETWORK LAYER

Network layer – IP V4 addressing – IPV6 addressing – ICMP – IGMP –Network layer delivery – forwarding – unicast and multicast routing protocols

Unit:4 TRANSPORT LAYER

Transport layer – Process to process delivery – UDP -TCP -Congestion – congestion control – QOS – Techniques to improve QOS

Unit:5 APPLICATION LAYER

Domain name system – name space – domain name space – distribution of name space – DNS in the internet – remote logging - email – file transfer -Network management system – SNMP Protocol

Text Books
1. Data communications and networking – Behrouz A Forouzan McGraw Hill 4th Edition 2015

Reprint

Reference Books
1. Computer Networks – Tenenbaum -Pearson -2022
2. Computer networking –Kurose James F, Ross Keith W -Pearson – 2017
3. Data and computer communications – William Stallings – Pearson 2017
4. Computer networks and Internet – Douglas E Comer – Pearson - 2018

Related Online Contents [MOOC, SWAYAM, NPTEL, Websites etc.]
1. https://nptel.ac.in/courses/106105080
2. https://www.tutorialspoint.com/computer-networks/index.asp
3. https://www.javatpoint.com/computer-network-tutorial