6th Semester

Course	Code	L	T	P	Credits
Computer Networks	**ITT350**	**3**	**1**	**0**	**4**

Course Outcomes (COs):

CO1: Understand the need for networking in general and computer networks in particular.
CO2: Study the prevalent TCP/IP reference model and understand various error, flow and access control strategies.
CO3: Study the IPV4 addressing and the strategies to delay the transition to IPV6 using techniques like subnetting, VLSM, NAT.
CO4: Understand routing in networks and study various routing algorithms.
CO5: Study the mechanism for connection establishment, termination between the nodes and the ways of reducing network congestion.
CO6: Understand various application layer services.

Syllabus:

UNIT I - INTRODUCTION:
History and development of computer networks, networks topologies. Layering and protocols.

UNIT II - PHYSICAL LAYER:
Different types of transmission media, errors in transmission: attenuation, noise. Encoding (NRZ, NRZI, Manchester, AMI, etc.).

UNIT III - DATA LINK LAYER AND SWITCHING:
MAC Layer: Aloha, CSMA, CSMA/CD, CSMA/CA protocols. Data Link Layer: Error detection (Parity, CRC), Framing, Sliding Window, Stop and Wait protocols, HDLC. Switching Theory: Circuit Switching, Message switching, Packet switching.

UNIT IV - NETWORK LAYER:
Network layer: Internet Protocol, IPv6, ARP, DHCP, ICMP, Routing algorithms: Distance vector, Link state, Metrics, Inter-domain routing. Dijkstra, Bellman-Ford Algorithms. Subnetting, Classless addressing, Network Address Translation.

UNIT V - TRANSPORT AND APPLICATION LAYER:
Transport layer: UDP, TCP. Connection establishment and termination, sliding window revisited, flow and congestion control, timers, retransmission, TCP extensions.

Application layer: DNS, SMTP, IMAP, HTTP, etc.

Recommended Books:

1. JF Kurose, KW Ross, Computer Networking: A Top-Down Approach.
2. Behrouz A. Forouzan, Data communications and Networking.
3. Andrew S. Tanenbaum, Computer Networks.
4. William Stallings, Data and Computer Communications.

Course	Code	L	T	P	Credits
Artificial Intelligence	**ITT351**	**3**	**0**	**0**	**3**

Course Outcomes (COs):

CO1: Gain historical perspective of AI and its formation.
CO2: Introduce the basic principles of AI problem solving.
CO3: Apply basic principles in problem solving, inference, perception, knowledge representation and learning.
CO4: Investigate applications of AI techniques in intelligent agents, expert systems, machine learning models.
CO5: AI development tools and techniques.

Syllabus:

UNIT I - INTRODUCTION:
Introduction to AI and intelligent agents.Problem Solving : Solving Problems by Searching, heuristic search techniques, constraint satisfaction problems, stochastic search methods, adversarial search,Game playing : minimax, alpha-beta pruning.

UNIT II - KNOWLEDGE REPRESENTATION AND REASONING:
Building a Knowledge Base : Propositional logic, first order logic, Theorem Proving in First Order Logic. Production Systems, Semantic Nets, Frames and Scripts Formalisms. Resolution in Predicate Logic, Unification, Strategies for Resolution by Refutation. Knowledge Acquisition and learning: Learning from examples and analogy, Rote learning, Neural Learning, Integrated Approach. Planning, partial order planning. Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

UNIT III - INTRODUCTION TO MACHINE LEARNING:
Machine Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning. Introduction to Probability, Basics Linear Algebra, Statistical Decision Theory – Regression & Classification, Bias – Variance, Overfitting and complexity; training, validation, test data.

UNIT IV - EXPERT SYSTEM:
Existing Systems (DENDRAL, MYCIN), domain exploration, Meta Knowledge, Expertise Transfer, Self Explaining System.Fuzzy logic: Fuzzy Logic Propositional logic, Membership functions, Fuzzy logic, Fuzzy rule generation, De-fuzzification, Time dependent fuzzy logic, Temporal fuzzy logics, Case study-to use fuzzy logic for processes control problem Programming Language: Introduction to programming Language- LISP, PROLOG

UNIT V - NEURAL NETWORKS:
Overview of different forms of learning, Learning Decision Trees, Neural Networks- Basics of

Neural Networks: Perceptrons, Feedforward nets Backpropagation algorithm, preliminary understanding of unsupervised learning.

Pattern Recognition: Introduction to Pattern Recognition, Structured Description, Symbolic Description, Machine perception, Line Finding, Interception, Semantic & Model, Object Identification, Speech Recognition.

Text Books:

1. Rich & Knight, "Artificial Intelligence".
2. Elamie, "artificial Intelligence", Academic Press.

Reference Books:

1. Char nick "Introduction to Artificial Intelligence", Addision Wesley.
2. Winston, "LISP", Addison Wesley.

Course	Code	L	T	P	Credits
Computer Graphics	ITT352	3	0	0	3

Course Outcomes (COs):

CO1: Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
CO2: Provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
CO3: Use of geometric transformations on graphics objects and their application in composite form.
CO4: Extract scene with different clipping methods and its transformation to graphics display device.
CO5: Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
CO5: Render projected objects to naturalize the scene in 2D view and use of illumination models for this.

Syllabus:

UNIT I - INTRODUCTION:
computer graphics, Co-ordinate representation, Pixel, Raster Scan & Random Scan methods, color, CRT Raster, scan basics, video basics, interactive devices, graphics input and output devices, mouse, track ball, light pen, digitizer, thumb wheel, raster scan graphics, applications.

UNIT II - Line GENERATION:
Points and lines generation algorithm, DDAlines drawing algorithm, Bresenham's lines drawing algorithm, circle generating algorithm, midpoint circle algorithm,midpoint ellipse generating algorithm, other curves, conic sections, polynomial and spline curves, Pixels addressing, filled-area primitives, scan-line polygon filled algorithms, inside-outside tests, scan-line fill of curved boundary algorithms,boundary fill algorithms,flood-fill algorithms, fill-area functions, character generation.

UNIT III - SEGMENTS:
Segments table, Creating, Deleting and renaming a segment Visibility, Image transformation.

UNIT IV - TRANSFORMATION:
2D Transformation, An introduction to 3D transformation, Projections, Light, color and shading.

UNIT V - WINDOWING AND CLIPPING:
Viewing transformation, Clipping. Generalized clipping IN 2D.
Hidden line and surfaces: Back-face Removal Algorithms, Hidden line methods
Rendering and Illumination: Introduction to curve generation, Bezier, Hermite and B-spline algorithms and their Comparisons

Text Books:

1. Computer Graphics (Principles and Practice) by Foley, van Dam, Feinerand Hughes, Addisen Wesley.
2. Computer Graphics by D Hearn and P M Baker, Printice Hall of India.
3. Mathematical Elements for Computer Graphics by D F Rogers, McGraw Hill
4. Procedural Elements for Computer Graphics by D F Rogers, McGraw Hill

Course	Code	L	T	P	Credits
Big Data	**ITT353**	**3**	**0**	**2**	**4**

Course Outcomes (COs):

CO 1: Understand Big Data, its platform and its use cases .
CO 2: Provide an overview of Apache Hadoop ,HDFS Concepts and Interfacing with HDFS
CO 3: Understanding Data Sciences and Data life cycle
CO 4: Understanding and Using Supervised and Unsupervised Learning Algorithms
CO 5: Tools and Technologies for Unstructured Data Analytics
CO 6: Implementing Machine Learning algorithms using Python

Syllabus:

Unit I - INTRODUCTION:

Big Data Overview, Introduction to the Big Data problem. Current challenges, trends, and applications, Algorithms for Big Data analysis. Data sets, Mining and learning algorithms that deal with large datasets Technologies for Big Data management. Big Data technology and tools, special consideration made to the Map-Reduce paradigm and the Hadoop ecosystem.

Unit II - DATA SCIENCE:

What is data sciences, The rising and importance of data sciences, Big data analytics in industry verticals, Data Analytics Lifecycle and methodology, Data Understanding, Data Preparation.

Unit III - MODELING:

Evaluation, Communicating results, Deployment, Data exploration & preprocessing.

Unit IV - MEASURES AND EVALUATION:

Data Analytics: Theory & Methods, Supervised learning, Linear/Logistic regression, Decision trees, Naïve Bayes, Unsupervised learning, K-means clustering, Association rules

Unit V - UNSTRUCTURED DATA ANALYTICS:

Technologies & tools, Text mining, Web mining, Operationalizing an Analytics project, Data Visualization Techniques, Creating final deliverables
Term project: Using Amazon AWS, BlueMix, Cognos, Biginsights.

Text Books:

1. Big Data: A Revolution That Will Transform How We Live, Work, and Think by Viktor Mayer-Schönberger, Kenneth Cukier.

2. Hadoop: The Definitive Guide by Tom White (Goodreads Author), Doug Cutting , oreily
Publiactions.
3. Real-Time Big Data Analytics: Emerging Architecture [Kindle Edition], Mike Barlow

Course	Code	L	T	P	Credits
Object-Oriented Programming II with Java	**ITT354**	**3**	**0**	**0**	**3**

Course Outcomes (COs):

CO1: Understand various basics related to java programming, object-oriented programming and other concepts like JVM, JVM architecture, JIT compilation.
CO2: Understand the underlying principles of object-oriented programming like abstraction, polymorphism etc and getting familiar with various java classes. Learn to define and import packages, implement interfaces.
CO3: Getting familiar with exception and string handling in java. Study creation, concatenation and conversion of a string, searching and modification, string comparison. String Buffer and StringBuilder classes and Date class.
CO4: Have detailed knowledge on concurrent programming and file handling. Study various data collectors available in java like ArrayList, LinkedList, Queue etc. Understanding thread execution, multithreading, thread priorities and scheduling, synchronization. Understanding file handling, creating, writing, reading, updating, touching and deleting files, Byte Streams and Character Streams, InputStream & OutputStream classes and their subclasses, Reader and Writer classes and their subclasses.
CO5: Be familiar with graphical components like buttons, labels, events, windows etc through which user can interact with the applications. Working with controls and layout managers, event handling and data validation.

Syllabus:

UNIT I - INTRODUCTION:

What is Java? Background/History of Java, Java Virtual Machine, JVM Architecture, Byte code, HotSpot JVM and JIT Compilation, Basics of OOP. Introduction to Classes and Objects. Data types. Garbage collection: Eden space, Survivor Space, Tenured generation, Permanent generation, Code cache, loops and flow control.

UNIT II - OBJECT ORIENTED PROGRAMMING CONCEPTS:

Abstraction, Encapsulation, Polymorphism and Overloading, Constructors and destructors scope of declarations, Access Control, Nested and Inner classes. Array handling. Using extends keyword, subclass, super-class, over- riding methods, dynamic method dispatch, The Object class, Abstract and final classes. Packages: defining, importing, Access Control. Interface: Defining, Implementing and applying interface. Wrapper classes.

UNIT III - EXCEPTION AND STRING HANDLING:

Basic exceptions, user defined exceptions, catching exceptions – try, catch and multi try catch, throwing and re-throwing, finally clause. String Handling: Creation, concatenation and conversion of a string, searching and modification, string comparison. StringBuffer and StringBuilder classes and Date class.

UNIT IV - CONCURRENT PROGRAMMING AND FILE HANDLING:

Generics & Collections: List interface, ArrayList, LinkedList, Queue, Stack,
Threads: Create new threads – extending java.lang.Thread, implementing java.lang.Runnable Interface, Understanding thread execution, multithreading, thread priorities and scheduling, synchronization Introduction to java.util.concurrent classes and interface and using java.util.concurrent.Callable interface. Introduction to Fork-Join Framework.
File handling, Creating, writing, reading, updating, touching and deleting files, Byte Streams and Character Streams, InputStream & OutputStream classes and their subclasses, Reader and Writer classes and their subclasses.

UNIT V - GUI COMPONENTS:
Introduction to AWT and Swing, frames, panels, buttons and events, layout managers, text fields, labels. Working with controls and layout managers, event handling and data validation, Applets. Introduction to JavaFx.

Text Books:
1. Java for Programmers, P.J. Dietel, H. M. Dietel, Pearson Education.
2. Java SE 6, Joel Murach, A. Steelman, SPD Pvt. Ltd.
3. Head first java, Kathy Sierra, Bert Bates, Oreilly.
4. Core Java, Cay Horstman and Gary Cornell, Prentice Hall

Course	Code	L	T	P	Credits
Computer Networks Lab	**ITL355**	**0**	**0**	**2**	**1**

Course Outcomes (COs):

CO1: Understand colour coding of guided media and create crossover and straight through cable.
CO2: Implement basic network utilities and analyse network traffic using Wireshark tool.
CO3: Hands-on Cisco Packet Tracer by building basic networks and configuring internetworking devices like router, switch.
CO4: Implement static and dynamic routing in Packet Tracer and configure access control lists.
CO5: Simulate wireless networks using NS3.

Syllabus:

1. Study and implementation of colour coding standards of guided media (UTP).
2. Implementation and understanding of basic network utilities: ping, ipconfig/ifconfig, mstsc, nslookup, tracert.
3. Network traffic capture and analysis using Wireshark.
4. Introduction to Cisco Packet Tracer: Building a LAN with HUBs and Switches, understand and implement address learning in switches.
5. Router Configuration Using Packet Tracer, IP addressing (static and dynamic), subnetting.
6. Static/Dynamic Route Configuration.
7. Implementation of routing protocols (RIP, OSPF, BGP).
8. Standard access control list (ACL) configuration, Extended access control list (ACL) configuration.
9. Implementation of flow control protocols.

Course	Code	L	T	P	Credits
Artificial Intelligence Lab	**ITL356**	**0**	**0**	**2**	**1**

Course Outcomes (COs):

CO1: Understand simple facts and variables.
CO2: Implement and apply simple predicates, predicate inference and goal queries
CO3: Demonstrate the proficiency in applying scientific methods to models of machine learning.

Syllabus:

AI PYTHON LAB CONTENTS

1. Input & Output
2. Operators and Arithmetic
3. Facts & Variables
4. Simple facts and facts with arguments
5. Rules & Predicates
6. Simple Predicates, Predicate Inference, Goal queries
7. Recursion
8. Graph Traversal
9. Depth First Search, Breadth First Search

Course	Code	L	T	P	Credits
Computer Graphics Lab	**ITL357**	**0**	**0**	**2**	**1**

Course Outcomes (COs):

CO1: Understand the basic concepts of computer graphics.
CO2: Design scan conversion problems using C programming.
CO3: Apply clipping and filling techniques for modifying an object.
CO4: Understand the concepts of different type of geometric transformation of objects in 2D and 3D.
CO5: Understand the practical implementation of modeling, rendering, viewing of objects in 2D

Syllabus:

1. Point drawing to understand co-ordinate system of display device.
2. To implement Bresenham's algorithms for line generation.
3. To implement DDA algorithm for line generation.
4. To implement midpoint circle generation algorithm
5. To implement midpoint ellipse generation algorithm
6. To implement flood-fill and boundary fill algorithm.
7. To perform 2D Transformations such as translation,
8. To perform 2D Transformations such as rotation,
9. To perform 2D Transformations such as scaling,
10. To perform 2D Transformations such as reflection
11. To perform 2D Transformations such as shearing.
12. To implement Cohen-Sutherland 2D clipping and window-viewport mapping.
13. To perform 3D Transformations such as translation, rotation and scaling.
14. To visualize projections of 3D images.
15. To convert between color models.
16. To implement text compression algorithm using librarires.
17. To implement image compression algorithm using librarires.
18. To perform animation using any Animation software.
19. To perform basic operations on image using any image editing software.
20. Implementation of viewing/rendering pipeline.

Course	Code	L	T	P	Credits
Object-Oriented Programming II with Java Lab	**ITL358**	**0**	**0**	**2**	**1**

Course Outcomes (COs):

CO1: Implementing the underlying principles of object-oriented programming like abstraction, polymorphism etc and various java classes.
CO2: Learn to define and import packages, implement interfaces.
CO3: Implementing exception handling, creating user defined exceptions, catching exceptions. Creation, concatenation and conversion of a string, searching and modification, string comparison. Implementing String Buffer and StringBuilder classes and Date class.
CO4: Using various data collectors available in java like ArrayList, LinkedList, Queue etc. Implementing multithreading, thread priorities and scheduling, synchronization. Implementing various file handling, creating, writing, reading, updating, touching and deleting files, Byte Streams and Character Streams, InputStream & OutputStream classes and their subclasses, Reader and Writer classes and their subclasses.
CO5: Executing graphical components like buttons, labels, events, windows etc through which user can interact with the applications.

Syllabus:

1. Java package with simple stack and queue class

2. Complex number manipulation

3. Date class similar to java.util package
4. Implementing dynamic polymorphism in java
5. Java interface for ADT stack
6. Developing a simple paint like program using applet
7. Developing a scientific calculator
8. Developing a template for linked list
9. Develop a multi threaded producer consumer Application
10. Generating prime numbers and Fibonacci series
11. Multithreaded GUI application