SCHEME AND SYLLABUS OF M Sc COMPUTER SCIENCE

(2016 ADMISSION ONWARDS)

A. Objectives

1. To develop interest among the candidates towards a career in academics and research, and to enable them with sufficient knowledge to become a competent academician.
2. To equip the students with sufficient exposure and skills to enable them to catch a deserving position in software industry.
3. To develop interest in promoting the use of Computer Science for the positive development of our society and the environment.
4. To enable the students to contest for national level competitive examinations.

B. Eligibility

Candidates for admission to M Sc Programme in Computer Science should have passed

(i) A Degree course with minimum 3 years duration after 10+2 with not less than 50% marks or 2 CGPA[S] out of 4 in Computer Science/Computer Application/Electronics as main or an equivalent Degree recognized by the University of Kerala for the purpose.

(ii) Any science degree with minimum 3 years duration after 10+2 with not less than 50% marks or 2 CGPA[S] out of 4 with Computer science/Computer application as one of the main/subsidiary/ core subject.

Candidate shall meet all other requirements in the prospectus published by University time to time.

C. Evaluation

Evaluation will be done in two components: Continuous Evaluation (CE) and End-Semester Evaluation (ESE).

(i) Continuous Evaluation (CE)

Theory Courses: In addition to class room lectures, students shall be assigned with application problems, class room presentations, group activities etc. Case studies/industry visits may also be organized. At least two tests shall be conducted for each course. Short viva may be conducted to assess assignments.

CE Mark for Theory (out of 25)

Assignments and Activities	: 10	*(distributed for minimum two components)*		
Test	: 10	Attendance	: 5	

Lab Courses: Each Lab course shall be completed under the supervision of a faculty member. The students shall undertake a case study for each practical course. The case study can be done as a team of 2 members if necessary. The practical record includes both lab exercises and case study report.

CE Mark for Lab Courses (out of 25)

Attendance	: 5	Lab performance	: 5	Record	: 5
Internal Lab Test	: 5	Case Study	: 5		

Minor Project & Seminar : Minor project shall be done in the college itself, under the guidance of a faculty in the department. The project can be done individually, or as a team of two members. The volume of work shall be limited to be completed in not more than 50 hrs.

CE Mark for Minor Project & Seminar (out of 50)

CE marks for Minor project & seminar put together out of 50 shall be submitted to the University. However, the faculty in charge shall assign the marks as follows:

(a) Minor Project :					
Report	:	5	Design and development	:	10
Implementation/Findings	:	5	Presentation and Defense	:	5
(b) Seminar:					
Presentation & Defense	:	12	Report	:	8
Topic & content organization of presentation	:	5			

Major Project:

Major project work shall be done individually by each student under the guidance of a faculty member from the department. An internal evaluation team consisting of at least three members, chaired by the Head of Department or a senior faculty member shall be constituted at the college every year by the end of third semester. The project guide of the candidate can be one of the members in the team.

If the student chooses to do his project in an organization other than the college, the department shall ensure the following:

(i) The project is supervised by a qualified person. The External Supervisor shall be a post graduate in either Science/Applied Science/Engineering branches. He/She shall have at least 3 years experience in running/managing/implementing/supervising such projects. A declaration shall be obtained in this regard from that person, and shall be kept with the Department.

(ii) An attendance statement and a performance feedback shall be obtained from the External supervisor. The student has to present periodic reports and attend for evaluation process before the internal evaluation team at the College as per the schedule.

CE Marks for Major Project (out of 100)

Study Phase activities & Report/Literature survey : 20 marks

Design	:	20 Marks	Methodology	:	20 marks
Findings/Implementation	:	20 marks	Presentation & Defense	:	20 marks

(ii) End Semester Evaluation (ESE)

End-semester evaluation for all courses will be conducted by the University. A student with 75% attendance in a course is eligible to attend the University examination.

Theory Courses: The question paper consists of two parts:

Part A (27 marks). 9 compulsory questions, of 3 marks each.

Part B (48 marks). Students must answer two out of three questions from each module. Each question carries 8 marks.

Lab Courses: Lab examinations shall be conducted in each college by two examiners appointed by the University, of which one shall be from other colleges. The External Examiner will finalize the marks in consultation with the internal examiner. The questions for the examination shall be prepared before each examination and approved by the board of examiners. A candidate shall be asked to answer one out of two questions given to him.

The marks will be distributed as follows. (Total 75)

Description of procedure: 10 marks [The procedure/algorithm/flow chart/pseudo code for solving the problem(s) shall be explained in the answersheet.]

Preparation of program: 15 marks

Logic & Output : 20 marks. 20 marks shall be distributed as follows:

(i) 15 marks for the correct output of the given problem.

(ii) 5 marks for completing the modifications suggested by the examiner(s) in the given questions during the examination hours.

[The program/code shall work for all cases of the given problem. Different test cases and answers shall be written in the answer sheet.]

Viva: 15 marks. Viva shall be on the problem domain, based on the programming tool used, from the area of study for solving the problem/from the theory concepts related to the area.

Case study Report and Viva : 15 marks

Minor Project Total : 50

Minor Project shall be evaluated by an examiner appointed by the university. A report of the project shall be submitted to the examiner at the time of examination.

Report of the work	: 10 marks	Methodology and Topic	: 5 marks
Findings/Implementation	: 10 marks	Presentation & Defense	: 15 marks
Viva Voce	: 10 marks		

Major Project Total : 100

Major Project shall be evaluated at the examination centres by a panel of two examiners appointed by the university, one of which shall be from other colleges. The project report shall be finalized after the internal evaluation. The candidates shall present the findings/output of their work before the examiners during the examination hours. The examiners will conduct a viva voce also.

Report of the work	:	20 marks	Methodology and Content	:	25 marks
Findings/Implementation	:	20 marks	Presentation & Defense	:	20 marks
Viva Voce	:	15 marks			

Comprehensive Viva

It is mandatory that the Comprehensive Viva shall be conducted by separate examiners than that for Project Evaluation. The viva will be conducted by a panel of two examiners appointed by the University, of which one shall be from outside the college. Though the viva shall be based on the entire syllabus contents, the candidates may be given opportunity to opt a set of subjects, not less than 40% of the programme. However, the candidate, in any case, shall not be asked to write answers to questions given by the examiners.

D. Pass Requirements:

For each subject(including practical), a student should get a minimum of 40% marks for the university examinations and 50% aggregate for the CE and ESE together for all theory and practical courses except Major Project. For Major Project and Comprehensive viva-voce in the 4th semester each student should get a minimum of 50% for the university examination and 50% aggregate for the CE and ESE together. Classification of passed candidates will be as per the University norms.

E. SCHEME

	Semester I	L	T	P	CE	ESE	Total
CS1611	Computer Architecture	3	-		25	75	100
CS1612	Data Structures and Algorithms	3	1		25	75	100
CS1613	Mathematical Foundations of Computer Science	3	1		25	75	100
CS1614	Programming Paradigms	3	1		25	75	100
CS1615	Computer Networks	3	1		25	75	100
CS1616	Data Structures & Algorithms Lab			3	25	75	100
CS1617	Java Programming Lab			3	25	75	100
Semester II		**L**	**T**	**P**	**CE**	**ESE**	**Total**
CS1621	Modern Operating Systems	3	-		25	75	100
CS1622	Advances in Database Management	3	-		25	75	100
CS1623	Object Oriented Analysis and Design	3	1		25	75	100
CS1624	Graphics & Multimedia Systems	3	1		25	75	100
CS1625	Optimization Techniques	3	1		25	75	100
CS1626	Minor Project & Seminar			4	50	50	100
CS1627	Database & Web Programming Lab			3	25	75	100
Semester III		**L**	**T**	**P**	**CE**	**ESE**	**Total**
CS1631	Data Mining & Warehousing	3	-		25	75	100
CS1632	Distributed Systems and Cloud Computing	3	1		25	75	100
CS1633	Information Security	3	1		25	75	100
CS1634	Compiler Design	3	1		25	75	100
CS1635	Elective I	3	1		25	75	100
CS1636	Network Administration Lab			3	25	75	100
CS1637	Distributed Computing Lab			3	25	75	100
Semester IV		**L**	**T**	**P**	**CE**	**ESE**	**Total**
CS1641	Research & Technical Writing	3	1		25	75	100
CS1642	Elective II	3			25	75	100
CS1643	Major Project			18	100	100	200
CS1644	Comprehensive Viva Voce				—	100	100
	Total						**2600**

Elective I:	Elective II
A. Big Data Analytics	A. Parallel Computing Algorithms
B. Digital Image Processing	B. Bioinformatics
C. Machine Intelligence	C. Neural Networks & Fuzzy Systems
D. Programming for Portable Devices	D. Embedded Systems

SEMESTER I

CS1611 Computer Architecture

Module I: Basic Structure of digital Computer, review of digital fundamentals, combinatorial circuits (review only). Central Processing Unit: General Register and Stack Organization, instruction set architecture, examples of assembly language instructions(8085), Addressing Modes, Program Control, CISC, RISC, pre-fetching of microinstructions, Parallel Processing Architectures-Parallelism in sequential Machines, Multiprocessor Architecture. Pipelining and Super Scalar Techniques-Linear Pipeline Processors.

Module II: Memory Organization, Memory system considerations, cache memory, virtual memory. Shared Memory, Distributed Memory- PRAM model of parallel computation. Managing Peripheral devices - I/O Interface - Asynchronous Data Transfer - Modes of Transfer - Interrupt - DMA - I/O Processor - Data and control parallelism, Serial Communication.

Module III: Non-Linear Pipeline processors-Instruction pipeline design-Arithmetic pipeline Design- Pipeline control methods; Job sequencing, collision prevention and pipeline chaining; Super Scalar and Super pipeline Design. Instruction level parallelism, Advanced Architectures, multicore processing, multiprocessor systems.

References

- Carpinelli, Computer System Organization & Architecture
- M. Morris Mano - Computer System Architecture PHI -2007
- Hennessy, J. L. and Patterson, D. A., Computer Architecture, 4th Ed., Morgan Kaufmann
- Introduction to Parallel Computing 2/e Ananth Grama, George Karypis and Vipin Kumar, Anshul Gupta
- Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability, Programmability", McGrawHill International Edition, 1993.
- M. Sasikumar, et.al., "Introduction to Parallel Processing", PHI, New Delhi, 2000

CS1612 Data Structures and Algorithms

Module I: Algorithms: properties of good algorithms, Efficiency of algorithms, Time and Space complexity. Non-linear data structures: trees, Binary search tree- algorithms on BST, balanced trees- AVL rotations, multi-way search trees- B Tree, B+ tree. Basic concepts of Red-Black tree, splay tree, tries. Elementary Graph algorithms- graph representations, Depth-first search, Breadth-first search, spanning tree.

Module II: Algorithm design techniques-Divide and conquer strategy- general method, binary search, minmax algorithm, quicksort, Strassen's matrix multiplication. Greedy Method –general method, knapsack problem, minimum cost spanning trees- Prim's algorithm, Kruskals algorithm, Single source shortest path.

Module III: Dynamic Programming –all pairs shortest path, matrix chain multiplication, longest common subsequence. Backtracking- n-queens problem & solution. Branch and Bound – Travelling salesperson problem. Randomized algorithms- Randomized quicksort, Deterministic and non deterministic algorithms, NP hard and NP complete problems.

References:

- Horowitz, Sahni, Rajasekaran; Computer algorithms - Galgotia, 1998
- Cormen, Thomas H; Leiserson, Charles E; Rivest, Ronald L, Introduction to Algorithms. - Prentice Hall of India, 1990.
- Samanta D., Classic Data Structures, Prentice Hall of India.
- Levitin, Introduction to the Design and Analysis of Algorithms
- G.L. Heileman, Data Structutes, Algorithms and Object Oriented Programming
- Horwitz ,E and Sahni, Sartaj, Fundamentals of Data structures.- Galgotia

CS1613 Mathematical Foundations of Computer Science

Module I: Fundamentals: Sets and Subsets, operations on sets, Inclusion-Exclusion principle, Pigeonhole Principle, sequence, product sets and partitions, Relations, properties of relations, equivalence relations, Functions, Functions for computer science, Permutation Functions, Growth of Functions. Partially ordered sets, Lattices, Finite Boolean algebra. Mathematics Logic- Statements and Notation, Connectives ,Normal Forms, The Theory of Interface for the statement Calculus, Inference Theory of the Predicate Calculus

Module II: Algebraic structures: Semigroups, Monoids, Groups, Subgroups, Symmetric groups, Groups homomorphism and isomorphism, Cosets and Lagrange's Theorem, Normal subgroups, Permutation of groups and Burnsides theorem. Finite –State Machines: Languages, representation of special grammars and languages, Finite state machines.

Module III: Graph Theory: Basic Concept of Graph Theory, Euler Paths and Circuits, Hamiltonian Paths and Circuits. Spanning tree, Probability: Axioms of probability, conditional probability, Baye's theorem.

References :

- Bernard Kolman c,Busby & Sharon Ross, Discrete Mathematical Structures [PHI]
- J.P. Tremblay & R. Manohar, Discrete Mathematical Structures with Application to computer science [Tata McGraw –Hill]
- C.J. Liu, Elements of Discrete Mathematics, MGH.
- Johnsonbaugh, Discrete Mathematics, Pearson Education, 2007.
- Grassmann, Logic and Discrete Mathematics: A Computer Science Perspective, Pearson Education, 2007.

CS1614 Programming Paradigms

Module I: Characteristics of Programming Languages, Programming language paradigms: Imperative, Object-Oriented, Functional, Logic, Event Driven and Concurrent Programming, Programming environments: Compilers, Interpreters, Interactive development tools, Debugging tools, Syntax and semantics, names, bindings and scope, variables, data abstraction, memory management: static & dynamic allocation, control structures, selective structures. Modular programming, function, parameter passing methods, lifetime of variables, recursion, error handling. Characteristics of object oriented programming, abstraction, inheritance, polymorphism, Design Principles for object oriented programming, OOP in C++: access specifiers, inheritance, friend functions, constructors, overloading, late binding.

Module II: Object Oriented Programming in Java: Abstraction, Inheritance, Polymorphism, overriding, access specification, special features of Java, interfaces, packages, exception handling, finally clause, concurrent programming in Java: multithreading, event handling. Applets, threads in Applets, Java APIs, AWT: working with windows, Graphics, Text, using AWT controls, layout manager and menus. I/O streams, files, Introduction to RMI, Comparative study of C++ and JAVA.

Module III: Programming for Web – three-tier architecture, declarative languages, responsive design, HTML5, CSS, XML, stylesheet, Common Gateway Interface, Scripting Languages- Javascript, Document Object Model, Asynchronous Programming with event-based Languages, Dynamic Languages, Content Management Systems. The Basic Servlet Architecture, Servlet Form Processing, Session Management. Functional programming – LISP (introduction only), comparison of programming languages.

References:

- R. Sebesta, Concepts of Programming Languages, Addison Wesley
- Debashish Jana, Java and Object-Oriented Programming Paradigm, Prentice Hall., 2008.
- Van Roy, Haridi, Concepts, Techniques and Models of Computer Programming, MIT Press, 2004.

- Robert Lafore, Object-Oriented Programming with C++
- Bruce Eckel , Thinking in Java
- J. Reynolds, Theories of Programming Languages, Cabridge University Press.
- Wang P.S., Dynamic Web Programming and HTML5, CRC Press, 2013.
- Duckett Jon, Beginning Web Programming with HTML, XHTML and CSS, Wrox, 2004.

CS1615 Computer Networks

Module 1: Introduction to Data Communication: Components of Data Communication, Networks, Protocols and Standards, Network Models, Review of Reference Models: OSI, TCP/IP and their comparison. Data and signals, Channel Capacity, Inter connecting devices – Repeater, Hub, Switch, Bridge, Router, Gateway.

Module II: Mobile Communication - Introduction: Mobile and Wireless Devices, Simplified Reference Model, Need for Mobile Computing, Wireless Transmission, Multiplexing, Modulation, Spread Spectrum, Cellular Systems, Medium Access Control, Comparisons, Telecommunications System: GSM, DECT, TETRA, UMTS and IMT 2000, Satellite System, Broadcast Systems, Wireless LAN: IEEE 802.11, Hyper LAN, Bluetooth.

Module III: Mobile Network and Transport Layers:- Mobile IP- Goals, Requirements, IP packet delivery, Advertisement and discovery. Registration, Tunneling and Encapsulation, Optimization, Reverse Tunneling, IPv6, Dynamic Host configuring protocol, Ad hoc networks - Routing, DSDV, Dynamic source routing. Traditional TCP, Classical TCP Improvements Indirect TCP, Wireless Application Protocol, World Wide Web. Overview of Wireless sensor networks, VPN, IOT and LiFi.

References

- Behrouz A Forouzan, Data Communications and Networking, McGraw- Hill, 2006
- Jochen Schiller, "Mobile Communication", Pearson Education, Delhi, 2000.
- Brijendra Singh, Data Communication and Computer Networks, PHI, 2011.
- Tanenbaum Andrew S., Computer Networks, TMH.
- Kurose, James F., Ross Keith W., Computer Networking: A top-down approach featuring the internet, Addison-Wesley.
- Comer, Computer Networks and Internet with Internet Applications, PHI, 2009.
- Stallings William, Data and Computer Communication, Pearson, 2007.

CS1616 Data Structures & Algorithms Lab

It is recommended to implement the algorithms in C++, making use of the features of object oriented programming.

A. *The list of experiments shall include the following topics:*

1. Programs to implement Linked list.
2. Implement stack as linked list, queue as linked list.
3. Construction of a Binary search tree.
4. Search in a BST.
5. Traversals on binary tree.
6. Deletion from BST.
7. Depth first search and breadth first search on a graph.
8. Algorithms for minimum cost spanning tree.
9. Divide and conquer algorithms for binary search, maximum and minimum.
10. Divide and conquer sorting: Quick sort and mergesort.
11. Greedy algorithm for solving knapsack.

12. Implement single source shortest path algorithm
13. Implement matrix chain multiplication
14. Find longest subsequence.
15. 8-queens problem.

B. A case study on either one of the following:

(a) Applications of any data structure.
(b) Using nonlinear data structures in real problems.
(c) A package for insertion deletion and traversal on various data structures
(d) Any software/utility making use of one or more data structures or algorithms covered in the syllabus for CS1612.
(e) Any simple game using data structures and one or more of the algorithms covered in the syllabus for CS1612.
(f) Investigations on advanced data structures like splay trees, tries etc.
(g) Studies/investigations on applications of multi-way search trees
(h) Studies/investigations on algorithms with reduced complexity for various applications.
(i) Any study/development of programs which applies or enhances the skills acquired through CS1612.
(j) Comparative study of various algorithms based on complexity estimations.

CS1617 Java Programming Lab

A. The list of experiments shall include and cover the following topics:

1. Java implementation of classes, objects and methods.
2. Using input output streams.
3. Method overloading and overriding.
4. Inheritance.
5. Interfaces
6. packages
7. Abstract classes.
8. Vectors and wrapper classes.
9. Multithreaded Programming and inter-process communication.
10. Programs to differentiate Java from C++
11. Exception handling
12. Applet Programming
13. AWT components.
14. Managing Input / Output Files in JAVA.
15. Connecting to database using JDBC
16. Including graphics, video and sound in web pages, including Java applets
17. Layers & Image Maps

A. A case study on either one of the following or any other which exhibits the capabilities and features of Java.

(a) Applications using GUI.
(b) Demonstrate network programming features in java.
(c) Generate any class library
(d) Any simple game using data JAVA.

SEMESTER II

CS1621 Modern Operating Systems

Module I: Introduction, Mainframe Systems, Desktop Systems, Multiprocessor Systems Distributed Systems, Clustered Systems, Real-Time Systems, Handheld Systems. Operating System Structures: System Components, Operating System Services, System Calls, System Programs, System Structure and Virtual Machines. Process Management: Processes: Process Concept, Operating on Processes, Cooperating process, Inter-process Communication. Threads: Multithreading Models, Multithreading Issues, P threads.

Module II: CPU Scheduling: Scheduling Criteria and Scheduling Algorithms, Multiple-Processor Scheduling, Real Time Scheduling and Algorithms Evaluation. Process Synchronization: Critical Section Problem, Semaphores & Monitors. Deadlock: Deadlock-Characterization, Methods of Handling the Deadlocks, Deadlock Prevention, Avoidance, Detection and Recovery. Storage Management: Memory Management: Swapping, Contagious Allocation, Paging, Segmentation and Segmentation with Paging. Virtual Memory: Demand Paging, Page Replacement, Allocation of frames, Thrashing.

Module III: File System Interface: Access Methods, Directory Structure, File Sharing, Protection. File System Implementation: File System Structure, Allocation Methods, Free-Space Management. Linux File system. I/O Systems: Application I/O Interface, Kernel I/O Subsystem. Mass-Storage: disk scheduling and Management, Swap-Space Management. Configuring and managing file system and disk space in Linux. Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Language-Based Protection. Security: Security Problem, User Authentication, Program Threats, System Threats. OS security functions, Trusted Operating System

References:

- Silberschartz A and Galvin P, Operating system Concepts, 6/e Addison Wesley.
- William Stallings, Operating System, , Prentice Hall Second Edition. 2007.
- Christopher Negus, Linux Bible, Wiley-DreamTech, 2005.
- Dietel & Dietel, Operating Systems, PHI. 2003.
- Tenenbaum, Modern Operating Systems, Pearson.
- Prasad B., Operating Systems & System Software, SciTech.
- NIIT, Operating System Linux, PHI.
- EVInEMETH, Snyder, KHein Trent, Linux Administration Handbook, Pearson.

CS1622 Advances in Database Management

Module I: Introduction- purpose of database systems, views of data– data abstraction, instances and schemas, data independence, data models Database languages- DDL, DML, transaction management, storage management, database administrator, database users, overall system structure. Relational data model- relational model concepts, keys, integrity constraints- domain constraints, key constraints, entity integrity constraints. Normalization theory- 1NF,2NF,3NF,BCNF, Multi valued dependencies and Fourth normal form– Join dependencies and Fifth normal form. Limitation of 4NF and BCNF.

Module II: ER data model – basic concepts, extended ER features, design of an ER database, reduction of an ER schema to tables. Relational algebra and calculus - tuple relational calculus, domain relational calculus. Object Oriented Database Management Systems (OODBMS) - concepts, limitation of relational model, need for OODBMS, composite objects, issues in OODBMSs, advantages and limitations of OODBMS, object model, object definition language ,object query language.

Module III: Distributed database, distributed storage, types of distribution, heterogeneous and homogeneous DDBMS, functions of DDBMS, architecture of distributed databases, the design of distributed databases, distributed transactions, commit protocols– 2 phase and 3 phase protocols for distributed databases. Multimedia

database– growth of multimedia database, applications, contents of MMDB, designing. Spatial database and geographic database information systems, gnome database– genomics, genome expression, proteomics, knowledge databases– deductive and semantic databases.

References

- Connolly, Begg, Database Systems: A practitioners approach to design, implementation and management, Pearson 2003.
- M. Tamer Ozsu and PatrickValduriez, Principles of Distributed Database Systems; Pearson Education Asia ISBN: 81-7808-375-2
- Abraham Silberschatz, Henry F. Korth & S. Sudarshan, 'Database System Concepts', McGraw Hill International Edition, 2006.
- Philip J. Pratt, Joseph J Adamski, 'Database Management Systems', Cengage Learning, 2009.
- Rameez Elmasri, Shamkant B. Navathe, 'Fundamentals of Database Sytems', 5th Ed., Pearson Education, 2009.
- Raghu Ramakrishnan, Johannes Gehrke, 'Database Management Systems', McGraw Hill International Edition, 2003.
- Leon & Leon, Database Management Systems, VIkas Publishing House.

CS1623 Object Oriented Analysis and Design

Module I: Objects, Attributes and Methods, Encapsulation and Information Hiding Messages, Class Hierarchy, Inheritance, Polymorphism, Genericity. Object Oriented System Development, Methodology. Introduction, UML diagrams, Class diagrams, Use-Case Diagrams, UML Dynamic Modeling.

Module II: Object Oriented Analysis Process, Object Analysis: Classification, Identifying Relationships, Attributes & Methods. The Object Oriented Design process & design Axioms, Designing classes, Access layer: Object Storage & Object Interoperability, View Layer: Designing Interface.

Module III: S/W Implementation, Component diagrams, Deployment diagrams, S/W Testing and Maintenance. Object - Oriented Testing: Full Life Cycle Object Oriented Testing (FLOOT).

References:

- Ambler,Scott W., The Object primer: the application developer's guide to object orientation and UML. 2 rev ed. - Cambridge University Press.
- Bahrami, A., Object Oriented System Development using the Unified Modeling Language, McGraw-Hill, 1999.
- Jawadekar, Waman S.,Software engineering:principles and practice. - TMH, 2004.
- Jacobson, Ivar.,Object-oriented software engineering:b a use case driven approach. - England, Addison-wesley, 1992.
- Booch, Grady; Rumbaugh, James; Jacobson, Ivar., The Unified Modeling Languageuser guide. - Pearson Education Asia, 2002.
- Bahrami, A., Object Oriented System Development using the Unified Modeling Language, McGraw-Hill, 1999.
- Page-Johns, Meilir., Fundamentals of Object oriented Design in UML, Pearson Education Asia,2000.
- Bennet,McRobb and Farmer, Object Oriented System Analysis and Design using UML, McGraw-Hill,1999.
- Rumbaugh, Jacobson and Booch,The Unified Modeling Language Reference Manual, Pearson Education Asia,1999.

CS1624 Graphics & Multimedia Systems

Module I: Introduction, output primitives and algorithms- DDA(Digital Differential Analyzer Algorithm) line drawing algorithm, Bresenhaum's line drawing algorithm, midpoint circle drawing algorithm. Two Dimensional Geometric Transformations, Window to View port Transformations, Clipping, 3-D Display Techniques, 3-D transformations, Hidden Surface Removal Methods-Back face Detection, Depth Buffer Method, Scan-line Method.

Module II. Multimedia: Multimedia System Architecture, Design Objects for Multimedia systems, Images, basic concepts, color image fundamentals, image file formats, Need for Data Compression, lossy and lossless compression, Huffman coding, applications of Huffman coding- lossless compression of text, audio. Runlength encoding, arithmetic coding, vector quantization, JPEG standard, dictionary coding, LZ77 approach.

Module III: Animation, Principles of Animation, Making Animations that work, File Formats for Multimedia Systems, MIDI Audio, Audio File Formats, Video, Using Video, How Video works, Broadcast video standards, Integrating Computers and Television, Recording formats, Digital Video Compression. Speech processing – digitization of speech, characteristics of speech, noise, representation of speech.

References:

- Hearn, Donald; Baker, Pauline, M., Computer graphics: C version Pearson, 1995.
- Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
- Nelson, The Data Compression Book, MGH.
- Ralf Steinmetz KlaraNahrstedt, Multimedia Applications, Springer International Edition
- Judith Jeffcoate, Multimedia in Practice: Technology & Applications, PHI

CS1625 Optimization Techniques

Module I: Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbounded solutions. Concept of Duality: Formulation of dual LPP, Duality theorem, advantages of duality, Dual simplex algorithm

Module II: Transportation Problem: Formulation, Solution, Unbalanced Transportation Problem. Finding Basic Feasible Solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method. Assignment Model: Formulation. Hungarian method for optimal solution. Solving unbalanced problem. Travelling salesman problem and crew assignment problem. Games Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 x 2 games.

Module III: Network Models: Definition, Shortest Route problem, Maximum flow problem. CPM & PERT: Network representation, Critical Path Computations. Queuing System: Elements of Queuing model, Pure birth and death models, Generalized Poisson Queuing model, specialized Poisson. Queues: Steady-state Measure of performance, single server models, Multiple server models, Matching serving model.

References:

- Kanthi Swaroop, P.K Guptha, ManMohan, Operations Research
- P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & Co.
- Sharma J.K., Mathematical models in operations research, TMH.
- Thaha H.A., Operations Research, Pearson.
- Winston, Operations Research Applications and Algorithms, Cengage.
- L. R Potti, Operations Research.

CS 1626 Mini Project & Seminar

(a) Mini Project

Each student has to do a mini project in the college lab itself. Mini project will give an opportunity for the students to prepare for main project and to achieve some of the objectives of the main project. This can also be used as an opportunity for producing and distributing socially useful softwares.

The projects can be done individually or as a group of maximum three members. The type and scope of the project shall be completely flexible. No restrictions shall be placed on the student on the choice of platform/tools/languages to be utilized for their project work. The only constraint is that considerable effort should be involved and there should be some technical work in the work. No value shall be placed on the use of tools in the evaluation of the project.

There should be an internal supervisor for each student. An external supervisor can also be permitted if the students opts for attachment to external organizations. But the external supervisor shall not be allowed to assess or evaluate the work.

(b) Seminar

Each student has to present a seminar on current and emerging topics in and around computer science. The students shall familiarize literature search, and practice assimilating of knowledge from published literature on current and emerging topics and to communicate the same in their own words through a technical presentation.

A report of the seminar shall be prepared containing the details of literature search, scope, relevance, working principles etc. shall be submitted by the student.

CS1627 Databases & Web Applications Lab

A. Databases:

1. SQL statements for creating, listing, dropping, checking, updating tables.
2. Record manipulation using insert, delete, update.
3. Experiments on the use of keys.
4. Queries with expressions.
5. Queries on aggregation, grouping.
6. Queries with substring comparison and ordering.
7. Queries to find values on different conditions and constraints.
8. Nested queries
9. Renaming attributes and joined tables
10. Experiments on other features covered in the course CS1622 Advanced Database Management

B. Web Programming lab experiments shall include the following topics.

1. Creating animated gifs, simple flash animations
2. Building Cascading Style Sheets
3. DHTML.
4. Creating and browsing XML database
5. Installing VRML plug-ins and viewing VRML source files
6. HTML forms and Fields
7. Exercises making use of client-side scripting languages.
8. Installation and configuring of any Web Development platform like J2EE, WAMP/LAMP , .NET etc.
9. Development of web sites involving a variety of tools

10. Connecting to databases from web page.
11. Development of dynamic web pages with updation of database content.
12. Exercises for developing applications with database connectivity, making use of variety of tools and features covered in the syllabus of CS1622 Database Management and CS1615 Programming Paradigms.

C. Case study: Development of a web application with database and dynamic operations.

SEMESTER III

CS1631 Data Mining & Warehousing

Module I: Introduction to Data Mining. Different kinds of data and patterns that are mined. Technologies used. Applications, Major Issues. Data Objects and Attribute Types, Basic Statistical Description of Data – Data visualization, Measuring Data Similarity and Dissimilarity. Data Pre-processing, Data cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

Module II: Basic concepts of Data Warehousing. Data warehousing modeling : Data cube and OLAP – Data warehouse design and usage. Data Warehouse Design and usage. Data warehouse Implementation. Data cube Technology. Classification, Decision Tree Induction, Bayes classification, Rule based classification, classification by back propagation.

Module III: Cluster Analysis: Partitioning methods, Hierarchical methods. Outlier–Outlier detection techniques. Advanced Techniques, Web Mining, Text mining, Spatial and Temporal Mining. Data mining Applications, Data mining and society. Data mining Trends, Data mining softwares.

References

- Data Mining : Concepts and Techniques , 3rd ed., J Han, M Kember, J Pei, Morgan Kaufman
- Zaki Mohammed J., Meira Wagner, Data mining and analysis, Cabridge University Presss, 2014.
- Liu Bing, Web Data Mining, Springer, 2011.
- Leskovek, Rajaraman, Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.
- Yazdani Sima, Wong, Shirley, Data Warehousing with Oracle, Addison Wesley.

CS1632 Distributed Systems & Cloud Computing

Module I: Characteristics of distributed System: Examples of distributed systems –issues in the design of distributed system. System models: Architectural models and fundamental models. Distributed objects and remote invocation: communication between distributed objects – remote procedure call – Events and notification. Operating system support: Operating system layer – protection – processes and threads-communication and invocation – Operating system architecture security: Overview of security techniques

Module II: Distributed file system: File service architecture - network file system- Andrew file system-recent advances Transactions and concurrency control: nested transactions-locks-optimistic concurrency control-comparison of methods for concurrency control-flat and nested distributed transactions- distributed deadlocks-transactions recovery. Replication System model and group communication- fault tolerant services-transactions with replicated data

Module III: Cloud Computing – Overview, Layers and types of cloud, Uses of Cloud; Components of Cloud Computing - Software as a Service, Platform as a Service, Infrastructure as a Service, Identity as a Service; Data storage in the cloud: Understanding, Advantages and Disadvantages of Cloud-Based Data Storage; Disaster Recovery – understanding threats; Service-Oriented Architecture – understanding SOA, Web services are not web pages

References:

- George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems: Concepts and Design - Pearson Education
- Andrew S Tanenbaum and Marten Van Steen, Distributed Systems: Principles and paradigms – Pearson Education
- Venkatakrishna&etal, Principles of Grid Computing – Concepts And Applications, Ane Books
- Kris Jamsa, Cloud Computing, Jones &Bartlett Learning.
- Rahul Deva &GarimaKulshreshtha, Soft Computing, Shrof Publishers & Distributors Pvt.Ltd.
- RajkumarBuya and etal, Cloud Computing – Principles And Paradigms, Wiley Publishers.

CS1633 Information Security

Module I: Introduction, Cryptography, Symmetric Key Cryptography – Stream ciphers, Block ciphers. DES, IDEA, Public Key Cryptography : RSA, Diffie-Hellman, Elliptic Curve Cryptography, Uses for Public Key Cryptography. Key management, Hash Functions: Birthday Attack, Non-cryptographic hashes, Tiger hash, HMAC, Uses for hash functions.

Module II: Authentication: Authentication methods, passwords, biometrics, two-factor authentication, Message Authentication Code. MD5, Digital Signature Standard. Authorization : Access control matrix, Multilevel security models, Compartments, Covert channel, Inference control, CAPTCHA, Firewall, Intrusion Detection System.

Module III: Simple Authentication Protocols: Introduction, Simple Security Protocols, Authentication Protocols, Authentication and TCP. Real World Security Protocols: SSH, SSL, IPSec, Kerberos, WEP, GSM. Software Flaws and Malware: Software Flaws, Malware, Botnet, Software Based Attacks. Concepts of digital watermarking-visible and invisible, robustness, imperceptibility, recoverability.

References

- Mark Stamp's Information Security: Principles and Practice by Deven N Shah, Wiley Publishers.
- William Stallings Cryptography and Network Security: Principles& Practice, Pearson Education.
- Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security- Private Communication in a Public World, Pearson Education
- Atul Kahate, Cryptography & Network Security, TMH, 2013.
- Paar Christof, Pelzl Jan, Understanding Cryptography, Springer

CS1634 Compiler Design

Module I: Assembly language fundamentals (8085 based assembly language programming). Assemblers-One pass and Two pass. Macro, Macro Processors- Macro definition and expansion. Macro processor algorithm, Macro processor Design options. Loading, Linking, Relocation, Program relocatability, Linkage editors, Bootstrap compilers.

Module II: Compilers- Compiler structure, compiler construction tools, Phases of compiler, Finite Automata, Push Down Automata (PDA), Non-determinism and NFA, DPDA and PDAs and languages accepted by these structures. Grammars, Languages-Types of grammars. The relationship between types of grammars, and finite machines. Push Down Automata (PDA) and Context free grammars (CFG). Lexical analysis: Specification and recognition of tokens, regular expressions and regular languages. LEX package on Unix. Conversion of NFA to DFA. Minimizing the number of states to DFA.

Module III: Context free grammars (CFG): Parsing and parse trees. Representation of parse (derivation) trees as rightmost and leftmost derivations. Top-down parsers-left recursion and its removal, Recursive descent parser and predictive parser. Bottom up parsers-shift reduce, operator precedence parsing, LR parsers. YACC package on Unix system. Intermediate Codes-Quadruples, triples. Intermediate code generation, Code generation, Code Optimization-optimization.

Text Books:

- Beck, Leland L, System Software: An introduction to system programming.3ed Addison Wesley, 97.
- Aho, Alfred V; Ullman, Jeffrey D., Principles of compiler design. - Narosa, 1985.
- Donovan, John J., System Programming. - TMH, 1995.
- Holub, Allen., Compiler design in C. - PHI, 1990.

CS1635A Big Data Analytics

Module I: Data Science, Introduction to Big Data. Characteristics of big data. Examples of big data, working with big data, Data explosion, Volume of data, Variety of data, Velocity of data, Bigdata processing architecture, When to consider Big Data solution. data processing techniques, Infrastructure challenges, bigata processing. Applications of Big data- Log Analytics, Fraud Detection Pattern, Social Media, Energy Sector.

Module II: Bigdata technologies, distributed data processing, bigdata processing requirements, Hadoor, Components of Hadoop – The Hadoop Distributed File System, Hadoop MapReduce and Hadoop Common Components. Application Development in Hadoop – Pig, Hive. HBase. Getting Your Data into Hadoop – Basic Copy Data, Flume. NoSQL, CAP theorem.

Module III: Integration of data warehousing and bigdata, components of the new data warehouse, bigdata appliances, Data Discovery and Visualization: bigdata analaytics, business problems suited for bigdata analytics, metadata, processing complexity of bigdata, Big Sheets. Advanced Text Analytics Toolkit. Machine learning Analytics, graph analytics.

References

- Krish Krishnan, Data Warehousing in the age of Bigdata, Morgun Kaufman.
- Understanding Big Data- Analytics for Enterprise Class Hadoop and Streaming Data. Chris Eaton, etc.
- Big Data Now- O'Reilly.
- David Loshin, BIgdata Analytics, Morgun Kaufman.

CS1635B Digital Image Processing

Module I: Image fundamentals, picture as collection of pixels, binary, grayscale, color images, color models, space requirements. Applications of image processing, Image sampling and quantization, neighbours of a pixel, adjacency, connectivity, boundaries, distance measures, image operations on pixel basis. Spatial domain operations: image negatives, log transformations, histogram Fundamental steps in digital image processing, components of an image processing system.

Module II:, image enhancement using histogram equalization, histogram matching, image subtraction, averaging, spatial filters. Smoothing, sharpening filters Enhancement in frequency domain, two dimensional DFT, frequency domain filters. Basic concepts of discrete wavelet transform, advantages of frequency domain operations. Generating spatial mask from frequency domain.

Module III: pseudo color image processing, intensity slicing, gray level to color, color complements, color slicing, halftoning, color segmentation, noise in color images. Image compression – Coding Redundancy, Interpixel Redundancy, Psychovisual Redundancy lossy and lossless. Lossless Predictive Coding. Lossy Compression – Lossy Predictive Coding, Transform Coding. Image compression standards. Procedure for JPEG, concepts of Image security.

References

- Rafael. C. Gonzalez & Richard E.Woods.- Digital Image Processing, 2/e Pearson Education, New Delhi - 2006
- W.K.Pratt.-Digital Image Processing ,3/e Edn., John Wiley & sons, Inc. 2006
- M. Sonka et.al Image Processing, Analysis and Machine Vision, 2/e, Thomson, Learning, India Edition,2007
- Anil K. Jain, Fundamentals of Image Processing, Pearson.
- Kennet Castleman, Digital Image Processing, Pearson.

CS1635C Machine Intelligence

Module–I: Introduction to machine intelligence: Turing Test, Knowledge engineering, Knowledge acquisition, procedure for knowledge acquisition, knowledge base, inference engine, knowledge representation. Procedural vs Declarative Representation, Domain modeling, Different knowledge representation schemes- semantic net, frame, script.

Module II: AI and search process: need for heuristics, search methods: blind search and heuristic search, Depth-first, Breadth-first, Best First, Hill-climbing, Game Playing: Min-Max, alpha-beta pruning. Reasoning, expert systems, Rule Based Expert Systems, basic characteristics of expert systems, examples(MYCIN, DENDRAL-concepts only), applications of expert systems, robots, software agent

Module III: Uncertainty: Introduction, Non-monotonic and Monotonic Reasoning, Confidence Factor, Bayes Theorem, Non-classical logics, Default Logic, Bayesian Networks, Fuzzy Logic, language and language Processing: Speech Processing; speech coding, speech recognition, speech synthesis; Natural Language Processing: general concepts and issues, ambiguity in natural languages.

References

- George Luger, Artificial Intelligence: Structure and strategies for Complex Problem solving, Pearson.
- Russel and Norvig, Artificial Intelligence: A modern Approach, Pearson.
- Rich, Night, Nair, Artificial Intelligence, MGH.
- D.W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI.

CS1635D Programming for Portable Devices

Module I: Wireless Application Protocol, WAP architecture, WAP client, WAP browser, advantages, applications, WML, language constructs, variables and contexts, tasks and event, WML user interaction, templates, text and image formatting, handling audio, wireless application services, IrDA protocols, WAP gateway, extension for mobile devices, synchronization of mobile devices and wired network.

Module II: Android concepts, components, Intents, Components life cycle, processes and threads, remote procedure call, development environments-SDK, Eclipse. Android architecture, Startup init, kernel, Android stack, Android Java, Application framework, App development.

Module III: Case study of operating system for mobile devices : architecture, memory management, interrupt handling and multi-tasking in Blackberry OS, Coding with Blackberry JDE, Blackberry App, user interface, iOS6 architecture, frameworks, SDK, MVC architecture, overview of objective C.

References

- C.S.R. Prabhu, Mobile Computing, Universities Press
- Martin Frost, Learning WML and WML Script, O'Reilly.
- Ruseyev S., WAP Technology and Applications, Easwar Press.
- REto Meier, Professional Android Applications Development, Wiley.
- Donn Felker, Android Applications Development, Wiley International

- Medneiks, Dronin et.al., Programming Android, O'Reilly.
- iOS6 Application Development, Wiley
- Kowalsky, Blackberry Applications Development, Wiley

CS1636 Network Administration Lab

- Installing and configuring Linux, disk partitions, installing and removing packages,
- Linux Administration, identifying administrative files configuration and log files,
- Managing user accounts, changing permissions and ownerships, creating and managing groups, disabling user accounts
- Boot loader management, lilo, grub, configuration- ckconfig, ntsys,
- Checking and monitoring system performance,
- File security, permissions,
- Getting system information,
- Study of different types of cables – coaxial, UTP, etc.
- Study of Hub, Switch, Repeater, Gateway.
- Installing a network card.
- Connect a computer to a LAN and use the Internet/copy file.
- Basic network setup, hostname, ip address etc.
- Setting up an internet connection, setting up wireless connections.
- Communication – mesg, talk , write, wall, finger, ping, tracerout.
- Configuring Static IP in Windows and Linux.
- Study of Network commands in Linux-ping, traceroute, nslookup, etc.
- Study of Network files used in Linux.
- Experiments using WireShark packet sniffer.
- Study of Ethereal as an analysis tool.
- Use of Ethereal to analyze HTTP, SMTP, FTP.
- Configure a network using Packet Tracer Software.
- Configure a network with any routing protocol using Packet Tracer Software.
- Study of different Proxy, Web Server softwares.
- Configuration of server – telnet, ftp, dhcp, nfs, ssh, proxy server, web server, samba, daemons – init, cond, atd, xinetd, sshd, httpd

CS1637 Distributed Computing Lab

A. *Experiments shall include and cover following topics.*

- Implementing Java RMI, RPC
- TCP, FTP, UDP programming
- Exercise on Servlets
- Exercise with EJB
- Client-server programs
- Experiments on cloud storage
- Experiments on network traffic management in simulated distributed environments
- Installation and setting up of Hadoop.
- Exercises on development using Hadoop
- Exercises on practicing programming for portable devices on platforms like Android

B. Case study on developing a cloud /distributed environment/developing distributed applications/developing applications for mobile devices/study on using various features of Hadoop/CUDA etc.

SEMESTER IV

CS1641 Research & Technical Writing

Module I: Research: Objectives and types of research: Motivation and objectives, Defining and formulating the research problem, Importance of literature review, Identifying gap areas from literature review Research- Definitions & types of research. The Scientific Method- Observation- Questions- Hypothesis- Experimentation- Critical Communication-Presenting and publishing research work- seminar, workshop, symposium, conference.

Module II: Reporting and thesis writing – writing a proposal, Structure and components of scientific reports - Types of report – Technical reports and thesis– Different steps in the preparation – Layout – Illustrations and tables - Bibliography, referencing and footnotes. Technical writing in Latex: LaTEX compilation, formatting, writing books as chapters, designing header and footer, designing chapters and sections, creating lists, tables, inserting images, setting labels and reference, index, list of figures and tables, math formulae, hyperlinks, bookmarks, bibliography. Troubleshooting. classes: article, book, report, slides, IEE Tran, writing research papers.

Module III: Introduction to Python: Environment Variables, Collections- Lists, Tuples, Sets, Dictionaries, Sorting Dictionaries, Copying Collections, String Operations, The format Method, Functions- Defining Your Own Functions, Optional Parameters, Passing Collections to a Function, Variable Number of Arguments, Scope, Mapping Functions in a Dictionary, Lambda, Closures, Iterators, Text, Binary Handling: iteration protocol, iterable objects, generators and generator expressions, data processing pipelines. Creating and using classes in Python, Custom Exception Classes, pydoc, Exception handling Multiple Exceptions, Python & CGI; Python Interacting with databases

References

- Kottwiz, LaTEX for Beginners.
- Kopka, A guide to Latex.
- Beazley, D. M. (2009). Python essential reference. Addison-Wesley Professional.
- Barry, P. (2010). Head First Python. " O'Reilly Media, Inc.".
- Punch, W. F., & Enbody, R. (2010). The practice of computing using python. Addison-Wesley Publishing Company.
- Mark, S. (2009). Programming in Python 3. Pearson Education India.
- Kothari, C.R., Research Methodology: Methods and Techniques. New Age International. Publishers

CS1642A. Parallel Computing Algorithms

Module 1: Parallelism, Temporal Parallelism, Data parallelism, inter-task dispatching, Instruction level parallelism, delay in pipelining, superscalar processors, VLIW processors. Multithreaded processors, structure of parallel computers, Classification of parallel computers.

Module II: Vector computers, IRAM, array processors, shared memory, distributed shared memory. Interconnection networks, message passing parallel computers, cluster of workstations. Use of MPI in clustering, dedicated high performance cluster, on-demand, high-throughput, data intensive computing.

Module III: Algorithms for Parallel machines: parallel programming models, operations, parallel programming, message passing programming, PVM, Software Tools-Data Dependency Analysis Types of Dependencies- Program Transformations- Shared Memory Programming, open MP, parallel algorithms, introduction to multi-core programming.

Reference:

- Rajaraman, Siva Ram Murthy, Parallel Computer Architecture and Programming, PHI, 2009.
- Parallel Computing Algorithms,
- Sasi Kumar, Shikhare & Ravi Prakash, Introduction to Parallel Processing, PHI, 2006.
- Quinn, Parallel Computing: Theory and Practice, MGH.
- Gybben, Rytter, Efficient Parallel Algorithms, Cambridge.

CS1642B Bioinformatics

Module I: Introduction: Aim & Scope of Bioinformatics; Biological foundations of Bioinformatics – Cell, Gene, Nucleic acids, Proteins, Structure of DNA , RNA and Proteins; Eukaryotic Gene Structure; Coding Region, Non-Coding Region, Storage of Genetic Information; Overview of Genomics, Proteomics, Metabolomics. Application of Bioinformatics in Computer-Aided Drug Design, DNA Fingerprinting.

Module II; Analyzing DNA sequence, IUPAC code for DNA sequence, palindromes in DNA sequence, RNA sequence analysis; FASTA format. Sequence analysis/Alignment: DNA sequence, RNA sequence, Protein sequence, sequence alignment classifications, analyzing protein sequence, human insulin sequence, Scoring Matrices – PAM, BLOSUM; Sequence Alignment: Introduction to Sequence Comparison - Pairwise Alignment Method (DOT PLOT method) and Multiple Analyses of Protein Structures; STS and EST sequences; DNA Microarray.

Module III Standard genetic code Biological databases: different types, typical data banks, GenBank, Swissprot, PDB; molecular visualization tools : Rasmol, Swiss PDB viewer; Searching PubMed, Protein information site: Expasy; retrieving protein/DNA sequences, Exploring the Human Genome. Sequence Analysis Tools – BLAST, FASTA; Prediction Tools – GENSCAN, SNP; Importance of Perl language in Bioinformatics; system biology Applications of Bioinformatics in Biodiversity, Human Genetics, Gene Therapy, Agriculture (overview only)

References

- Jean-Michel Claverie and Cedric Notredame, Bioinformatics: A Beginner's Guide, Wiley Publishing, Inc, 2006
- Dr. K Mani & N Vijayaraj, Bioinformatics: A practical approach, Aparna Publications
- Harshawardhan P Bal, Bioinformatics: Principles and Applications, Tata McGraw Hill Publishing Company Ltd.
- Dan E Crane and Michael L Raymer, Fundamental Concepts of Bioinformatics, Pearson Education
- Selzer-Marhofer-Rohwer, *Applied Bioinformatics – an introduction*, Springer
- ZhumurGhosh, BibekanandMallick, *Bioinformatics – Principles and Applications*, Oxford Higher Education

CS1642C Neural Networks & Fuzzy Systems

Module I: Introduction – Brain and Computer – biological and artificial neuron models – MP, Adaline, and Perceptron models –Characteristics of ANN, applications of ANN, Classification of ANN: connectivity, neural dynamics, learning strategy, learning rules. learning in simple neurons – the perception – the perceptron learning rule, limitations of perceptron – the multiplayer perceptron, Back Propagation network.

Module II: Adaptive resonance theory – architecture and operation – ART algorithm – training the ART network – classification – associative memory – Bi-directional associative memory – applications of neural nets – pattern recognition. Kohnen self Organizing networks – introduction – the Kohnen algorithm – weight training – neighborhoods – reducing the neighborhood

Mdolue III: Fuzzy systems: uncertainty and information, fuzzy sets and membership, fuzziness, classical sets and fuzzysets-operations, properties, properties of membership functions, fuzzification, defuzzification to crisp sets, fuzzy logic, applications. Fundamentals of genetic algorithms, creation of offsprings, reproduction, genetic modeling, operators. applications of genetic algorithms.

Text Books:

- B. Yegnanarayana , Artificial Neural Networks - PHI
- Beale. R and Jackson. T, "Neural Computing – An Introduction" , Adam Hilger.
- Philip D. Wasserman, "Neural Computing – Theory and Practice", Van Nostrand and Reinhold
- Sivanandan, Deepa, Principles of soft computing, Wiley India.
- Sathish Kumar, Neural Networks: A classroom approach, MGH.
- Ross, Fuzzy logic with engineering applications, Wiley India

CS1642D Embedded Systems

Module I: Introduction to Embedded Systems:- Processor, Hardware units and devices, Software, Examples. Design Process of Embedded systems. Classification of Embedded Systems. 8051 Architecture, Interfacing, Advanced Architectures, Processor and Memory Organization, Instruction-Level Parallelism. I/O Types, Serial and Parallel Communication Devices, Wireless Devices. Network Embedded systems.

Module II: Software Programming in ALP and HLL. Header, Source files and Preprocessor Directives in C. Macros and Functions. Program elements:- Data Types, Data structures, Modifiers, Statements, Loops and Pointers. Embedded Programming in C++ and Java. Multiple Process and Threads. Tasks, Task states, Task and Data. Shared Data, Interprocess communication, Functions:- Signal, Semaphore, Message queue, Pipe, Socket and RPC.

Module III: RTOS:- RTOS Services , Process Management, Timer and Event functions, Memory Management, Device management, File and I/O Management. Interrupt Routines, RTOS, RTOS Security Issues. Case Study :- VxWorks, WindowsCE, RTLinux. Embedded Software Development Process and Tools. Host and Target Machines. Getting Embedded Software into target machine.

References

- Raj Kamal Embedded Systems- Architecture, Programming and Design, 2nd edition, TMH.
- Rao B. Kanta, Embedded Systems, PHI.
- Elecia White, Making Embedded Systems, O'Reilly
- Douglass, Design Patterns for Embedded Systems in C., Newns(Elsevier), 2011.

CS1643 Major Project

Major project work shall be done individually by each student under the guidance of a faculty member from the department. The Project proposals and synopsis submission shall be done in third semester itself. It is advisable to select the project topic and area keeping the following objectives in mind:

1. The project work shall give enough opportunity for the students to apply some of the skills and knowledge earned through the theory courses.
2. The student shall get an exposure in developing industry type applications/utility software for computer systems or mobile devices/in studying and analyzing theoretical concepts and presenting comparative analysis of state-of-the art techniques/in developing new or improved algorithms/in the use of soft computing techniques in selected area/discipline.

The students need to do the following activities:

1. The candidate shall submit proposal for different projects before the evaluation team. The team shall select and finalize one of the proposals. However if all proposals are not acceptable, he may be asked to submit new/modified proposals. The candidate shall prepare and submit a synopsis of the accepted proposal. A record of accepted synopsis of each candidate shall be maintained in the department.
2. A detailed study of the requirements and feasibility of the proposed work shall be conducted by the candidate with the help of the project guide. A study phase report shall be presented before the evaluation team within one month from the beginning of project work. The design of proposed work shall be completed and presented before the evaluation team. The design shall be finalized with suggested corrections/updations.
3. The developed software/algorithm shall be implemented and demonstrated before the internal evaluation team. A short presentation explaining the proposed work and experimental results shall also be made. The project Report shall be finalized only after the internal presentation- after correcting/updating the document based on the comments from internal evaluation team.

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UNIVERSITY OF KERALA

SCHEME AND SYLLABUS OF

M Sc COMPUTER SCIENCE

(2016 ADMISSION ONWARDS)

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