



MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI-12

SYLLABUS

UG - COURSES – AFFILIATED COLLEGES

Course Structure for BCA
(Choice Based Credit System)

(with effect from the academic year 2026-2027 onwards)



Semester-V				
Part	Subject Status	Subject Title	Subject Code	Credit
III	CORE	OPERATING SYSTEMS	FCCA51	4
III	CORE	ASP.NET PROGRAMMING	FCCA52	4
III	CORE	ASP.NET PROGRAMMING LAB	FCCAP5	4
III	CORE	PROJECT WITH VIVA VOCE	FCCA5P	3
III	ELECTIVE	SOFTWARE PROJECT MANAGEMENT	FECA51	3
III	ELECTIVE	ARTIFICIAL INTELLIGENCE	FECA5A	3
IV	NAAN MUDHALVAN			2
		INTERNSHIP/ INDUSTRIAL VISIT/ FIELD VISIT/ KNOWLEDGE UPDATION ACTIVITY	FIFK51	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 **1 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	9-10	Outstanding
2	80-89	A+	8-8.9	Excellent
3	70-79	A	7-7.9	Very Good
4	60-69	B+	6-6.9	Good
5	50-59	B	5-5.9	Above Average
6	40-49	C	4-4.9	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**

- First Class with Distinction : CGPA $\geq 7.5^*$
- First Class : CGPA ≥ 6.0
- Second Class : CGPA ≥ 5.0 and < 6.0
- Third Class : CGPA < 5.0



OPERATING SYSTEMS

Course Objectives

- Understanding the design of the Operating System
- Imparting knowledge on CPU scheduling, Process and Memory Management.
- To code specialized programs for managing overall resources and operations of the computer.
- To study about the concept of Job and Processor scheduling
- To learn about the concept of memory organization and multiprogramming

UNIT I

Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. Process concepts: definition of process, process states-Life cycle of a process, process management- process state transitions, process control block(PCB), process operations , suspend and resume, context switching, Interrupts -Interrupt processing, interrupt classes, Inter process communication-signals, message passing.

UNIT II

Asynchronous concurrent processes: mutual exclusion- critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm, software solutions to the mutual Exclusion Problem-, n-thread mutual exclusion- Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores. Concurrent programming: monitors, message passing

UNIT III

Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.

UNIT IV

Job and processor scheduling: scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms- FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fair share scheduling.

UNIT V

Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-



contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping
 Virtual Memory organization: Virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies

Text Book

1. H.M. Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011

Reference Books

1. William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.
2. A.Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, John Wiley & Sons (ASIA) Pte Ltd., 2012

ASP.NET PROGRAMMING

Course Objectives

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

UNIT I

Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library- C# Fundamentals: Primitive types and Variables – Operators - Conditional statements -Looping statements – Creating and using Objects – Arrays – String operations.

UNIT II

Introduction to ASP.NET - IDE-Languages supported Components -Working with Web Forms – Web form standard controls: Properties and its events – HTML controls -List Controls: Properties and its events.

UNIT III

Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes - File Modes – File Share – Reading and Writing to files – Creating, Moving, Copying and Deleting files – File uploading.



UNIT IV

ADO.NET Overview – Database Connections – Commands – Data Reader - Data Adapter - Data Sets - Data Controls and its Properties – Data Binding

UNIT V

Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files - Website Security - Authentication - Authorization – Creating a Web application.

Text Book

1. Svetlin Nakov, Veselin Kolev & 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, A PRESS, 2010.

Web Resources

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

ASP.NET PROGRAMMING LAB

Course Objectives

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

Exercises

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. Working with File concepts.
7. Web application using Data Controls.
8. Data binding with Web Controls.
9. Data binding with Data Controls.
10. Database application to perform insert, update and delete operations.
11. Database application using Data Controls to perform insert, delete, edit, paging and sorting operation.
12. Implement the XML classes.
13. Implement Authentication – Authorization.
14. Ticket reservation using ASP.NET controls.
15. Online examination using ASP.NET controls

Text Books

1. Svetlin Nakov, Veselin Kolev & 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 press, 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: SOFTWARE PROJECT MANAGEMENT/ AGILE PROJECT MANAGEMENT

SOFTWARE PROJECT MANAGEMENT

Learning Objectives

- To define and highlight importance of software project management.
- To formulate and define the software management metrics & strategy in managing projects
- Understand to apply software testing techniques in commercial environment

Unit I

Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle - Software Development Process and models - The SEI CMM - International Organization for Standardization.

UNIT II

Managing Domain Processes - Project Selection Models - Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project -Project Planning - Creating the Work Breakdown Structure - Approaches to Building a WBS - Project Milestones - Work Packages - Building a WBS for Software.

UNIT III

Tasks and Activities - Software Size and Reuse Estimating - The SEI CMM - Problems and Risks - Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMO II - SLIM: A Mathematical Model - Organizational Planning - Project Roles and Skills Needed.

UNIT IV

Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming - Scheduling Fundamentals - PERT and CPM - Leveling Resource Assignments - Map the Schedule to a Real Calendar - Critical Chain Scheduling.

UNIT V

Quality: Requirements – The SEI CMM - Guidelines - Challenges - Quality Function Deployment - Building the Software Quality Assurance - Plan - Software Configuration Management: Principles - Requirements - Planning and Organizing - Tools - Benefits - Legal Issues in Software - Case Study



Textbook

1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, “Quality Software Project Management”, Pearson Education Asia 2002.

Reference Books

1. Pankaj Jalote, “Software Project Management in Practice”, Addison Wesley 2002.
2. Hughes, “Software Project Management”, Tata McGraw Hill 2004, 3rd Edition.

NOTE: Latest Edition of Textbooks May be Used

Web Resources

1. NPTEL & MOOC courses titled Software Project Management
2. www.smartworld.com/notes/software-project-management

AGILE PROJECT MANAGEMENT

Course Objectives

- Learning of software design, software technologies and APIs.
- Detailed demonstration about Agile development and testing techniques.
- Learning about Agile Planning and Execution.
- Learning of Agile Management Design and Quality Check.
- Detailed examination of Agile development and testing techniques.

UNIT I

Introduction: Modernizing Project Management: Project Management Needed a Makeover – Introducing Agile Project Management.

Applying the Agile Manifesto and Principles: Understanding the Agile manifesto – Outlining the four values of the Agile manifesto – Defining the 15 Agile Principles – Adding the Platinum Principles – Changes as a result of Agile Values – The Agile litmus test.

Why Being Agile Works Better: Evaluating Agile benefits – How Agile approaches beat historical approaches – Why people like being Agile.

UNIT II**Being Agile**

Agile Approaches: Diving under the umbrella of Agile approaches – Reviewing the Big Three: Lean, Scrum, Extreme Programming - Summary

Agile Environments in Action: Creating the physical environment – Low-tech communicating – High-tech communicating – Choosing tools.

Agile Behaviours in Action: Establishing Agile roles – Establishing new values – Changing team philosophy.



UNIT III

Agile Planning and Execution

Defining the Product Vision and Roadmap: Agile planning – Defining the product vision – Creating a product roadmap – Completing the product backlog.

Planning Releases and Sprints: Refining requirements and estimates – Release planning – Sprint planning.

Working Throughout the Day: Planning your day – Tracking progress – Agile roles in the sprint – Creating shippable functionality – The end of the day.

Showcasing Work, Inspecting and Adapting: The sprint review – The sprint retrospective.

Preparing for Release: Preparing the product for deployment (the release sprint) – Preparing the operational support – Preparing the organization for product deployment – Preparing the marketplace for product deployment

UNIT IV

Agile Management

Managing Scope and Procurement: What's different about Agile scope management – Managing Agile scope – What's different about Agile procurement – Managing Agile procurement.

Managing Time and Cost: What's different about Agile time management – Managing Agile schedules – What's different about Agile cost management – Managing Agile budgets.

Managing Team Dynamics and Communication: What's different about Agile team dynamics – Managing Agile team dynamics – What's different about Agile communication – Managing Agile communication.

Managing Quality and Risk: What's different about Agile quality – Managing Agile quality – What's different about Agile risk management – Managing Agile risk.

UNIT V

Implementing Agile

Building a Foundation: Organizational and individual commitment – Choosing the right pilot team members – Creating an environment that enables Agility – Support Agility initially and over time.

Being a Change Agent: Becoming Agile requires change – why change doesn't happen on its own – Platinum Edge's Change Roadmap – Avoiding pitfalls – Signs your changes are slipping.

Benefits, Factors for Success and Metrics: Ten key benefits of Agile project management – Ten key factors for project success – Ten metrics for Agile Organizations.



Text Books

1. Mark C. Layton, Steven J. Ostermiller, Agile Project Management for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.
2. Jeff Sutherland, Scrum – The Art of Doing Twice the Work in Half the Time, Penguin, 2014.

Reference Books

1. Mark C. Layton, David Morrow, Scrum for Dummies, 2nd Edition, Wiley India Pvt. Ltd., 2018.
2. Mike Cohn, Succeeding with Agile – Software Development using Scrum, Addison-Wesley Signature Series, 2010.
3. Alex Moore, Agile Project Management, 2020.
4. Alex Moore, Scrum, 2020.
5. Andrew Stellman and Jennifer Greene, Learning Agile: Understanding Scrum, XP, Lean, and Kanban, Shroff/O'Reilly, First Edition, 2014.

Web Resources

1. www.agilealliance.org/resources

ELECTIVE: **ARTIFICIAL INTELLIGENCE/ MACHINE LEARNING**
ARTIFICIAL INTELLIGENCE

Course Objectives

- 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 types of Reinforcement learning.

UNIT I

Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree

UNIT II

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search

UNIT III

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model



UNIT IV

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT V

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning

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 Artificial Intelligence”, Khanna Publishing House, Delhi.
2. Saroj Kaushik, “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. NPTEL & MOOC courses titled Artificial Intelligence and Expert Systems
2. <https://nptel.ac.in/courses/106106140/>
3. <https://nptel.ac.in/courses/106106126/>

MACHINE LEARNING

Learning Objectives

- To Learn about Machine Intelligence and Machine Learning applications
- To implement and apply machine learning algorithms to real-world applications
- To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems
- To create instant based learning
- To apply advanced learning

UNIT I

Introduction Machine Learning - Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines



UNIT II

Neural networks and genetic algorithms Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III

Bayesian and computational learning Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV

Instant based learning K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT V

Advanced learning Recommendation systems – opinion mining, sentiment analysis. Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

Textbooks

1. Tom M. Mitchell, —Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning" 2015, MIT Press

Reference Books

1. EthemAlpaydin, —Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, —Machine Learning: An Algorithmic Perspective, CRC Press, 2009.



NAAN MUDHALVAN

PROBLEM SOLVING TECHNIQUES

Course Objective

- Understand the systematic approach to problem solving.
- Know the approach and algorithms to solve specific fundamental problems.
- Understand the efficient approach to solve specific factoring-related problems.
- Understand the efficient array-related techniques to solve specific problems.
- Understand the efficient methods to solve specific problems related to text processing. Understand how recursion works.

UNIT I

Introduction: Notion of algorithms and programs – Requirements for solving problems by computer – The problem-solving aspect: Problem definition phase, Getting started on a problem, The use of specific examples, Similarities among problems, Working backwards from the solution – General problem-solving strategies - Problem solving using top-down design – Implementation of algorithms – The concept of Recursion.

UNIT II

Fundamental Algorithms: Exchanging the values of two variables – Counting - Summation of a set of numbers - Factorial computation - Sine function computation - Fibonacci Series generation - Reversing the digits of an integer – Base Conversion.

UNIT III

Factoring Methods: Finding the square root of a number – The smallest divisor of an integer – Greatest common divisor of two integers - Generating prime numbers – Computing the prime factors of an integer – Generation of pseudo-random numbers - Raising a number to a large power – Computing the nth Fibonacci number.

UNIT IV

Array Techniques: Array order reversal – Array counting or histogramming – Finding the maximum number in a set - Removal of duplicates from an ordered array - Partitioning an array – Finding the kth smallest element – Longest monotone subsequence.

UNIT V

Text Processing and Pattern Searching: Text line length adjustment – Left and right justification of text – Keyword searching in text – Text line editing – Linear pattern search. Recursive algorithms: Towers of Hanoi – Permutation generation.

Text Book

1. R.G. Dromey, How to Solve it by Computer, Pearson India, 2007

Reference Books

1. George Polya, Jeremy Kilpatrick, The Stanford Mathematics Problem Book: With Hints and Solutions, Dover Publications, 2009 (Kindle Edition 2013).
2. Greg W. Scragg, Problem Solving with Computers, Jones & Bartlett 1st edition, 1996.

Web Resources

1. <https://www.studytonight.com/>
2. <https://www.w3schools.com/>

