System Programming

Course Title : System Programming

Course Code: : CS311

Credits : 03

Unit I: Language Processors
Introduction, Language processing activities, Fundamentals of language processing, Fundamentals of language specification, Language processor development tools.

Unit II: Assemblers
Elements of assembly language programming, a simple assembly scheme, pass structure of assemblers, design of a two pass assembler, a single pass assembler for IBM PC.

Unit III: Macro Processors
Macros facility, Macro definition and call, Macro Expansion, Nested macro calls, Advanced macro facilities, Design of macro preprocessor.

Unit IV: Compilers and Interpreters
Aspects of compilation, memory allocation, compilation of expressions, compilation of control structures, code optimization, Interpreters.

Unit V: Linkers & Loaders
Relocation and linking concepts, design of a linker, Self-relocating programs, a linker for MS DOS, Linking for overlays, Loaders.

Unit VI: Software Tools
Software tools for program development, Editors, Debug monitors, Programming Environments, User interfaces, DLLs

Text Books :

1. "System Programming and Operating Systems", D. M. Dhamdhere, TMGH, 2nd Edition.

Reference Books :

1. "System Programming", J. J. Donovan, Mc-Graw Hill.
2. "Systems Programming" by A A Puntambekar and I A Dhotre
3. "System Programming and Compiler Construction (Includes Labs)" by R K Maurya and Anand A Godbole

Computer Algorithm

Course Title : Computer Algorithm

Course Code: : CS311

Total Credits : 03+01=04

Unit 1 Introduction
What is algorithm, Algorithm Specification, Performance Analysis, heap.

Unit 2 Divide and Conquer
The general method, Binary search, Finding the maximum and minimum, Merge sort, Quick sort, and analysis of these algorithms.

Unit 3 The Greedy Method
The general method, Knapsack problem, Job sequencing with deadlines, minimum-cost spanning trees – Prim's and Kruskal's Algorithms, Optimal storage on tapes, Single source shortest paths.

Unit 4 Dynamic Programming
The general method, Multistage graphs, All pair shortest paths, Optimal binary search trees, 0/1 knapsack, Reliability design, Traveling Sales person problem.

Unit 5 Backtracking
The general method, 8-queen problem, sum of subsets, Knapsack Problem, Hamiltonian Cycle, and Graph Coloring.

Unit 6 Basic Traversal and Search Techniques and Polynomial Problems

Techniques for Binary Trees, Game Tree; Techniques for Graphs – Breadth First Search & Traversal, Depth First Search & Traversal, AND/OR graphs; Connected components and Spanning Trees; Bi-connected components and depth first search. NP Hard and NP Complete.

Text Books :

1. "Fundamentals of Computer Algorithms", Horowitz, Sahni and Rajasekaran, Galgotia Publications.

Reference Books :
1. "Fundamentals of Computer Algorithms", Horowitz and Sahni, Galgotia Publishers.
2. "Design and Analysis of Algorithms", Aho, Hopfcraft and Ullman, Addison Wesley.
3. "Introduction to Algorithms", Thomas Cormen, PHI Publication.
4. "Introduction to Design and Analysis of Algorithm", Goodman, McGraw Hill.

Computer Graphics and Multimedia Techniques

Course Title : Computer Graphics and Multimedia Techniques

Course Code: : CS315

Credits : 03

Unit 1 Introduction to Graphics Devices:
Display Devices and Adapters, Working of Printers, LCD Display.

Unit 2 Transformations:
Basic 2D & 3D transformations - Translation, Scaling, Rotation, Reflection, Shearing, Multiple Transformations, Rotation about an axis parallel to a coordinate axis, Rotation about an arbitrary axis in space, Affine and Perspective Geometry, Orthographic projections and Axonometric projections.

Unit 3 Raster Scan Graphics:
Bresenham's line and circle drawing algorithms, Scan Conversion techniques: RLE, Frame Buffer, Scan converting polygons: Edge fill and Seed fill algorithms, Anti- aliasing and Half-toning.

Unit 4 Viewing and Clipping:

Introduction, Windowing and View-porting, Introduction to clipping, Point clipping, Line clipping: Sutherland - Cohen line clipping algorithm.

Unit 5 Curves and Surfaces
Curve Representation, Non-parametric and parametric curves, representation of space curves, Cubic Spline, Parabolic Blended curves, Bezier curves and B-spline curves, Z- buffer, Warnock algorithm.

Unit 6 Multimedia Applications
Media preparation, composition, integration, communication, entertainment using commercial tools

Text Books :

1. "Mathematical elements for Computer Graphics" - David F. Rogers, J. Alan Adams (MGH Int.) (For chapters 1, 2, 5)
2. "Procedural elements for Computer Graphics" - David F. Rogers, (MGH Int.) (For chapters 3, 4)
3. "Multimedia Making it Work", Tay Vaughan, TMGH, 5th Edition.
4. "Multimedia Communication", Fred Halsall, Pearson Education.

Reference Books :
1. Newman Sproul, "Principles of Interactive Computer Graphics" - (MGH) (chapters 1,4)
2. Prof. Rajesh Maurya, "Computer Graphics" (Wiley India Pvt. Ltd.) (Chapter 4)
3. Hearn & Baker, "Computer Graphics".
4. Ranjan Parekh, "Principles of Multimedia", TMGH

Artificial Intelligence

PCC CS 503 Artificial Intelligence

3 Credits

Module 1
Introduction: Overview, Turing test, Intelligent agents. Problem Solving: Solving Problems by Searching: Uninformed search - Depth First Search, Breadth First Search, DFID, Heuristic search - Generate and Test, Best First Search, Beam Search, Hill Climbing, A*, Problem reduction search – AND/OR Graphs, AO*, Constraint satisfaction, Means-ends analysis, Stochastic search methods - Simulated

Annealing, Particle Swarm Optimization, Game Playing - Minimax algorithm, Alpha-beta pruning

Module 2
Knowledge and Reasoning: Building a knowledge base - Propositional logic, first order logic, Inference in first order logic, Resolution – refutation proofs, Theorem Proving in First Order Logic; Planning, partial order planning, Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks

Module 3
Learning: Overview of different forms of learning: unsupervised, supervised, semi-supervised, K-means clustering algorithm, Decision Trees, Neural Networks, Deep Learning.

Module 4
Advanced topics: Introduction to Computer Vision, Natural Language Processing, Expert Systems, Robotics, Genetic Algorithm,

Text Books
1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach," Prentice Hall
2. E. Rich, K. Knight and S. B. Nair, "Artificial Intelligence," TMH
References
1. C. Bishop,"Pattern Recognition and Machine Learning," Springer
3. D. W. Patterson, "Introduction to artificial intelligence and expert systems," Prentice Hall
4. A. C.Staugaard, Jr., "Robotics and AI: An Introduction to Applied Machine Intelligence," Prentice Hall
5. I. Bratko, "Prolog Programming for Artificial Intelligence," Addison-Wesley
6. S. O. Haykin, "Neural Networks and Learning Machines," Prentice Hall
7. D.Jurafsky and J. H. Martin,"Speech and Language Processing," Prentice Hall

Software Engineering

PCC CS 504 Software Engineering

3 Credits

Module 1
Introduction: What is Software Engineering and its history, software

crisis, Evolution of a Programming System Product, Characteristics of Software, Brooks' No Silver Bullet, and Software Myths, Software Development Life Cycles: Software Development Process, The Code-and-Fix model, The Waterfall model, The Evolutionary Model, The Incremental Implementation, Prototyping, The Spiral Model, Software Reuse, Critical Comparisons of SDLC models, An Introduction to Non-Traditional Software Development Process: Rational Unified Process, Rapid Application Development, Agile Development Process.

Module 2
Requirements: Importance of Requirement Analysis, User Needs, Software Features and Software Requirements, Classes of User Requirements: Enduring and Volatile, Sub phases of Requirement Analysis, Functional and Nonfunctional requirements, Barriers to Eliciting User requirements, The software requirements document and SRS standards, Requirements Engineering, Case Study of SRS for a Real Time System. Tools for Requirements Gathering: Document Flow Chart, Decision Table, Decision Tree, Introduction to nontraditional Requirements.

Module 3
Software Design: Goals of good software design, Design strategies and methodologies, Data oriented software design, Coupling, Cohesion, Modular structure, Packaging, Structured Analysis: DFD, Data Dictionary, Structured Design: Structure chart, Object oriented design, Top-down and bottom-up approach, UML, UML Diagrams, Design patterns,.

Module 4
Software Project Management: Overview of Project Manager Responsibilities & project planning, Software Measurement and Metrics: Line of Code (LOC), Function Point (FP) based measures, Various Size Oriented Measures: Halstead's software science, Project Size estimation Metrics Project Estimation, Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization & Team Structures Staffing, Risk Management.

Module 5

Software Coding & Testing: Development: Selecting a language, Coding guidelines, Writing code, Code documentation. Testing process, Design of test cases, Functional Testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause

effect graphing, Structural testing, Cyclomatic Complexity Measures: Control flow graphs, Path testing, Data flow and mutation testing, Unit testing, Integration and system testing, Debugging, Alpha & beta testing, testing tools & standards.

Module 6
Software Maintenance: Management of maintenance, Maintenance process, Maintenance models, Regression testing, Reverse engineering, Software reengineering, Configuration management, documentation.

Module 7
Software Reliability & Quality Management: Introduction to reliability and metrics to reliability measure, Overview of S/W Quality management System ISO 9000, SEI CMM.

Text Book:
1. Software Engineering: A Practitioner's Approach, R. S. Pressman, McGraw Hill
2. Fundamental of Software Engg. By Rajib Mall 4th edition PHI
3. A Concise Introduction to Software Engineering By Pankaj Jalote
Reference Book:
1. Zero Defect Software, G. G. Schulmeyer, McGraw-Hill
2. Object Oriented Modeling and Design, J. Rumbaugh, Prentice Hall
3. Software Engineering, K.K. Aggarwal, Yogesh Singh, New Age International Publishers

COMPUTER GRAPHICS

Unit I Introduction and Line Generation: Types of computer graphics, Graphic Displays-
Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Mid-point circle generating
algorithm, and parallel version of these algorithms.

Unit II Transformations: Basic transformation, Matrix representations and homogenous
coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping
algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm,

Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon
clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping,
Curve clipping, Text clipping

Unit III Three Dimensional: 3-D Geometric Primitives, 3-D Object representation, 3-D
Transformation, 3-D viewing, projections, 3-D Clipping.

Unit IV Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, Introductory
concepts of Spline, Bspline and Bezier curves and surfaces.

Unit V Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A-
buffer method, Scan line method, basic illumination models– Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity
Attenuation, Color consideration, Transparency and Shadows.

REFRENCES:
1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education
2. Foley, Vandam, Feiner, Hughes – "Computer Graphics principle", Pearson Education.
3. Rogers, " Procedural Elements of Computer Graphics", McGraw Hill
4. W. M. Newman, R. F. Sproull – "Principles of Interactive computer Graphics" – Tata MCGraw Hill.
5. Amrendra N Sinha and Arun D Udai," Computer Graphics", Tata MCGraw Hill.
6. R.K. Maurya, "Computer Graphics " Wiley Dreamtech Publication.
7. M.C. Trivedi, NN Jani, Computer Graphics & Animations, Jaico Publications
8 Rishabh Anand, Computer Graphics- A practical Approach, Khanna Publishing House
9. Mukherjee, Fundamentals of Computer graphics & Multimedia, PHI Learning Private Limited.
10. Donald Hearn and M Pauline Baker, "Computer Graphics with OpenGL", Pearson education

Cyber Security

Cyber Security

Introduction- Introduction to Information Systems, Types of Information
Systems, Development of Information Systems, Introduction to Information
Security, Need for Information Security, Threats to Information Systems,
Information Assurance, Cyber Security, and Security Risk Analysis.

Application Security- (Database, E-mail and Internet), Data Security
Considerations-Backups, Archival Storage and Disposal of Data, Security
Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security
Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail
Viruses, Macro Viruses, Malicious Software, Network and Denial of Services
Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash,
Credit/Debit Cards. Digital Signature, Public Key Cryptography

Developing Secure Information Systems- Application Development
Security, Information Security Governance & Risk Management, Security
Architecture & Design Security Issues in Hardware, Data Storage &
Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV
and Intrusion Detection Systems, Backup Security Measures.

Security Policies- Development of Policies, WWW Policies, Email Security
Policies, Policy Review Process-Corporate Policies-Sample Security Policies,
Publishing and Notification Requirement of the Policies.
Evolving Technology Security – Mobile, Cloud, Outsourcing, SCM.

Information Security Standards-ISO, IT Act, Copyright Act, Patent Law,

IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law:
Copy Right Law, Software License, Semiconductor Law and Patent Law.
Case Study – Corporate Security

Internet of Things

RCS-061: INTERNET OF THINGS

I Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples .
Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability.

II Hardware for IoT: Sensors, digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology.
Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms such as Arduino, NetArduino, Raspberry pi, Beagle Bone, Intel Galileo boards and ARM cortex.

III Network & Communication Aspects in IoT: Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination

IV Programming the Ardunio: Ardunio platform boards anatomy, ardunio IDE, coding, using emulator, using libraries, additions in ardunio, programming the ardunio for IoT.

V Challenges in IoT Design Challenges: Development challenges, Security challenges, Other challenge IoT Applications : Smart metering, e-health, city automation, automotive applications, home automation, smart cards, Communicating data with H/W units, mobiles, tablets, Designing of smart street lights in smart city.

References:
1. Olivier Hersent,DavidBoswarthick, Omar Elloumi"The Internet of Things key applications and protocols", willey
2. Jeeva Jose, Internet of Things, Khanna Publicatiosn
3. Michael Miller "The Internet of Things" by Pearson
4. Raj Kamal "INTERNET OF THINGS", McGraw-Hill, 1ST Edition,

2016
5. ArshdeepBahga, Vijay Madisetti " Internet of Things(A hands on approach)" 1ST edition, VPI publications,2014
6. Adrian McEwen,HakinCassimally "Designing the Internet of Things" Wiley India

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