

# DATA COMMUNICATION AND NETWORKING

Course Code: CI42	Credits: 3:0:1
Pre - requisites: Nil	Contact Hours: 42L+14P
Course Coordinator: Dr. Josy Elsa Varghese	

## Course Contents

### Unit I

**Data communication Fundamentals:** Introduction, components, Data Representation, Data Flow; Networks – Network criteria, Physical Structures, Network Models, Categories of networks; Protocols, Standards, Standards organization; The Internet – Brief history, the Internet today; **Network Models** - Layered tasks; The OSI model – Layered architecture, Peer-to-Peer Process, Encapsulation; Layers in the OSI model; TCP/IP Protocol suite; Addressing.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106108098>
- Impartus Recording: <https://a.impartus.com/ilc/#/course/96149/452>

### Unit II

**Digital Transmission Fundamentals (with problems to solve):** Analog & Digital data, Analog & Digital signals (basics); Transmission Impairment – Attenuation, Distortion and Noise; Data rate limits – Nyquist Bit Rate, Shannon Capacity; Performance, **Digital Transmission (with problems to solve):** Digital-to-Digital conversion - Line coding, Line coding schemes (unipolar, polar, bipolar).

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106108098>
- Impartus Recording: <https://a.impartus.com/ilc/#/course/96149/452>

### Unit III

**or detection & correction (with problems to solve):** Introduction, Block coding, near Block codes, Cyclic codes – CRC, Polynomials, **Datalink control:** Framing, low& error control, Protocols, Noiseless channels (Simplest Protocol, Stop-and-wait protocol); Noisy channels (Stop-and-wait ARQ).

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation Videos

- Links: <https://nptel.ac.in/courses/106108098>  
<https://nptel.ac.in/courses/106105082>

- Impartus Recording: <https://a.impartus.com/iic/#/course/96149/452>

#### Unit IV

**Multiple Access:** Random Access (CSMA, CSMA/CD, CSMA/CA), Controlled Access (Reservation, Polling, Token Passing), Channelization (FDMA, TDMA, CDMA)

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106108098>  
<https://nptel.ac.in/courses/106105082>
- Impartus Recording: <https://a.impartus.com/iic/#/course/96149/452>

#### Unit V

**Wired LANs:** IEEE standards; Standard Ethernet; **Wireless LANs:** IEEE802.11 Architecture, MAC sublayer, addressing mechanism, Bluetooth and its architecture, Connecting devices.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106108098>
- Impartus Recording: <https://a.impartus.com/iic/#/course/96149/452>

#### **Lab Experiments:**

Students need to use OPNET Simulator to simulate the following experiments:

1. Simulate a 3-node point-to-point network with duplex links in between them. Set the Queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a 4-node point-to-point network and connect the link as follows:- n0-n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP n1-n3. Apply relevant applications over TCP and UDP agents changing the parameters and determining the no. of packets sent by TCP/UDP.
3. Simulate the different types of internet traffic such as FTP and TELNET over the network and analyze the throughput.
4. Simulate the transmission of a PING message over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

5. Simulate an Ethernet LAN using N nodes (6-10), change error rate and data rate and compare Throughput.
6. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and determine collision across different nodes.
7. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and plot congestion window for different source/destination.
8. Simulate simple ESS and with transmitting nodes in WIRELESS LAN by simulation and determine the performance with respect to the transmission of packets.

**Text Book:**

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition, Tata McGraw-Hill, 2012.

**Reference Books:**

1. Alberto Leon-Garcia and India Widjaja, Communication Networks – Fundamental Concepts and Key architectures, Second Edition, Tata McGraw-Hill, 2004.
2. Wayne Tomasi, Introduction to Data Communications and Networking, Pearson Education, 2005.

**Course Outcomes (COs):**

At the end of the course, the students will be able to:

1. Distinguish different communication models/protocol stacks (OSI & TCP/IP) and analyze the usage of appropriate network topology for a given scenario. (PO-1, 2, 3, PSO-1,2)
2. Handle the issues associated with digital data signals and solve the problems on data transmission by measuring the performance parameters. (PO-1, 2, 3, PSO-1,2)
3. Apply different error detection, error correction, and flow control strategies to solve error and flow control issues induced during data communication. (PO-1, 2, 3, PSO-2)
4. Use the different strategies of multiple access to achieve better network efficiency and analyze the network performance. (PO-1, 2, 3, PSO-1, 2)
5. Illustrate the IEEE standards for wired, and wireless LANs and their connecting devices. (PO-3, 10, PSO-2)

## DESIGN AND ANALYSIS OF ALGORITHMS

<b>Course Code:</b> C143	<b>Credits:</b> 3:0:0
<b>Pre - requisites:</b> Nil	<b>Contact Hours:</b> 42L
<b>Course Coordinator:</b> Dr. Sini Anna Alex	

### Course Contents

#### Unit I

##### **Asymptotic Bounds and Representation Problems of Algorithms:** Computational

Tractability: Some Initial Attempts at Defining Efficiency, Worst-Case Running Times and Brute-Force Search, Polynomial Time as a Definition of Efficiency, Asymptotic Order of Growth: Properties of Asymptotic Growth Rates, Asymptotic Bounds for Some Common Functions, A Survey of Common Running Times: Linear Time,  $O(n \log n)$  Time,  $O(n^k)$  Time, Beyond Polynomial Time. Substitution Method, Some Representative Problems, A First Problem: Stable Matching. (Textbook 1)

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos

- Links: <https://nptel.ac.in/courses/106106131>
- <https://nptel.ac.in/courses/106102064>

<https://www.geeksforgeeks.org/fundamentals-of-algorithms/?ref=shm>

#### Unit II

**Graphs & Divide and Conquer:** Graph Connectivity and Graph Traversal, Breadth-First Search: Exploring a Connected Component, Depth-First Search, Implementing Graph Traversal Using Queues and Stacks: Implementing Breadth-First Search, Implementing Depth-First Search, An Application of Breadth-First Search and Depth-First Search, Directed Acyclic Graphs and Topological Ordering, Divide and Conquer Technique: Masters Theorem for recurrence relations, The Merge sort Algorithm, Quick Sort Algorithm. (Textbook 2)

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos

- Links: <https://nptel.ac.in/courses/106106131>
- <https://nptel.ac.in/courses/106102064>
- <https://www.geeksforgeeks.org/fundamentals-of-algorithms/?ref=shm>

#### Unit III

**Transform and Conquer:** Heaps and Heapsort. (Textbook 2)

**Greedy Algorithms:** Interval Scheduling: The Greedy Algorithm Stays Ahead: Designing a Greedy Algorithm, Analyzing the Algorithm, Scheduling to Minimize

Lateness: An Exchange Argument: The Problem, Designing the Algorithm. (Textbook 1) Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Fractional Knapsack Problem, Huffman Trees and Codes. (Textbook 2)

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106106131>
- <https://nptel.ac.in/courses/106102064>  
<https://www.geeksforgeeks.org/fundamentals-of-algorithms/?ref=shm>

## Unit IV

**Dynamic Programming:** Weighted Interval Scheduling: A Recursive Procedure, Subset Sums, and 0/1 Knapsack problem: Adding a Variable: The Problem, Designing the Algorithm, Bellman Ford Algorithm. (Textbook 1)

**Dynamic Programming:** Warshall's and Floyd's Algorithm. (Textbook 2)

**Iterative Improvement:** The Simplex Method, The Maximum-Flow Problem. (Textbook 2)

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106106131>
- <https://nptel.ac.in/courses/106102064>  
<https://www.geeksforgeeks.org/fundamentals-of-algorithms/?ref=shm>

## Unit V

**NP and Computational Intractability:** Polynomial-Time Reductions NP-Complete Problems: Circuit Satisfiability: A First NP-Complete Problem, General Strategy for Proving New Problems NP Complete, Sequencing Problems: The Traveling Salesman Problem, The Hamiltonian Cycle Problem.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://www.geeksforgeeks.org/fundamentals-of-algorithms/?ref=shm>

### Text Books:

1. Jon Kleinberg and Eva Tardos, *Algorithm Design*, Pearson, 1st Edition 2013.
2. Anany Levitin, *Introduction to the Design & Analysis of Algorithms*, 3<sup>rd</sup> Edition, Paperback Publication -2017, Pearson education.

### **Reference Books:**

1. Design and Analysis of Algorithms, Michael. T. Goodrich, Roberto Tamassia, An Indian Adaptation, Wiley, 2023
2. Introduction to Algorithms, H., Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein Thomas, 3<sup>rd</sup> Edition, 2009, MIT press.
3. Fundamentals of Computer Algorithms, Horowitz E., Sartaj Sahni S., Rajasekaran S, 2008, Galgotia Publications.

### **Course Outcomes (COs):**

At the end of the course, students will be able to:

1. Define the basic concepts and analyze the worst-case running times of algorithms using asymptotic analysis. (PO-1,2 PSO-1,3)
2. Recognize the design techniques for graph traversal using representative algorithms. (PO-1,2,3 PSO-1,3)
3. Identify how to divide and conquer, transform and conquer work, and analyze the complexity of the methods by solving recurrence. (PO-1,2,3 PSO-1,3)
4. Illustrate the Greedy paradigm and Dynamic programming paradigm using representative algorithms. (PO-1,2,3,4 PSO-2,3)
5. Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete. (PO-1,2,3,4 PSO-2,3)

### **Course Assessment and Evaluation:**

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tools</b>	<b>Marks</b>	<b>Course Outcomes addressed</b>
Internal Test-I (CIE-I)	30	CO1, CO2
Internal Test-II CIE-II)	30	CO3, CO4, CO5
<b>The average of the two CIE shall be taken for 30 marks</b>		
<b>Other Components</b>		
Assessment Test	10	CO1, CO2, CO3
Assignment	10	CO4, CO5
<b>The Final CIE out of 50 Marks = Average of two CIE tests for 30 Marks + Marks scored in Assessment Test + Marks scored in Assignment</b>		
<b>Semester End Examination (SEE)</b>	<b>100</b>	<b>CO1, CO2, CO3, CO4, CO5</b>

# AUTOMATA THEORY AND COMPILER DESIGN

<b>Course Code:</b> CI44	<b>Credits:</b> 3:0:0
<b>Pre – requisites:</b> Nil	<b>Contact Hours:</b> 42L
<b>Course Coordinator:</b> Dr. Sini Anna Alex	

## Course Contents

### Unit I

**Introduction to Automata Theory:** Central Concepts of Automata theory, Deterministic Finite Automata (DFA), Non- Deterministic Finite Automata (NFA), NFA to DFA Conversion, Minimization of DFA. **Introduction to Compiler Design:** Language Processors, Phases of Compilers, Compiler Construction Tools.

- Pedagogy: Chalk and Talk, PowerPoint Presentations
- Links: <https://nptel.ac.in/courses/106104148>
- <https://nptel.ac.in/courses/106108113>

### Unit II

**Regular Expressions and Languages:** Regular Expressions, Finite Automata and Regular Expressions.

**Push Down Automata:** Definition of the Pushdown Automata, The Languages of a PDA.

**Lexical analysis Phase of Compiler Design:** The Role of Lexical Analyzer, Input Buffering, Specifications of Tokens, Recognition of Tokens.

- Pedagogy: Chalk and Talk, PowerPoint Presentations
- Links: <https://nptel.ac.in/courses/106104148>
- <https://nptel.ac.in/courses/106108113>

### Unit III

**Context Free Grammars:** Formal Definition of a Context Free Grammar, Derivations, Parse Trees, Ambiguity, Writing a Grammar: Elimination of Ambiguity, Elimination of Left Recursion, Left Factoring.

**Syntax Analysis:** The role of the Parser, Top-down Parsing, First and Follow, LL (1) Grammars, Non-Recursive Predictive Parsing, Error Recovery in Predictive Parsing. Bottom-up Parsing, Introduction to LR Parsing: Simple LR parser. More Powerful LR Parsers: Canonical LR (1) items, Constructing LR (1) set of items, Canonical LR (1) parse tables, Constructing LALR parsing tables.

- Pedagogy: Chalk and Talk, PowerPoint Presentations, Active Learning
- Links: <https://nptel.ac.in/courses/106108113>

## Unit IV

**Introduction to Turing Machine:** Problems that Computers Cannot Solve, The Turing machine.

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation order for SDDs, Applications of Syntax-Directed translation, Syntax-Directed Translation Schemes.

- Pedagogy: Chalk and Talk, PowerPoint Presentations.
- Links: <https://nptel.ac.in/courses/106104148>
- <https://nptel.ac.in/courses/106108113>

## Unit V

**Intermediate Code Generation:** Variants of syntax trees, Three-address code, Types and Declarations, Translation of expressions, Type Checking: Rules of Type Checking, Type Conversions, Control flow: Boolean Expressions, Short-Circuit Code, Flow of Control statements, Control Flow Translation of Boolean Expressions, Avoiding Redundant Gotos, Back patching: One pass Code generation Using backpatching, Backpatching for Boolean Expressions.

**Code Generation:** Issues in the Design of a Code Generator, Target Language, A Simple Code Generator.

- Pedagogy: Chalk and Talk, PowerPoint Presentations
- Links: <https://nptel.ac.in/courses/106108113>

### Text Books:

1. John E Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, “Introduction to Automata Theory, Languages and Computation”, Third Edition, Pearson Education India, 2011.
2. Alfred V.Aho, Monica S.Lam,Ravi Sethi, Jeffrey D. Ullman, “ Compilers Principles, Techniques and Tools”, Second Edition, Pearson Education India, 2013.

### References:

1. Elain Rich, “Automata, Computability and complexity”, 1st Edition, Pearson Education,2018.
2. K.L.P Mishra, N Chandrashekaran , 3rd Edition , ‘Theory of Computer Science”,PHI,2012.
3. Peter Linz, “An introduction to Formal Languages and Automata “, 3rd Edition, Narosa Publishers,1998.
4. K Muneeswaran,” Compiler Design”, Oxford University Press 2013.

### **Course Outcomes (COs):**

At the end of the course the student will be able to:

1. Acquire fundamental understanding of the core concepts in automata theory and Theory of Computation. (PO1,PO2,PSO1,PSO2)
2. Design and develop lexical analysers, parsers and code generators. (PO1, PO2, PO3, PO9,PSO1,PSO2)
3. Design Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. (PO1, PO2, PO3, PO4,PSO1,PSO3)
4. Acquire fundamental understanding of the structure of a Compiler and Apply concepts automata theory and Theory of Computation to design Compilers. (PO1,PO2,PO3,PO9,PSO1,PSO2,PSO3)
5. Design syntax directed computation models for problems in Automata theory (PO2,PO3,PO4,PSO2,PSO3) and adaptation of such model in the field of compilers.

### **Course Assessment and Evaluation:**

#### **Continuous Internal Evaluation (CIE): 50 Marks**

<b>Assessment Tool</b>	<b>Marks</b>	<b>Course outcomes addressed</b>
Internal test-I	30	CO1, CO2, CO3
Internal test-II	30	CO3, CO4, CO5
Average of the two internal tests shall be taken for 30 marks.		
<b>Other components</b>		
Active Learning: Technical Paper		
Writing, Game Based Learning	10	CO1, CO2, CO3
Tutorial Assignment	10	CO1, CO2, CO3, CO4, CO5
<b>Semester End Examination (SEE)</b>	100	CO1, CO2, CO3, CO4, CO5

## **OPERATING SYSTEMS**

**Course Code: CI45**

**Credits: 3:0:0**

**Pre - requisites: Nil**

**Contact Hours: 42L**

**Course Coordinator: Ms. Akshatha G C**

### **Course Contents**

#### **Unit I**

**Introduction:** What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations.

**Operating system structures:** operating system services, user operating system interface, System calls, Types of system calls, Operating system structure, System boot.

**Unit II**

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106105214>
- Impartus recording: <https://a.impartus.com/ilc/#/course/148805/703>

#### **Unit II**

**Process Management:** Basic concept; Process scheduling; Operations on processes; Inter-process Communication. **Threads:** Overview; Multithreading models;

**Process scheduling:** Basic concepts, Scheduling criteria, scheduling algorithms, multiple processor scheduling, Algorithm evaluation.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106105214>
- Impartus recording: <https://a.impartus.com/ilc/#/course/148805/703>

#### **Unit III**

**Process Synchronization:** Synchronization, The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; and Monitors.

**Deadlocks:** System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106105214>
- Impartus recording: <https://a.impartus.com/ilc/#/course/148805/703>

## Unit IV

**Memory Management Strategies:** Background, Swapping, Contiguous memory allocation; Paging, Structure of page table; Segmentation.

**Virtual Memory Management:** Background; Demand paging, Copy-on write, Page replacement; Allocation of frames, Thrashing.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106105214>
- Impartus recording: <https://a.impartus.com/ilc/#/course/148805/703>

## Unit V

**File System:** File concept; Access methods; Directory structure; File system mounting, file sharing, protection.

**Secondary Storage Structures:** Disk scheduling; FCFS Scheduling, SSTF scheduling, SCAN, C-SCAN scheduling, Look Scheduling, CLOOK scheduling.

**System Protection:** Goals of protection, Principles of protection, Domain of protection, Access matrix.

- Pedagogy/Course delivery tools: Chalk and talk, PowerPoint Presentation, Videos
- Links: <https://nptel.ac.in/courses/106105214>
- Impartus recording: <https://a.impartus.com/ilc/#/course/148805/703>

### Text Books:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles, 8th edition Wiley- India,2011.

### Reference Books:

1. D.M Dhamdhere, Operating systems - A concept-based Approach, 2nd Edition, Tata McGraw-Hill, 2002
2. Harvey M Deitel, Operating systems, 3rd Edition, Addison Wesley, 1990.
3. Thomas Anderson and Michael Dahlin, Operating Systems: Principles and Practice, 2nd Edition, 2014.

### Course Outcomes (COs):

At the end of the course, students will be able to:

1. Describe the structure of the computer system and services provided by the Operating system. (PO-1,2, PSO-1,2)
2. Apply different scheduling algorithms for Process/Memory/Disk Management. (PO-1,2,3,4, PSO-1,2,3)
3. Describe Process management and the need for controlled access to computing resources by cooperative processes. (PO-1,2,3,4, PSO-1,2)
4. Apply deadlock detection and prevention algorithms to solve the given problem. (PO-1,2,3,4, PSO-1,2,3)
5. Illustrate memory management strategies and operating system principles for achieving protection and security. (PO-1,2,3,4, PSO-1,2)

### Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks		
Assessment Tools	Marks	Course Outcomes addressed
Internal Test-I (CIE-I)	30	CO1, CO2
Internal Test-II (CIE-II)	30	CO3, CO4, CO5
The average of the two CIE shall be taken for 30 marks		
Other Components		
Case study-System Calls	10	CO1, CO2, CO3
Assignment	10	CO4, CO5
The Final CIE out of 50 Marks = Average of two CIE tests for 30 Marks + Marks scored in Case Study – System calls + Marks scored in Assignment		
Semester End Examination (SEE)	100	CO1, CO2, CO3 CO4, CO5

## ALGORITHMS LABORATORY

**Course Code:** CIL47

**Pre – requisites:** Nil

**Course Coordinator:** Dr. Sini Anna Alex

**Credits:** 0:0:1

**Contact Hours:** 14P

### Course Contents

Design and Develop algorithms to implement the concepts in the design and analysis of algorithms.

Sl. No.	Lab Course Contents
1.	Asymptotic bounds and functions: Best Case, Average Case and Worst-Case Complexity. GCD Computation four methods.
2.	Linear Search and Binary Search using Iterative and Recursive Approach with Time Complexity.
3.	Divide and Conquer Technique: Merge sort algorithm.
4.	Divide and Conquer Technique: Quick sort algorithm
5.	Graph Traversal: Breadth first search
6.	Graph Traversal: Depth first search
7.	Graph Traversal: Topological Sorting
8.	Minimum Spanning Tree using Greedy Technique: Prim's or Kruskal algorithm
9.	Single Source Shortest Path using Greedy Technique: Dijkstra's algorithm
10.	Greedy approach: Job Sequencing with deadlines/Interval Scheduling or 0/1 Knapsack Problem using Dynamic Approach
11.	Dynamic Programming approach: Warshall's Algorithm
12.	Branch and Bound Technique: Travelling Salesman Problem

Lab experiments will be scenario-based implementation by evaluating the time complexity for the algorithm techniques specified in the course content.

### Reference Books:

1. **Jon Kleinberg and Eva Tardos, Algorithm Design**, Tsinghua University Press(2005).
2. **Anany Levitin: Introduction to the Design & Analysis of Algorithms**, 2nd Edition, Pearson Education, 2007.

### Course Outcomes (COs):

At the end of the course, the student will be able to:

1. Understand the basic concepts and analyze the worst-case running times of algorithms using asymptotic analysis. (PO-1,4,10, PSO-1,2)
2. Recognize the design techniques for graph traversal, divide and conquer, greedy, and dynamic programming paradigms using representative algorithms. (PO-1,2,3,5, 7, 9, 10, PSO-1,2,3)
3. Illustrate Branch and bound paradigm through NP-complete problems. (PO-1, 3, 4, 10,12, PSO-2,3)

### Course Assessment and Evaluation:

#### Continuous Internal Evaluation (CIE): 50 Marks

Assessment Tools	Marks	Course Outcomes addressed
Lab Test-I	10	CO1, CO2
Lab Test-II	10	CO3
Weekly Evaluation + Lab Record	30	CO1, CO2, CO3
<b>The Final CIE out of 50 Marks = Marks of Lab Record + Marks scored in Lab Test-I + Marks scored in Lab Test-II</b>		
Semester End Examination (SEE)	50	CO1, CO2, CO3

## ADVANCED WEB PROGRAMMING LABORATORY

Course Code: CIL48

Credits: 0:0:1

Pre - requisites: Nil

Contact Hours: 14p

Course Coordinator: Mrs. Pallavi T P

### Course Contents

#### Front-End Technology:

1. Html, html5
2. CSS
3. JavaScript
4. XML
5. Bootstraps
6. jQuery

#### Back-end technology:

1. Node.js
2. MySQL
3. PHP

#### Reference Books:

1. Thomas A Powell-HTML & CSS, The complete reference, Tata McGraw-Hill, fifth edition,
2. "Node.js by Example Paperback", May 2015.
3. Web link for Node.js: <https://nodejs.org/en/>

#### Course Outcomes (COs):

At the end of the course, the student will be able to:

1. Develop a static, interactive and well-formed webpage using JavaScript, CSS and HTML, XML, (PO-1,2,3,4,5,9, 10,12, PSO-1,3)
2. Design dynamic data-driven Websites using My SQL and PHP (PO-1,2,3,4,5,9, 10,12, PSO-1,3)
3. Design dynamic data-driven Web sites using Node.js (PO-1,2,3,4,5,9, 10,12, PSO-1,3)

#### Course Assessment and Evaluation:

Continuous Internal Evaluation (CIE): 50 Marks

Assessment Tools	Marks	Course Outcomes addressed
Lab Test-I	10	CO1, CO2
Lab Test-II	10	CO3
Weekly Evaluation+Lab Record	30	-
Semester End Examination (SEE)	50	CO1, CO2, CO3

The Final CIE out of 50 Marks = Marks of Lab Record + Marks scored in LabTest-I + Marks scored in Lab Test-II

## ADDITIONAL MATHEMATICS - II

**Course Code:** AM41

**Pre – requisites:** Nil

**Course Coordinator:** Dr. Veena B N

Credits: 0:0:0

Contact Hours: 42

### Course Contents

#### Unit I

**Differential Calculus- I:** Partial differentiation, Euler's theorem, total differential coefficient, differentiation of composite and implicit functions.

- Pedagogy / Course delivery tools: Chalk and talk
- Online tools: Use of open source software to demonstrate methods and solve problems on interpolation
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: [https://a.impartus.com/ilc/#/course/107625\\_1030](https://a.impartus.com/ilc/#/course/107625_1030)

#### Unit II

**Differential Calculus- II:** Jacobian and Properties. Taylor's theorem for the function of two variables, maxima, and minima for functions of two variables.

- Pedagogy / Course delivery tools: Chalk and talk
- Online tools: Use of open source software to demonstrate methods and solve problems on numerical differentiation and integration.
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: [https://a.impartus.com/ilc/#/course/107625\\_1030](https://a.impartus.com/ilc/#/course/107625_1030)
- <https://a.impartus.com/ilc/#/course/59742/295>

#### Unit III

**Vector Integration:** Line integrals, surface integrals, and volume integrals. Green's theorem, Stokes' and Gauss divergence theorem (without proof), and problems on orthogonal curvilinear coordinates.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: [https://a.impartus.com/ilc/#/course/619570\\_1030](https://a.impartus.com/ilc/#/course/619570_1030)

#### Unit IV

**Order Differential Equations:** Higher order linear differential equations, Cauchy's and Legendre's homogeneous differential

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/96127/452>
- <https://a.impartus.com/ilc/#/course/59742/295>

#### Unit V

**Probability:** Introduction. Sample space and events. Axioms of probability. Addition and multiplication theorems. Conditional probability- illustrative examples. Bayes theorem – examples.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/107/111107119/>
- <https://nptel.ac.in/courses/111/107/111107119/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/283623/703>

#### Text Books:

1. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017.
2. **Erwin Kreyszig** – Advanced Engineering Mathematics – Wiley Publication, 10<sup>th</sup> Edition, 2015.

#### Reference Books:

1. **H. K. Dass** – Higher Engineering Mathematics – S Chand Publications, 1998
2. **B. V. Ramana** – Engineering Mathematics – Tata McGraw-Hill Publishing Co Ltd., New Delhi, 2008.

#### Course Outcomes (COs):

At the end of the course the student will be able to

1. To carryout differentiation of function of several variables. (PO-1,2)
2. Solve the problems related to Jacobians, the extreme values of a function and Taylors series. (PO-1,2)
3. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1,2)
4. Find the solution of second and higher order ODEs with constant and variable coefficients. (PO-1,2)
5. Solve the problems on conditional probability and Baye's theorem. (PO-1,2)

## ADDITIONAL MATHEMATICS - II

Course Code: AM41	Credits: 0:0:0
Pre - requisites: Nil	Contact Hours: 42
Course Coordinator: Dr. Veena B N	

### Course Contents

#### Unit I

**Differential Calculus- I:** Partial differentiation, Euler's theorem, total differential coefficient, differentiation of composite and implicit functions.

- Pedagogy / Course delivery tools: Chalk and talk
- Online tools: Use of open source software to demonstrate methods and solve problems on interpolation
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

#### Unit II

**Differential Calculus- II:** Jacobian and Properties. Taylor's theorem for the function of two variables, maxima, and minima for functions of two variables.

- Pedagogy / Course delivery tools: Chalk and talk
- Online tools: Use of open source software to demonstrate methods and solve problems on numerical differentiation and integration.
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>
- <https://a.impartus.com/ilc/#/course/59742/295>

#### Unit III

**Vector Integration:** Line integrals, surface integrals, and volume integrals. Green's theorem, Stokes' and Gauss divergence theorem (without proof), and problems, orthogonal curvilinear coordinates.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/619570/1030>

#### Unit IV

**Higher Order Differential Equations:** Higher order linear differential equations, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/96127/452>
- <https://a.impartus.com/ilc/#/course/59742/295>

#### Unit V

**Probability:** Introduction. Sample space and events. Axioms of probability. Addition and multiplication theorems. Conditional probability- illustrative examples. Bayes theorem – examples.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/107/111107119/>
- <https://nptel.ac.in/courses/111/107/111107119/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/283623/703>

#### Text Books:

1. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017.
2. **Erwin Kreyszig** – Advanced Engineering Mathematics – Wiley Publication, 10<sup>th</sup> Edition, 2015.

#### Reference Books:

1. **H. K. Dass** – Higher Engineering Mathematics – S Chand Publications, 1998
2. **B. V. Ramana** – Engineering Mathematics – Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2008.

#### Course Outcomes (COs):

At the end of the course the student will be able to

1. To carryout differentiation of function of several variables. (PO-1,2)
2. Solve the problems related to Jacobians, the extreme values of a function and Taylors series. (PO-1,2)
3. Exhibit the interdependence of line, surface and volume integrals using integral theorems. (PO-1,2)
4. Find the solution of second and higher order ODEs with constant and variable coefficients. (PO-1,2)
5. Solve the problems on conditional probability and Baye's theorem. (PO-1,2)

# **ABILITY ENHANCEMENT COURSE – III/IV**

## **UI/UX DESIGN**

<b>Course Code:</b> CIAEC39/ CIAEC49	<b>Credits:</b> 1:0:0
<b>Pre – requisites:</b> Nil	<b>Contact Hours:</b> 14L
<b>Course Coordinator:</b> Dr. Sini Anna Alex	

### **Course Contents**

#### **Unit I**

**What is UX, What is UI, The importance of Website UX Design, Tips to improve the efficiency of website, User Interface Patterns, User Experience and User interface: Tips to achieve a good user experience and User interface.**

**The Five Main Ingredients of UX, The Three “What’s” of User Perspective: “What is This”, “What’s in It for Me”, “What Do I Do”.**

#### **Unit II**

**Difference between UI and UX, Difference between usability and user experience Usability, User Experience (UX), Key Factors for a Good User Experience, Relationship between Usability and User Experience.**

#### **Unit III**

**UX Design Methodology, UX Design: For Better Web Experiences, UX Design Philosophy: Understanding What Matters, UX Research in the UX Process, Understanding information architecture.**

#### **Unit IV**

**Persona in UX Design, why make Personas, Creating User Profiles: What a Profile is Not So, what Is a User Profile/Persona, Bad profile, Why it's bad, Useful profile, Why it's useful.**

**Designing Behavior: Designing with Intention, UX Design is Not a Matter of Opinion, Rewards and Punishments, How to Create Trust, Trust is a Critical Element in Everything You Do.**

#### **Unit V**

**Visual Design Principles, why visual Design Principles are important, the impact of Aesthetics on the credibility of a website, how to increase trust in company, Ten Useful Psychology Principles for UX Designers. Ethics and Privacy in Design, Industry Trends and Case Studies.**

## NOSQL-2

**Course Code:** CIAEC39/ CIAEC49

**Credits:** 1:0:0

**Pre – requisites:** Nil

**Contact Hours:** 14L

**Course Coordinator:** Dr. Mohana Kumar S

### Course Contents

#### Unit I

Hbase: Introduction, Architecture, Hbase vs RDBMS, Shell Commands, Create Table, Insert & Retrieve Data, Performance Bottlenecks.

- Pedagogy/Course delivery tools: Chalk & talk and Powerpoint presentation

#### Unit II

Hive: Introduction, Data types, Create & Drop Database, Create/Alter/Drop Table, Static Partitioning, Dynamic Partitioning. HiveQL: Operators, Functions,

- Pedagogy/Course delivery tools: Chalk & talk and Powerpoint presentation

#### Unit III

HiveQL: Group By and Having, Order By, Sort By, Join. Redis: Introduction, Features, Datatypes, Keys, String.

- Pedagogy/Course delivery tools: Chalk & talk and Powerpoint presentation

#### Unit IV

Graph Databases: Introduction, Features, Graph data in a relational database, Querying graph data using MySQL, Neo4j in NoSQL space, Key-value stores, Column-family stores

- Pedagogy/Course delivery tools: Chalk & talk and Powerpoint presentation

#### Unit V

Data modeling in Neo4j, Neo4j CQL Read/Write Clauses: Set Clause, Delete clause, Remove clause, Foreach clause, Match clause, Where clause, Count Function, Order by clause, Limit, skip, String Functions, Aggregate Function.

- Pedagogy/Course delivery tools: Chalk & talk and Powerpoint presentation

#### Text Books:

1. Edward Capriolo, Dean Wampler, Jason Rutherglen, "Programming Hive", O'Reilly Media, Inc., 2012.
2. Tiago Macedo, Fred Oliveira, "Redis Cookbook", O'Reilly Media, Inc., July 2011.

# ADDITIONAL MATHEMATICS - I

Course Code: AM31

Pre-requisites: Nil

Course Coordinators: Dr. Shashi Prabha Gogate &

Credit: 4/4/4

Contact Hours: 62,

## Course Contents

### Unit I

**Differential Calculus:** Successive differentiation, nth derivatives of some standard functions, Leibnitz theorem, Polar curves. Angle between the radius vector and the tangent, angle between curves, length of the perpendicular from pole to the tangent, pedal equations. Taylor's and Maclaurin's expansions.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- <https://nptel.ac.in/courses/111/104/111104144/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit II

**Integral Calculus:** Introduction, Reduction formula, Reduction formula for  $\int \sin^n x \, dx$

$\int \cos^n x \, dx$  and  $\int \sin^n x \cos^m x \, dx$ . Evaluation of double and triple integrals.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit III

**Vector Algebra:** Scalar and vectors. Vector addition and subtraction. Multiplication of vectors (Dot and Cross products). Scalar and vector triple product-simple problems. Vector functions of a single variable. Derivative of a vector function, geometrical interpretation. Velocity and acceleration.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

### Unit IV

**Vector Differentiation:** Scalar and vector fields, gradient of a scalar field, directional derivative, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, Laplace's operator. Vector identities connected with gradient, divergence and curl.

- Pedagogy / Course delivery tools: Chalk and talk
- Links: <https://nptel.ac.in/courses/111/105/111105134>
- Impartus recording: <https://a.impartus.com/ilc/#/course/107625/1030>

## Unit V

**First-Order Differential Equations:** Solution of first-order and first-degree differential equations, variable separable methods, homogeneous equations, linear and Bernoulli's equations, and exact differential equations.

- Pedagogy / Course delivery tools: Chalk and talk, Power Point Presentation
- Links: <https://nptel.ac.in/courses/111/105/111105121/>
- Impartus recording: <https://a.impartus.com/ilc/#/course/59742/295>

### **Text Books:**

1. **B.S. Grewal** – Higher Engineering Mathematics, Khanna Publishers, 44<sup>th</sup> edition, 2017.
2. **Erwin Kreyszig** – Advanced Engineering Mathematics – Wiley Publication, 10<sup>th</sup> Edition, 2015.

### **Reference Books:**

1. **H. K. Dass** – Higher Engineering Mathematics – S Chand Publications, 1998.
2. **B. V. Ramana** – Engineering Mathematics – Tata McGraw-Hill Publishing Co. Ltd., New Delhi, 2008.

### **Course Outcomes (COs):**

At the end of the course, the student will be able to

1. Solve problems related to the nth derivative to some standard functions, polar curves, and power series expansions. (PO-1,2)
2. Apply the concept of reduction formula to determine the length, area, volume and revolution of an arc of the curve. (PO-1,2)
3. Solve the problems related to velocity and acceleration. (PO-1,2)
4. Apply vector differentiation to identify solenoidal and irrotational vectors. (PO-1,2)
5. Apply the concept of various methods to solve first-order first-degree differential equations. (PO-1,2)