MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for B. Sc. Computer Science
(Choice Based Credit System)

(with effect from the academic year 2023-2024 onwards)

Semester-VI				
Part	**Subject Status**	**Subject Title**	**Subject Code**	**Credit**
III	CORE	COMPUTER NETWORKS	EMCS61	4
III	CORE	.NET PROGRAMMING	EMCS62	4
III	CORE	OPERATING SYSTEM	EMCS63	4
III	CORE	PRACTICAL: .NET PROGRAMMING LAB(ASP.NET)	EMCSP8	4
III	CORE	MAJOR PROJECT WITH VIVA VOCE	EMCS6P	4
III	ELECTIVE	ARTIFICIAL INTELLIGENCE/ ARTIFICIAL NEURAL NETWORK/ CYBER FORENSICS	EECS61/ EECS62/ EECS63	3
IV		NAAN MUTHALVAN / PROGRAMMING IN C		2
V		EXTENSION ACTIVITY NSS/NCC/YRC/RRC/SPORTS/OUT REACH PROGRAM	E5EA61	2

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)**

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

- **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

COMPUTER NETWORKS

Course Objective

- To learn the basic concepts of Data communication and Computer network
- To learn about wireless Transmission
- To learn about networking and data link layer.
- To study about Network communication.
- To learn the concept of Transport layer

UNIT I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs - Physical Layer – Theoretical Basis for Data Communication - Guided Transmission Media

UNIT II

Wireless Transmission - Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

UNIT III

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

UNIT IV

Network Layer - Design Issues - Routing Algorithms - Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

UNIT V

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transporet Protocols (ITP) - Network Security: Cryptography

Text Book

1. A.S. Tanenbaum, ―Computer Networks‖, 4th Edition, Prentice-Hall of India, 2008.

Reference Books

1. B.A. Forouzan, ―Data Communications and Networking‖, Tata McGraw Hill, 4th Edition, 2017
2. F. Halsall, ―Data Communications, Computer Networks and Open Systems‖, Pearson Education, 2008
3. D.Bertsekas and R. Gallagher, ―Data Networks‖, 2nd Edition, PHI, 2008.
4. Lamarca, ―Communication Networks‖, Tata McGraw- Hill, 2002

Web Resources

1. https://en.wikipedia.org/wiki/Computer_network
2. https://citationsy.com/styles/computer-networks

.NET PROGRAMMING

Course Objective

- To identify and understand the goals and objectives of the .NET framework and ASP.NET .
- To develop ASP.NET Web application using standardcontrols.
- To implement file handling operations.
- To handles SQL Server Database using ADO.NET.
- Understand the Grid view control and XML classes.

UNIT I

The .NET framework: The .NET Programming Framework - VB.NET, C# and the .NET languages- VB.NET versus VB Script and Visual Basic 6 - The Common Language Runtime - The .NET class library - ASP.NET - Visual Studio .NET - Learning the .NET languages: The .NET languages - Data types - Declaring variables - Scope and Accessibility - Variable operations - Object based manipulation - Conditional structures-Loop structures

UNIT II

Types objects and Namespaces: The basics about classes - Value types and reference types - Advanced class programming - Understanding namespaces and assemblies - Setting up ASP.NET and IIS: Web servers and you - IIS Manager - Installing ASP.NET - Migrating from ASP

UNIT III

ASP.NET Applications: ASP.NET Applications - Code Behind - The global .asax application file - Understanding ASP.NET classes - ASP.NET configuration - Web form fundamentals: A simple page applet - A deeper look at HTML control classes- Assessing HTML server controls

UNIT IV

Web controls: Stepping up to web controls - Web control classes - AutoPostBack and web control events - A simple web page applet - assessing web controls- Using Visual Studio .NET: The Promise of Visual Studio .NET - Starting a visual studio .NET project - The web form designer - Writing code.

UNIT V

Validation and Rich controls: Validation - A simple validation example - Understanding regular expressions - State Management: The problem of state - View state - Session state - Application state

Text Book

1. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015
2. SvetlinNakov, VeselinKolev& Co, Fundamentals of Computer Programming with C#,Faber publication,2019.

Reference Books

1. Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtechpres,2013.
3. Anne Boehm, Joel Murach, Murach's C# 2015, Mike Murach& Associates Inc.2016.
4. DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010,APRESS,2010.

Web Resources

1. https://www.geeksforgeeks.org/introduction-to-net-framework/
2. https://www.javatpoint.com/net-framework

OPERATING SYSTEM

Course Objective

- To acquire the fundamental knowledge of the operating system architecture and components and to know the various operations performed by the operating system.
- Understand the basic working process of an operating system.
- Understand the importance of process and scheduling.
- Understand the issues in synchronization and memory management.

Unit I

Introduction: What Operating system do? – Computer System Organization – Computer System Architecture – Operating System Structures- Operating System Operation. System Structures: Operating System Services – System Calls – System Programs – Operating System Design and Implementation- Operation System Generation- System Boot.

Unit II

Process Concept: Process Concept- Process Scheduling –Operation on Processes- Inter Process Communication- Example of IPC System – Communication in Client – Server system.

Process Scheduling: Basic concept-Scheduling criteria- Scheduling algorithm-Thread scheduling- Multiple Processor Scheduling-Real Time CPU Scheduling-Operating system example- Algorithm evaluation.

Unit III

Synchronization: Background - The Critical section problem-Peterson's solution - Semaphores – Classic problems of Synchronization. DeadLocks: System model-Deadlock Characterization- Methods for handling deadlocks- Deadlock Prevention-Deadlock Avoidance-Deadlock detection - Recovery from deadlock.

Unit IV

Memory Management: Background – Swapping - Contiguous Memory allocation – Segmentation – paging. **Virtual Memory Management**: Background - Demand paging - Copy and Write-page replacement-Allocation of Frames - Thrashing.

Unit V

File System: File Concept-Access Method-Directory and Disk Structure--File Sharing- Protection. **Implementing File System**: File System Structure - File System implementation- Directory implementation-Allocation Methods - Free Space Management. **Mass Storage Structure**: Overview of Mass Storage Structure-Disk Structure - Disk Scheduling - Disk Management.

Text Book:

1. Operating System Concepts – Abraham Silberscartz, Peter Baer Galvin, and Greg Gange. Addision Wesley Publishing Company – Ninth Edition.

Reference Books:

1. Operating System: Internal and Design Principles – Fifth Edition, William Stalling , PHI Learning Private Limited.
2. Understanding Operating Systems: Ida M.Flynn ,Ann MclverMcHoes.

PRACTICAL .NET PROGRAMMING LAB(ASP.NET)

Course Objective

- To develop ASP.NET Web application using standard controls.
- To create rich database applications
- To implement file handling operations.
- To implement XML classes.
- To utilize ASP.NET security features for authenticating the website

Programs

1. Create an exposure of web applications and tools
2. Implement the HTML controls
3. Implement the server controls
4. Web application using web controls
5. Web application using list controls

6. Web page design using rich control. Validate user input using validation controls.
7. Web application using data controls
8. Data base application to perform insert, update and delete operations.
9. Data base application using data controls to perform insert, delete, edit operation
10. Data base application using data controls to perform paging and sorting operation
11. Implement the XML classes 12.Online examination using ASP.NET controls

Text Book

1. SvetlinNakov, VeselinKolev& Co, Fundamentals of Computer Programming with C#, Faber publication,2019.
2. Mathew, Mac Donald, The Complete Reference ASP.NET, Tata McGraw-Hill,2015.

Reference Books

1. Herbert Schildt, The Complete Reference C#.NET, TataMcGraw-Hill,2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET 4.5 Black Book, Dreamtech pres,2013.
3. Anne Boehm, Joel Murach, Murach‘s C# 2015, Mike Murach& Associates Inc.2016.
4. DenielleOtey, Michael Otey, ADO.NET: The Complete reference, McGrawHill,2008.
5. Matthew MacDonald, Beginning ASP.NET 4 in C# 2010, APRESS, 2010.

Web Resources

1. https://www.geeksforgeeks.org/introduction-to-net-framework/
2. https://www.javatpoint.com/net-framework

Elective: **Artificial Intelligence/ Artificial Neural Network/ Cyber Forensics**

ARTIFICIAL INTELLIGENCE

Course Objective

- To learn various concepts of AI Techniques.
- To learn various Search Algorithm in AI.
- To learn probabilistic reasoning and models in AI.
- To learn about Markov Decision Process.
- To learn various type of Reinforcement learning.

UNIT I

Introduction: What is AI- The foundations of Artificial Intelligence- The history of Artificial Intelligence- The state of the art - Risks and benefits of AI Intelligent Agents: Agents and Environments- The nature of Environments - Specifying the task environment- Properties of task environments.

UNIT II

Solving Problems by Searching: Problem solving agents - Example Problems - Search algorithms - Uninformed search strategies : Breadth-first search, Dijkstra's algorithm or Uniform-cost search - Depth-first search and the problem of memory - Informed (Heuristic) Search Strategies: Greedy best-first search - A* search.

UNIT III

Learning from Examples: Forms of learning - Supervised learning - Example Problem: Restaurant waiting- Learning Decision Trees - Expressiveness of decision trees - Learning decision trees from example . Deep Learning : Introduction - Simple feed forward Networks- Networks as complex functions-Gradients and learning - Applications: Vision - Natural Language Processing.

UNIT IV

. Computer Vision: Introduction - Image formation - Simple Image features - Edges - Texture - Optical flow- Segmentation of natural images - Classifying images - Image classification with convolutional neural network - Detecting objects - Using computer vision - Understanding what people are doing - Linking pictures and Words

UNIT V

Robotics: Robots - Robot hardware - Types of robots from the hardware perspective - Sensing the world - Producing motion - What kind of problem is robotics solving - Humans and Robots-Coordination - Learning to do what humans want - Application Domains.

Text Book

1. Stuart Russell and Peter Norvig, ―Artificial Intelligence: A Modern Approach‖ , 3rd Edition, Prentice Hall.
2. Elaine Rich and Kevin Knight, ―Artificial Intelligence‖, Tata McGraw Hill

Reference Books

1. Trivedi, M.C., ―A Classical Approach to Artifical Intelligence‖, Khanna Publishing House, Delhi.
2. SarojKaushik, ―Artificial Intelligence‖, Cengage Learning India, 2011
3. David Poole and Alan Mackworth, ―Artificial Intelligence: Foundations for Computational Agents‖, Cambridge University Press 2010

Web Resources

1. https://github.com/dair-ai/ML-Course-Notes
2. https://web.cs.hacettepe.edu.tr/~erkut/ain311.f21/index.html
3. https://www.toolify.ai/?gclid=CjwKCAjwvdajBhBEEiwAeMh1U6tlqU1LXlRFbcghLMZVwICm_4PkIRcDRE-VYq_wTDcuaQeq_bCHnhoCcm4QAvD_BwE

ARTIFICIAL NEURAL NETWORKS

Learning Objectives

- Understand the basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks.
- Understand the Error Correction and various learning algorithms and tasks.
- Identify the various Single Layer Perception Learning Algorithm.
- Identify the various Multi-Layer Perception Network.
- Analyze the Deep Learning of various Neural network and its Applications.

UNIT I

Artificial Neural Model- Activation functions- Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms- Error correction - Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.

UNIT II

Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.

UNIT III

Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception, Learning in continuous perception. Limitation of Perception.

UNIT IV

Multi-Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta learning rule, Back propagation algorithm

UNIT V

Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzman Machines, Training of DNN and Applications

Text Book

1. Neural Networks A Classroom Approach- Satish Kumar, McGraw Hill- Second Edition.
2. ―Neural Network- A Comprehensive Foundation‖- Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.

Reference Books

1. Artificial Neural Networks-B. Yegnanarayana, PHI, New Delhi 1998.

Web Resources

1. https://www.w3schools.com/ai/ai_neural_networks.asp
2. https://en.wikipedia.org/wiki/Artificial_neural_network
3. https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12

CYBER FORENSICS

Learning Objectives

- Understand the definition of computer forensics fundamentals.
- To study about the Types of Computer Forensics Evidence
- Understand and apply the concepts of Duplication and Preservation of Digital Evidence
- Understand the concepts of Electronic Evidence and Identification of Data
- To study about the Digital Detective, Network Forensics Scenario, Damaging Computer Evidence.

UNIT I

Overview of Computer Forensics Technology: Computer Forensics Fundamentals: What is Computer Forensics Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of professional Forensics Methodology, Steps taken by Computer Forensics Specialists. Types of Computer. Forensics Technology: Types of Business Computer Forensic, Technology–Types of Military Computer Forensic Technology–Types of Law Enforcement–Computer Forensic. Technology–Types of Business Computer Forensic Technology.

UNIT II

Computer Forensics Evidence and capture: Data Recovery: Data Recovery Defined, Data Back–up and Recovery, The Role of Back –up in Data Recovery, The Data –Recovery Solution. Evidence Collection and Data Seizure: Collection Options, Obstacles, Types of Evidence,

UNIT III

Duplication and Preservation of Digital Evidence: Processing steps, Legal Aspects of collecting and Preserving Computer forensic Evidence. Computer image Verification and Authentication: Special needs of Evidential Authentication, Practical Consideration, Practical Implementation.

UNIT IV

Computer Forensics Analysis: Discovery of Electronic Evidence: Electronic Document Discovery: A Powerful New Litigation Tool. Identification of Data: Time Travel, Forensic Identification and Analysis of Technical Surveillance Devices.

UNIT V

Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files. Networks: Network Forensics Scenario, a technical approach, Destruction Of E–Mail, Damaging Computer Evidence, Documenting The Intrusion on Destruction of Data, System Testing.

Text Book

1. John R. Vacca, ―Computer Forensics: Computer Crime Investigation‖, 3/E, Firewall Media, New Delhi, 2002.

Reference Books

1. Nelson, Phillips Enfinger, Steuart,―Computer Forensics and Investigations‖ Enfinger, Steuart, CENGAGE Learning, 2004.
2. Anthony Sammes and Brian Jenkinson,‖Forensic Computing: A Practitioner's Guide‖, Second Edition, Springer–Verlag London Limited, 2007.
3. Robert M.Slade,‖ Software Forensics Collecting Evidence from the Scene of a Digital Crime‖, TMH 2005.

Web Resources

1. https://www.vskills.in
2. https://www.hackingarticles.in/best-of-computer-forensics-tutorials/

MAJOR PROJECT WITH VIVA VOCE

Major Project with Viva voce- Individual or group of maximum three members- Project report should be submitted for external evaluation.
Internal 50 marks
External 50 marks.
Students who couldn't appear for Naan Muthalvan Course in a particular semester or who have failed in Naan Muthalvan course should write the following self-study papers (External 100 marks)

PROGRAMMING IN C

Learning Objective

- To familiarize the students with the Programming basics and the fundamentals of C, Datatypes in C, Mathematical and logical operations.
- To understand the concept using if statements and loops
- This unit covers the concept of Arrays and Functions
- This unit covers the concept of Structurs and unions and Preprocessors
- To understand the concept of implementing pointers.

UNITI

Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, data types, declaration of variables, Assigning values to variables---Assignment statement, declaring a variable as constant, as volatile. Operators and Expression: Arithmetic, Relational, logical, assignment, increment, decrement, conditional, bitwise and special operators, arithmetic expressions, operator precedence, type conversions, mathematical functions Managing Input and Output Operators: Reading and writing a character, formatted input, formatted output.

UNIT II

Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE , ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops.

UNIT III

Arrays: Declaration and accessing of one & two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. Functions: The form of C functions, Return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes-character arrays and string functions.

UNIT IV

Structures and Unions: Defining, giving values to members, initialization and comparison of structure variables, arrays of structure, arrays within structures, structures within structures, structures and functions, unions. Preprocessors: Macro substitution, file inclusion.

UNIT V

Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

Text Book

1. E. Balagurusamy, Programming in ANSI C, Fifth Edition, Tata McGraw-Hill, 2010.

Reference Books

1. Byron Gottfried, Schaum‘s Outline Programming with C, Fourth Edition, Tata

McGraw-Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998
3. YashavantKanetkar, Let Us C, Eighteenth Edition, BPB Publications,2021

Web Resources

1. https://codeforwin.org/
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://en.cppreference.com/w/c
4. http://learn-c.org/
5. https://www.cprogramming.com/