MAHATMA GANDHI INSTITUTE OF TECHNOLOGY(Autonomous)
Gandipet, Hyderabad – 500075

DEPARTMENT OF INFORMATION TECHNOLOGY

List of Open Electives Offered by IT Department to CSB, CSD and CSM branches under MR-21 Regulation

VI Semester Open Elective-I for CSB, CSM and CSD branches

S.No	Code	Name of the Course
1	IT631OE	Biometrics
2	IT632OE	Cyber Forensics
3	CS631OE	Data Structures

VII Semester Open Elective-II for CSB, CSM and CSD branches

S.No	Code	Name of the Course
1	IT731OE	Human Computer Interaction
2	CS731OE	Computer Networks
3	CS733OE	Java Programming

VIII Semester Open Elective-III for CSB, CSM and CSD branches

S.No	Code	Name of the Course
1	IT831OE	Computer Graphics
2	CS831OE	Python Programming
3	CS833OE	Introduction to Machine Learning

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Open Elective for other Departments
VI Semester Syllabus
IT631OE : Biometrics
(Open Elective-I)
(Common to CSB, CSM & CSD)

Course Objectives:

- Will learn the biometric technologies.
- Learn the computational methods involved in the biometric systems.
- Learn methods for evaluation of the reliability and quality of the biometric systems..

Course Outcomes:

- Identify the various Biometric technologies.
- Design of biometric recognition for the organization.
- Develop simple applications for privacy.
- Understand the watermarking techniques of biometrics.
- Understand the research on biometric techniques.
- Understand the need of biometric in the society.

Unit – I : Introduction & Handwritten Character Recognition :

Introduction, history, type of Biometrics, General Architecture of Biometric Systems, Basic Working of biometric Matching, Biometric System Error and performance Measures, Design of Biometric Systems, Applications of Biometrics, Benefits of Biometrics Versus Traditional Authentication Methods, character Recognition, System Overview, Gesture Extraction for character Recognition, Neura: Network for handwritten Character Recognition, Multilayer Neural Network for Handwritten Character Recognition, Devanagari Numeral Recognition, Isolated Handwritten Devanagari Character Recognition suing Fourier Descriptor and Hidden Markov Model.

Unit – II : Face Biometrics & Retina and Iris Biometrics :

Introduction, Background of Face Recognition, Design of Face Recognition System, Neural Network for Face Recognition, Face Detection in Video Sequences, Challenges in Face Biometrics, Face Recognition Methods, Advantages and Disadvantages, Performance of Biometrics, Design of Retina Biometrics, Iris Segmentation Method, Determination of Iris Region, Experimental Results of Iris Localization, Applications of Iris Biometrics, Advantages and Disadvantages. Vein and Fingerprint Biometrics & Biometric Hand Gesture Recognition for Indian Sign Language. Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages, Basics of Hand Geometry, Sign Language, Indian Sign Language, SIFT Algorithms- Practical Approach Advantages and Disadvantages.

Unit– III : Privacy Enhancement Using Biometrics & Biometric Cryptography And MultimodalBiometrics :

Introduction, Privacy Concerns Associated with Biometric Developments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy

Soft Biometrics - Introduction to Biometric Cryptography, General Purpose Cryptosystem, Modern

Cryptography and Attacks, Symmetric Key Ciphers, Cryptographic Algorithms
Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics Characters, AADHAAR : An Application of Multimodal Biometrics.

Unit – IV : Watermarking Techniques & Biometrics :

Scope And Future Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics -Biometrics, and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometric, Radio Frequency Identification Biometrics, DNA Biometrics, Comparative Study of Various Biometrics Techniques.

Unit – V : Image Enhancement Techniques & Biometrics Stands :

Introduction, current Research in image Enhancement Techniques, Image Enhancement, Frequency Domain Filters, Databases and Implementation, Standard Development Organizations, Application Programming Interface, Information Security and Biometric Standards, Biometric Template Interoperability.

Suggested Readings :

1. G R Sinha and Sandeep B. Patil, “Biometrics: concepts and applications”, Wiely, 2013.
2. Paul Reid, “Biometrics for Network Security”, Pearson Education.

Reference Books:

1. Samir Nanavathi, Micheal Thieme and Raj Nanavathi, “Biometrics, Identity verification in a networkedWorld”, Wiley, dream Tech.
2. John D. Woodward and Jr. Wiley, “Biometrics, The Ultimate Reference.”, Dreamtech

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Open Elective for other Departments
VI Semester Syllabus
IT622OE : Cyber Forensics
(Open Elective-I)
(Common to CSB, CSM & CSD)

Course Objectives :

- A brief explanation of the objective is to provide digital evidences which are obtained from digital media.
- In order to understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- According to a snippet from the United States Security Service, the functions computer has in different kinds of crimes.

Course Outcomes :

- Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations.
- It gives an opportunity to students to continue their zeal in research in computer forensics

Unit – I : Introduction of Cybercrime :
Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

Unit – II : Initial Response and forensic duplication :
Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

Unit – III : Forensics analysis and validation :
Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions
Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

Unit – IV : Current Forensic tools :
Evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software
E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.
Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

Unit – V : Working with Windows and DOS Systems :

Understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines

Suggested Readings :

1. Kevin Mandia, Chris Prosise, "Incident Response and computer forensics", Tata McGraw Hill, 2006.
2. John R. Vacca, "Computer Forensics, Computer Crime Investigation", Firewall Media, NewDelhi.
3. Nelson, Phillips Enfinger, Steuart, "Computer Forensics and Investigations", CENGAGE Learning

Reference Books:

1. Keith J. Jones, Richard Bejtiich, Curtis W. Rose, "Real Digital Forensics", Addison- Wesley Pearson Education
2. Tony Sammes and Brian Jenkinson, "Forensic Compiling, A Tractitioneris Guide", Springer International edition.

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Open Elective for other Departments
VI Semester Syllabus
CS621OE : Data Structures
(Open Elective-I)
(Common to CSB, CSM & CSD)

Prerequisites: Any programming language

Course Objectives :

- Exploring basic data structures such as stacks and queues.
- Introduces a variety of data structures such as trees and graphs
- Understand the concepts of heaps and tries.
- Introduces sorting and pattern matching algorithms.

Course Outcomes:

Student will be able to:

- Understand basic data structures such as arrays, linked lists, stacks and queues.
- Describe the hash function and concepts of collision and its resolution methods.
- Understand, design and implement the general tree data structures with their applications.
- Solve problem involving graphs, trees and heaps.
- Implement and know the application of algorithms for sorting and pattern matching

Unit – I :

Introduction: Data structures-definition and types, Static and Dynamic representation of data structure and comparison. **Stack:** definition, operations on stacks, Notations- Infix, Prefix and Postfix representation. Infix to Postfix conversion example. Evaluation of Postfix expression example.

Unit – II :

Hashing: Hash Functions, collision resolution techniques- Separate Chaining, Open Addressing-Linear probing, Quadratic Probing, Double Hashing. Rehashing, Extensible Hashing.

Dictionaries: Linear list representation, skip list representation, operations - insertion, deletion and searching.

Unit – III :

Trees: Basic terminology, Types of trees: Binary Tree, Complete and Full Binary Tree, Extended Binary Trees, Threaded Binary Trees. **Search Trees**: Binary Search Trees, Definition, Implementation, Operations-Searching, Insertion and Deletion, Splay Trees-Insertion.

Unit – IV :

Graphs-Basic terminology, Representation of graphs, **Graph Traversals**-Breadth First Search, Depth First Search with algorithms.

Sortings: Heap Sort, External Sorting- Model for external sorting, Merge Sort.

Unit – V :

Pattern matching and Tries: Pattern matching algorithms-Brute force, the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm, Standard Tries, Compressed Tries, Suffix tries

Suggested Readings :

1. Horowitz and Sahani, Fundamentals of Data Structures, Galgotia Publications Pvt Ltd Delhi India.
2. Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C and C++, PHI Learning Private Limited, Delhi India.

Reference Books:

1. Richard F.Gillberg & Behrouz A. Forouzan, Data Structures, A Pseudo code Approach with C, Second Edition, Cengage Learning, India Edition, 2005.
2. Aaron M. Tenenbaum,Yedidyah Langsam and Moshe J. Augenstein, Data Structures Using C and C++, PHI Learning Private Limited, Delhi India.
3. Seymour Lipschutz, Schaum's Outlines ,Data Structures, Special Second Edition,Tata McGraw-Hill,.

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Open Elective for other Departments
VII Semester Syllabus
IT721OE : Human Computer Interaction
(Open Elective-II)
(Common to CSB, CSM & CSD)

Course Objectives:

- To gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface. Be able to apply models from cognitive psychology to predicting user performance in various human- computer interaction tasks and recognize the limits of human performance as they apply to computer operation.
- Appreciate the importance of a design and evaluation methodology that begins with and maintains a focus on the user.
- Be familiar with a variety of both conventional and non-traditional user interface paradigms, virtual and augmented reality, mobile and wearable computing, and ubiquitous computing.
- Understand the social implications of technology and their ethical responsibilities as engineers in the design of technological systems.
- Working in small groups on a product design from start to finish will provide you with invaluable team- work experience.

Course Outcomes:

- Understand the importance of Graphical user interface and human characteristics in design and how people interact with computers.
- Students can articulate and apply common design principles for making good decisions in the design of user interfaces.
- Understand various kinds of components that are available in the screens and windows and their characteristics and have an ability to select the proper device based and screen based controls. Design effective HCI for individuals and persons with disabilities
- Ability to design multimedia/ ecommerce/ e-learning Web sites

Unit – I : Importance of user Interface :

Defining the User Interface, importance of good design: Benefits of good design, The Blossoming of the World Wide Web: A brief history of Screen design.

Characteristics of Graphical and Web User Interfaces: Introduction of the graphical user interface, The Graphical User Interface: popularity of graphics, the concept of direct manipulation

Graphical Systems: Advantages and Disadvantages, Characteristics of the Graphical User Interface,

The Web user Interface: The Popularity of the Web, Characteristics of a Web Interface.

Unit – II : The User Interface Design Process :

Know Your User or Client: Human interaction with computers, importance of human characteristics in Design, Human Considerations in the Design of Business Systems, Human interaction speeds.

Understand the Business Function: Determining Basic Business Functions

Understand the Principles of Good Interface and Screen Design: Human Considerations in Interface and Screen Design: Screen and Web Page Meaning and Purpose, Organizing Elements Clearly and Meaningfully, Ordering of Data and Content, Navigation and Flow, Visually Pleasing Composition , Focus and Emphasis, Presenting Information Simply and Meaningfully

The Web — Web sites and Web Pages: Browsing and Searching, Statistical Graphics, Technological Considerations in Interface Design.

Unit – III : The User Interface Design Process :

Develop System Menus and Navigation Schemes: Web Site Navigation, Kinds of Graphical Menus

Select the Proper Kinds of Windows: Window Characteristics, Components of a Window, Window

Presentation Styles, Types of Windows, Organizing Window Functions, The Web and the Browser, Select the Proper Interaction Devices, Choose the Proper Screen-Based Controls

Write Clear Text and Messages: Words, Sentences, Messages, and Text, Content and Text for Web Pages.

Create Meaningful Graphics, Icons, and Images: Icons, Multimedia

Graphics Choose the Proper Colors: Color Uses, Possible Problems with Color, Choosing Colors for Textual Graphic Screens, Choosing Colors for Statistical Graphics Screens, Choosing Colors for Web Pages

Unit – IV : HCI in the software process :

The software life cycle, Usability engineering, Iterative design and prototyping-**Design Focus:** Prototyping in practice, Design rationale,

Design rules: Principles to support usability, Standards, Golden rules and heuristics,

HCI patterns. Evaluation techniques: Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, choosing an evaluation method.

Universal design: Universal design principles, Multi-modal interaction- Design Focus: Designing websites for screen readers, Design Focus: Choosing the right kind of speech

Design Focus: Apple Newton

Unit – V : Cognitive models :

Goal and task hierarchies, Design Focus: GOMS saves money, Linguistic models, The challenge of display- based systems, Physical and device models, Cognitive architectures.

Ubiquitous computing and augmented realities: Ubiquitous computing applications research.

Design Focus: Ambient Wood – augmenting the physical, Design Focus: Shared experience, Virtual and augmented reality, Applications of augmented reality, Information and data visualization, Getting the size right.

Suggested Readings:

1. Wilbert O Galitz, “The essential guide to user interface design”, Wiley Dream Tech. Units 1, 2, 3
2. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, “Human – Computer Interaction”, Pearson Education Units 4,5

Reference Books:

1. Ben Shneidermann, “Designing the user interface”, Pearson Education Asia, 3rd Edition
2. Rogers, Sharps. “Interaction Design Prece”, Wiley Dreamtech.
3. Soren Lauesen , “User Interface Design”, Pearson Education.
4. D. R. Olsen, “Human –Computer Interaction”, Cengage Learning.
5. Smith - Atakan, “Human –Computer Interaction”, Cengage Learning

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Open Elective for other Departments
VII Semester Syllabus
CS721OE : Computer Networks
(Open Elective-II)
(Common to CSB, CSM & CSD)

Course Objectives:

- Familiarize the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Identify the Error detection and correction techniques in Data Link Layer.
- Analyze the knowledge of routing algorithms.
- Understand the connection management of TCP&UDP Protocols.
- Ability to understand the concepts of DNS & Electronic Mail.

Course Outcomes:

- Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
- Gain the knowledge of Error detection and correction techniques.
- Gain the knowledge of routing algorithms.
- Gain the knowledge of TCP&UDP connection management.
- Gain the knowledge of DNS & Electronic Mail.

Unit –I :
Network hardware, Network software, OSI, TCP/IP Reference models, Example Networks: ARPANET, Internet.
Physical Layer: Guided Transmission media: twisted pairs, coaxial cable, fiber optics, Wireless transmission.

Unit – II :
Data link layer: Design issues, framing, Error detection and correction.
Elementary data link protocols: simplex protocol, A simplex stop and wait protocol for an error-free channel, A simplex stop and wait protocol for noisy channel.
Sliding Window protocols: A one-bit sliding window protocol, A protocol using Go-Back-N, A protocol using Selective Repeat, Example data link protocols.
Medium Access sub layer: The channel allocation problem,
Multiple access protocols: ALOHA, Carrier sense multiple access protocols, collision free protocols. Wireless LANs, Data link layer switching.

Unit– III :
Network Layer: Design issues, Routing algorithms: shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing, Congestion Control Algorithms, Quality of Service, Internetworking, The Network layer in the internet.

Unit–IV:
Transport Layer: Transport Services, Elements of Transport protocols,
Connection management, TCP and UDP protocols.

Unit–V :

Application Layer –Domain Name System, SNMP,
Electronic Mail; the World WEB, HTTP, Streaming audio and video.

Suggested Readings :

1. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition.Pearson Education / PHI
2. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
2. "Data and Computer Communications" by William Stallings 9th Edition, Pearson Education 2010.
3. "TCP/IP Illustrated" by W. Richard Stevens,Addison-Wesley Professional; 2nd edition 2011.

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Course Objectives :

Open Elective for other Departments
VII Semester Syllabus
CS723OE: Java Programming(Open Elective-II)
(Except CSE,IT, CSBS,CS(AI&ML),CS(Data Science)

Course Objectives:

- To understand object-oriented programming concepts using Java.
- To implement the concepts of packages and interfaces
- To introduce the concepts of exception handling and multithreading
- To describe various data manipulation operations using collection framework
- To develop Graphical User Interface applications using applets and swing controls

Course Outcomes:

- Able to solve real world problems using OOP techniques.
- Able to implement the concepts of packages and interfaces
- Able to develop multithreaded applications with synchronization
- Able to solve problems using java collection framework
- Able to design GUI based applications

Unit – I :

Object-Oriented Thinking- Introduction to Object-Oriented concepts, Java buzzwords, An Overview of Java, Data types, Variables and Arrays, operators, expressions, control statements, Introducing classes: Class fundamentals, Declaring objects, introducing Methods, Constructors, and this keyword, method overloading, String handling.
Inheritance– Inheritance basics, using super, method overriding, dynamic method dispatch, using abstract class, using final with inheritance and Object class.

Unit – II :

Packages- Defining a Package, CLASSPATH, Access protection, importing packages.
Interfaces- defining an interface, implementing interfaces, Nested interfaces, applying interfaces, variables in interfaces, extending interfaces, default interface methods, use static methods in an interface
Exception handling - Fundamentals of exception handling, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built- in exceptions, creating own exception sub classes.

Unit – III :

Multithreading- Differences between thread-based multitasking and process-based multitasking, Java thread model, creating threads, thread priorities, synchronizing threads, inter thread communication.
Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files,generics.

Unit – IV :

The Collections Framework (java.util)- Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set. Collection algorithms, Arrays, The Legacy Classes,
More Utility classes, String Tokenizer,Random, Scanner.

Unit – V :

GUI Programming with Swing – Introduction to AWT, components, containers.
Understanding Layout Managers, Flow Layout, Border Layout, Grid Layout, Card Layout, Grid Bag Layout.

Event Handling- The Delegation event model- Events, Event sources, Event Listeners, Event classes, Handling mouse and keyboard events.**A Simple Swing Application**, Applets – Applets and HTML, Security Issues, Applets and Applications, passing parameters to applets, Creating a Swing Applet, Painting in Swing, A Paint example.

Suggested Readings :

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd 2014.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education 2000.

Reference Books:

1.Y. Daniel Liang, Introduction to Java programming, Pearson Education 2013.
2. P. Radha Krishna Object Oriented Programming through Java, University Press 2007.
3. S. Malhotra, S. Chudhary, Programming in Java, 2nd edition, Oxford Univ. Press 2013.

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Open Elective for other Departments
VIII Semester Syllabus

IT821OE : Computer Graphics
(Open Elective – III)

Course Objectives :

- The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
- Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;
- To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
- To learn the basic principles of 3- dimensional computer graphics.
- To be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

Course Outcomes :

- Acquire familiarity with the relevant mathematics of computer graphics better analogy data with pictorial representation.
- able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications
- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.
- Use of geometric transformations on graphics objects and their application in composite form.

Unit – I:
Introduction to CG :
Introduction, **Application areas of Computer Graphics**, **Overview of graphics systems: video-display devices:** CRT, Vector scan/random scan display, raster scan display, colour CRT monitors, direct view storage tubes, flat panel displays
Raster-scan systems: Raster scan display system with video controller Random scan systems, graphics monitors and work stations and input devices.
Output primitives: Points and lines
line drawing algorithms: 1.vector generation/digital analyzer (DDA)Algorithm, 2.bresenham's line algorithm**,**
Antialiasing: 1. super sampling considering zero line width, 2.super sampling considering finite line width, 3.supersampling with pixel-weighting mask, 4.unweighted area sampling, 5.weghted area sampling, 6.filtering techniques
Circle generation algorithms: mid-point circle and ellipse algorithms**.**
Filled area primitives: representation of polygons, entering polygons, an inside test Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms**.**

Unit – II: 2D Transformation :
2-D Geometrical transforms: Translation, scaling, rotation, reflection and shear transformations**,** matrix representations and homogeneous coordinates, composite transforms,
Transformations between coordinate systems: co-ordinate systems, transformation between two Cartesian frames of references
2D Viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation**,** 2Dviewing functions**.**

2D Clipping: point clipping, line clipping, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

Unit – III: 3D Transformation :

3-D Object representation: Polygon surfaces-polygon tables, plane equations, polygon meshes

Quadric Surfaces: Spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces.

Basic illumination models: Diffuse illumination, point source illumination, specular reflection, combined diffuse and specular reflection**.**

Polygon Rendering Methods: Constant-intensity shading, gouraud shading, polygon shading, halftone shading.

3- Composite transformations: Rotation about arbitrary axis, reflection with respect to given plane

3-D viewing: Viewing pipeline, viewing coordinates, transformation from world co ordinate to viewing co ordinates.

Projections: Parallel projections, perspective projections, types of parallel projections, types of perspective projections, view volume and general projection transforms.

3D clipping:3D midpoint subdivision algorithm.

D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations.

Unit – IV: Surface Detection and Rendering :

Visible surface detection methods: Classification, back-face detection, depth-buffer, scan-line algorithm, depth sorting, BSP-tree methods, Area sub-division algorithms: warnock's algorithm, weiler-atherton algorithm, buffer algorithm. Octree methods: Octree in space,octree in the view plane Illumination Models and Surface rendering Methods: Basic illumination models, polygon rendering methods

Unit – V: Animation :

Computer animation: Design of animation sequence, general computer animation functions, raster animations, computer animation languages,

Key frame systems: Morphing, motion specifications: goal directed systems, kinematics and dynamics

Suggested Readings :

1. Donald Hearn and M. Pauline Baker, "Computer Graphics C version", Pearson education
2. Zhigand xiang, Roy Plastock, Schaum's outlines , "Computer Graphics Second edition", Tata McGrawhill edition

Reference Books:

1. C. Foley, VanDam, Feiner and Hughes , "Computer Graphics Principles & practice", Pearson Education. second edition
2. David F Rogers, "Procedural elements for Computer Graphics", Tata Mc Graw hill, 2nd edition
3. Neuman and Sproul ,"Principles of Interactive Computer Graphics", TMH.
4. Shalini, Govil-Pai, "Principles of Computer Graphics", Springer

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Open Elective for other Departments
VIII Semester Syllabus

CS821OE: Python Programming (Open Elective – III)

((Except CSE,IT,CSBS,CS(AI&ML), CS(Data Science))

Course Objectives :

- To learn about Python programming language syntax, semantics, and the runtime environment
- To be familiarized with universal computer programming concepts like data types, containers
- To be familiarized with general computer programming concepts like conditional execution, loops & functions
- To be familiarized with general coding techniques and object-oriented programming

Course Outcomes :

- Develop essential programming skills in computer programming concepts like data types, containers.
- Apply the basics of programming in the Python language.
- Solve coding tasks related Exceptions and Functions.
- Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming.
- Solve coding tasks related to GUI Programming.

Unit – I :

Introduction: Introduction to Python, Program Development Cycle, Input, Processing, and Output, Displaying Output with the Print Function, Comments, Variables, Reading Input from the Keyboard, Performing Calculations, Operators. Type conversions, Expressions, More about Data Output.

Data Types and Expression: Strings Assignment, and Comment, Numeric Data Types and Character Sets, Using functions and Modules.

Decision Structures and Boolean Logic: if, if-else, if-elif-else Statements, Nested Decision Structures, Comparing Strings, Logical Operators, Boolean Variables.

Repetition Structures: Introduction, while loop, for loop, Input Validation Loops, Nested Loops.

Unit – II :

Sequences: Introduction to Sequences: Strings, Lists, and Tuples, Mapping, Set Types and Dictionaries

String: Strings and Operators, Built-in Methods and Special Features of String. Related Modules.

Lists: Operators, Built-in Functions, List Type Built in Methods, Special Features of List, Related Modules

Tuples: Built-in Functions, Tuple Type Built in Methods, Special Features of Tuples, Related Modules

Mapping and Set Type: Dictionaries, Dictionary Keys, Operators and Built-in Methods. Set type, Operator and Built in Methods. Related Modules.

Unit – III :

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Redefined Clean-up Actions.

Functions: What are Functions, Defining and Creating functions, Function Arguments: Formal and Variable length, Calling functions, Recursive Functions and Variable Scope.

Modules: Modules, Standard Modules, Importing Modules, Namespaces and Packages.

Unit – IV :

File Operations: Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Object Oriented Programming: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Design with Classes: Objects and Classes, Data modelling Examples, Case Study An ATM, Structuring Classes with Inheritance and Polymorphism.

Unit – V :

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs.

Suggested Readings :

1. Fundamentals of Python First Programs, Kenneth. A. Lambert, Cengage, 2016.
2. Python Programming: A Modern Approach, VamsiKurama, Pearson, 2018.

Reference Books:

1. Introduction to Python Programming, Gowrishankar.S, Veena A, CRC Press, 2019.
2. Introduction to Programming Using Python, Y. Daniel Liang, Pearson, 2017.
3. Core Python Programming, Wesley J.Chun, Second Edition ,Pearson 2007.

e-Resources: https://www.tutorialspoint.com/python3/python_tutorial.pdf

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Open Elective for other Departments
VIII Semester Syllabus
CS823OE: Introduction to Machine Learning
(Open Elective-III)
(Except CSE,IT,CSBS,CS(AI&ML),CS(Data Structures))

Prerequisites

1. Data Structures
2. Knowledge on statistical methods

Course Objectives :

- This course explains machine learning techniques such as decision tree learning, Bayesian learning etc.
- To understand computational learning theory.
- To study the pattern comparison techniques

Course Outcomes :

- Understand the concepts of computational intelligence like machine learning
- Ability to get the skill to apply machine learning techniques to address the real time problems in different areas
- Understand the Neural Networks and its usage in machine learning application.

Unit – I :

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning–Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning ,inductive bias in decision tree learning, issues in decision tree learning.

Unit – II :

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

Unit – III :

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory–Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression,

radial basis functions, case-based reasoning, remarks on lazy and eager learning.

Unit – IV :

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

ReinforcementLearning–Introduction,thelearningtask,*Q*–learning,non-deterministic, rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

Unit – V :

AnalyticalLearning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

AnalyticalLearning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

CombiningInductiveandAnalyticalLearning–Motivation,inductive-analyticalapproachestolearning,usingpriorknowledgetoinitializethehypothesis.

Suggested Readings :

1.Machine Learning–Tom M.Mitchell,-MGH

Reference Books:

1.Machine Learning: An Algorithmic Perspective, Stephen Marshl and,Taylor & Francis