UTTARAKHAND TECHNICAL UNIVERSITY
DEHRADUN

SYLLABUS AND ORDINANCES

Wef-2010-11
SYLLABUS

FOR

M.Sc. (Computer Science) Programme

Ordinance
for
M.Sc. (Computer Science) Programme
Uttrakhand Techical university,Dheradun

1. Admission

Admission to the M. Sc. (Computer science) 1st semester will be made as per rules prescribed by the Academic Council of the University.

2. Eligibility

B.Sc. with Mathematics/Statistics as a subject or BCA or B.Sc.(IT) or B.Sc.(CS)**.**

3. Attendance

3.1 Every candidate is required to attend all the lectures, tutorials, practicals and other prescribed curricular and co-curricular activities. It can be condoned up to 25% on medical grounds or for other genuine reasons.

3.2 A further relaxation of attendance up to 15% can be given by Principal/Dean/ Director of the Institute for the students, who have been absent with prior permission, for reasons acceptable to Head of the Institution.

3.3 No candidate will be allowed to appear in the end semester examinations if he/she does not satisfy the overall average attendance requirements as per clause 3.1 and clause 3.2.

4. Duration

4.1 Total duration of the M.Sc. (Computer Science) Course shall be two years, each year comprising two semesters.

4.2 Each semester shall normally have teaching for the 90 working days.

4.3 A student failing 2 times in I and / or II semester (of first year) and ineligible for the carry over system (clause 7) shall not be permitted to continue studies further.

4.4 Maximum time allowed for completing the M.Sc. (Computer Science) course will be 4 (Four) years. Those who are unlikely to satisfy the condition shall not be allowed to continue the studies any further.

5. Curriculum

5.1 The 2 (Two) years curriculum will be divided into four semesters. Semester I to III include lectures, tutorials, practicals. Semester IV will be exclusively devoted by students for projects in Industries /Organizations.

5.2 It will also include co-curricular and extra curricular activities as prescribed from time to time by the college/university.

6. Examination

6.1 Student's performance will be evaluated through continuous assessment in the form of Class Tests, Assignments, Quizzes, Viva voce/Practicals etc. There shall also be an examination at the end of each semester in theory subjects, practicals and project.

6.2 The maximum marks for the theory subjects shall consist of marks allotted for end semester examination and sessional work.

6.3 The maximum marks for the practical shall consist of marks allotted for practical examination and sessional work.

6.4 Pass/fail in a subject shall be declared on the basis of total marks obtained in theory/practical examination and the sessional award for theory/practical subjects.

6.5 The minimum pass marks in the theory subjects (including sessional marks) shall be 40%.

6.6 The minimum pass marks in the practical subjects (including sessional marks) shall be 50%.

6.7 The marks of the previous semester(s) shall not be added in declaring the result of any semester examination.

6.8 To pass a semester candidate must secure 50% of aggregate marks in that semester. No merit position shall be awarded to a candidate who has qualified for promotion to higher classes with back papers.

6.9 The student failing in the project only but satisfying all other requirements including obtaining 50% or more marks in aggregate will be allowed to submit a new project at any time after the result is declared and within the next academic year without repeating the whole session.

7. Promotion Rules

7.1 A candidate satisfying all the conditions under clause 5 shall be promoted to the next semester.

7.2 A candidate not satisfying the above conditions but failing in not more than 2 subjects (Theory and/or practical) of a semester examination shall be governed by the clause No. 8.

7.3 All other candidates will be required to repeat the semester either as regular candidate, after re-admission or opting for ex-studentship. This facility is however subject to the time limits stipulated in clause No. 4.

8. Promotion under carry-over system

8.1 A candidate who fails in the category of clause No. 7.2 shall become eligible for provisional promotion to next semester and the carry-over system as per the following table.

For promotion to & exam	Max. permitted no. of carry over subjects of semester			
	I	II	III	IV
II	2	-	-	-
III	2	2	-	-
IV	2	2	2	-

8.2 No separate carry-over Examination will be held for any subject except for M.Sc. (Computer Science) Final year. Any candidate eligible for the carry-over system shall have to appear in the carry over subjects in the subsequent University Examination for the same semester.

9. Ex-studentship

Sessional marks in the subject of an ex-student shall remain the same as those secured by him/her earlier.

10. Result

Results at the end of final year will be declared with the following weightage :

I year	100%
II year	100%
III year	100%

11. Award of Division

11.1 If candidate passes all examinations in single attempt and secures 75% or more in aggregate marks he/she shall be placed in the First Division with Honours.

11.2 If candidate passes all examinations and secures aggregate marks of 60% or more but less than 75%, he/she shall be placed in First Division.

11.3 If candidate passes all examinations and secures aggregate marks of 50% or more but less than 60%, he/she shall be placed in Second Division.

12. Seminar and Project

12.1 Candidate must secure 50% marks to pass in seminar and project.

13. Grace Marks

A candidate shall be entitled to grace marks of a maximum of 5 in any one subject in a semester to enable him to pass, provided he is failing in only one subject and has secured the necessary minimum aggregate. The grace marks shall not be added to the marks of the subject or to the aggregate. The grace marks will not be awarded to enable a candidate to pass in a practical or project.

14. **Scrutiny shall be allowed as per the rules of the University.** Revaluation is not permitted.

M. Sc. (Computer Science)
UTTARAKHAND TECHNICAL UNIVERSITY
DEHRADUN

Programme Structure

SEMESTER - I

MSCS101 : Computer Fundamental & Programming in 'C'

MSCS102 : Combinatorics & Graph Theory

MSCS103 : Relational Data Base Management System

MSCS104 : Digital Electronics & Computer System Architecture

MSCS105 : Operating System with Case Study of UNIX/LINUX

MSCSP11 : Programming & Problem Solving in 'C'

MSCSP12 : Shell Programming

SEMESTER - II

MSCS201 : Advance Data Structures

MSCS202 : Data Warehousing and Data Mining

MSCS203 : Theory of Computation

MSCS204 : Software Engineering

MSCS205 : Data Communication and Computer Networks

MSCSP21 : Data Structures Using 'C'

MSCSP22 : Data Communication and Computer Networks

SEMESTER - III

MSCS301 : Programming in C++

MSCS302 : Java Programming

MSCS303 : Design and Analysis of Algorithm

MSCS304 : Mobile and Wireless Computing

MSCS305 : Elective

i) Fuzzy Logic & Neural Network

ii) Artificial Intelligence

iii) Network Security and Cryptography

iv) Distributed and Parallel Computing

MSCSP31 : Programming in C++

MSCSP32 : Java Programming

SEMESTER - IV

MSCSPR 401 : Project work 6 months duration (In an organization)

MSCSSM 402 : Seminar

FIRST SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	MSCS101	Computer Fundamental & Programming in 'C'	3	1	-	10	20	30	70	100
2.	MSCS102	Combinatorics & Graph Theory	3	1	-	10	20	30	70	100
3.	MSCS103	Relational Database Management System	3	1	-	10	20	30	70	100
4.	MSCS104	Digital Electronics & Computer System Architecture	3	1	-	10	20	30	70	100
5.	MSCS105	Operating System with Case Study of UNIX/LINUX	3	1	-	10	20	30	70	100
Practical										
1.	MSCSP11	Programming & Problem Solving in 'C'	-	-	4	50	-	50	50	100
2.	MSCSP12	Shell Programming	-	-	4	50	-	50	50	100
		Total	15	5	8	-	-	250	450	700

Total Period = 28
Total Marks = 700

SECOND SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	MSCS201	Data Structures	3	1	-	10	20	30	70	100
2.	MSCS202	Data Warehousing and Data Mining	3	1	-	10	20	30	70	100
3.	MSCS203	Theory of Computation	3	1	-	10	20	30	70	100
4.	MSCS204	Software Engineering	3	1	-	10	20	30	70	100
5.	MSCS205	Data Communication and Computer Networks	3	1	-	10	20	30	70	100
Practical										
1.	MSCSP21	Data Structures Using 'C'	-	-	4	50	-	50	50	100
2.	MSCSP22	Object Oriented Programming in C++	-	-	4	50	-	50	50	100
		Total	15	5	8	-	-	250	450	700

TA	: Teacher Assessment	Total Period = 28
CT	: Class Test	Total Marks = 700
ESE	: End Semester Examination	
SUB TOT.	: Subject Total	
TOT.	: Total	

THIRD SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	MSCS301	Programming in C++	3	1	-	10	20	30	70	100
2.	MSCS302	Java Programming	3	1	-	10	20	30	70	100
3.	MSCS303	Design and Analysis of Algorithm	3	1	-	10	20	30	70	100
4.	MSCS304	Mobile and Wireless Computing	3	1	-	10	20	30	70	100
5.	MSCS305	Elective i) Fuzzy Logic & Neural Network ii) Artificial Intelligence iii) Network Security and Cryptography iv) Distributed and Parallel Computing	3	1	-	10	20	30	70	100
Practical										
1.	MSCSP31	Programming in C++	-	-	4	50	-	50	50	100
2.	MSCSP32	Programming in JAVA	-	-	4	50	-	50	50	100
		Total	15	5	8	-	-	250	450	700

Total Period = 28
Total Marks = 700

FOURTH SEMESTER:

S. No	Course No.	Subject	Evaluation – Scheme							
			Period			Sessional			Examination	
			L	T	P	TA	CT	TOT	ESE	Sub. Total
Theory										
1.	MSCSPR	Thesis/Project Work	-	-	20	-	-	-	500	500
2.	MSCSSM	Seminar	-	-	8	-	-	-	150	150
		Total	-	-	-	-			650	650

TA : Teacher Assessment
CT : Class Test
ESE : End Semester Examination
SUB TOT. : Subject Total
TOT. : Total

Total Period = 28
Total Marks = 650

Note: The students with the help of the Institution may do summer training of 6-8 weeks duration, after II Semester in an organization (academic or industrial) which will be submitted in the organization.

Each theory paper will of 100 marks comprising of 70 marks for University examination and 30 Marks for sessional. Each practical will be of 100 marks (50 marks of University

examination and 50 Marks for sessional). The following in the distribution for marks (Semester wise):

	Theory	Practicals	Total
1. Semester I	5x100	2x100	700
2. Semester II	5x100	2x100	700
3. Semester III	5x100	2x100	700
4. Semester IV (a) Project (b) Seminar			 500 150
TOTAL			2750

MSCS101 : Computer Fundamental & Programming in 'C'

Introduction to Computers: Computer hardware Components, Disk Storage, memory, keyboard, mouse, printers, monitors, CD etc., and their functions, Comparison Based analysis of various hardware components.

Basic Operating System Concepts: MS-DOS, WINDOWS, Functional knowledge of these operating systems. Introduction to Basic Commands of DOS, Managing File and Directories in various operating Systems, Introduction to internet, Basic terms related with Internet, TCP/IP.

Programming in C: History, Introduction to C Programming Languages, Structure of C programs, compilation and execution of C programms. Debugging Techniques, Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation. Control Statements: if-else, switch, break, continue, the comma operator, go to statement.

Loops: for, while, do-while.

Functions: built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

Arrays: Linear arrays, multidimensional arrays, Passing arrays to functions, Arrays and strings.

Structure and Union: Definition and differences, self-referential structure. And address of (&) operator, pointer to pointer, Dynamic Momory Allocation, calloc and malloc functions, array of pointers, function of pointers, structures and pointers.

References:

1. V. Rajaraman, "Fundamentals of Computers", PHI
2. Pater Norton's "Introduction to Computer", TMH
3. Hahn, "The Internet complete reference", TMH
4. Peter Nortton's, "DOS Guide", Prentice Hall of India
5. Gottfried, "Programming in C, Schaum's Series Tata McGraw Hill

MSCS102 : Combinatorics & Graph Theory

Rules of sum and products, Permutation, Combination, Permutation groups and application, Probability, Remsey Theory, Discrete numeric function and generating function, combinatorial problems, Difference equation.

Recurrence Relation: Introduction, Linear recurrence relation with constant coefficient, Homogeneous solution, Particular solution, Total solution, Solution by the method of generating function.

Graphs, sub-graphs, some basic properties, Walks, Path & circuits, Connected graphs, Disconnected graphs and component, Eular and Hamiltonian graphs, Various operation on graphs, Tree and fundamental circuits, Distance diameters, Radius and pendent vertices, Rooted and binary trees, Counting trees, Spanning trees, Finding all spanning trees of a graph and a weighted graph.

Cut-sets and cut vertices, some basic properties, All cut sets in a graph, Fundamental circuit and cut sets, Connectivity and seperatability, Network flows, Planner graphs, Combinatorial and geometric dual, Kuratowski to graph detection of planarity, Geometric dual, Some more criterion of planarity, Thickness and Crossings, Vector space of a graph and vectors, basis vectors, cut set vector, circuit vector, circuit and cut set verses sub spaces, orthogonal vector and sub space. Indicidence matrix & adjacency matrix of graphs.
Coloring and covering partitioning of graph, Chromatic number, Chromatic partitioning, Chromatic polynomials, Matching, covering, Four color problem, Directed graph, Types of directed graphs, Directed paths and connectedness, Euler digraph, Tree and directed edges, Fundamental circuit in digraph, Matrices A,B,C of digraph adjacency matrix of digraph, Enumeration and its types, counting of labeled and unlabeled trees, Polya's theorem, Graph enumeration with polyas theorem, Graph theoretic algorithm.

References:

1. Deo Narsing, :Graph Theory with applications to engineering and computer science", PHI
2. Tremblay and Manohar, :Discrete mathematical structures with applications to computer Science:, TMH
3. Joshi K.D., "Fundamental of discrete mathematics:, New Age International
4. John Truss, "Discrete mathematics of computer scientist"
5. C.L. Liu, "Discrete mathematics"

MSCS103 : Relational Data Base Management System

Introduction to database systems-Operational Data, File Management Vs Data Management, characteristics of Database approach, An Architecture for a Database System, Advantages and Disadvantages of DBMS, Data associations - Entities, Attributes and Associations, Relationship among Entities, Representation of Associations and Relationship, Data Model Classification, Entity Relationship Model,Relational Data Model, Network Data Model, Hierarchical Data Model .Objects – Relational Model Objects, Relationship, Composite Objects, Procedures, Types and Inheritance.

Relational data structure-A Review of Set Theory, Relations, Domains and Attributes, Tuples, Keys. Integrity Rules Extensions And Intensions, Base Tables, Indexes Relational Algebra and Operations, Retrieval Operations, Relational Calculus and Domain Calculus.

Relational database design-Universal Relation, Anomalies in a Database, Normalization Theory, Functional Dependencies. Closure of a Set of F.D Covers, Non Redundant and Minimum Cover, Canonical Cover, First, Second and Third Normal Forms, Relations with more than one Candidate Key, Good and Bad Decompositions, Boyce Codd Normal Form, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Query processing-Query Processing Stages, Query Interpretation, Equivalence of Expression, Query Execution Statistics. Query Execution Plan, Query Estimation, Query Evaluation, View Processing, Integrity & Security, Need for Integrity and Security Integrity Constraints.
The distributed databases -Motivation for Distributed Database . Distributed Database concepts, Types of Distribution Architecture of Distributed Databases, The Design of Distributed Databases, Distributed Query Processing, Recovery In Distributed Systems, Commit Protocols for Distributed Databases, Multi Database System.

References:

1. Date C.J. "An Introduction to Database System". Addision Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts" McGraw Hill
3. Database Management System: V. K. Jain, Wiley dreamtech
4. Elmasri, Navathe, "Fundamentals of Database Systems" Addision Wesley
5. Paul Beynon Davis, "Database Systems" Palgrave Macmillan
6. Bipin C. Desai, "An introduction to Database Systems", Galgotia Pub.
7. Begining SQL: Paul Wilton, Wiley dreamtech

MSCS104 : Digital Electronics & Computer System Architecture

Representation of information & Basic Building Blocks: Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD), ASCII, EBCDIC and their conversion. Logic gates, Boolean Algebra, K-map simplification, Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, Demultiplexer, Carry look ahead adder, Combinational logic Design, Flip-Flops, Registers, Counters (Synchronous and asynchronous), ALU, Micro-operation. ALU-chip, Faster Algorithm and Implementation (multiplication & Division).

Basic Organization: Operational flow chart (Fetch, Execute, Instruction Cycle), Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers.

Memory Organization: Memory hierarchy, Main memory (RAM/ROM) chips), Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc.

I/O Organization: Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.

References:

1. Willam Stalling, "Computer Organization & Architecture" Pearson Education Asia
2. Mano Morris, "Computer System Architecture" PHI
3. Zaky & Hamacher, "Computer Organization: McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization" New Age
5. Tannenbaum, "Structured Computer Organization" PHI.

MSCS105 : Operating System with Case Study of UNIX/LINUX

Introduction: Definition, Design Goals, Evolution; Concept of User, job and Resources; Batch processing, Multi-programming, Time sharing; Structure and Functions of Operating System.

Process Management: Process states, State Transitions, Process Control Structure, Context Switching, Process Scheduling, Threads.

Memory Management: Address Binding, Dynamic Loading and Linking Concepts, Logical and Physical Addresses, Contiguous Allocation, Fragmentation, Paging, Segmentation, Combined Systems, Virtual Memory, Demand Paging, Page fault, Page replacement algorithms, Global Vs Local Allocation, Thrashing, Working Set Model, Paging.

Concurrent Processes: Process Interaction, Shared Data and Critical Section, Mutual Exclusion, Busy form of waiting, Lock and unlock primitives, Synchronization, Classical Problems of Synchronization, Semaphores, Monitors, Conditional Critical Regions, System Deadlock, Wait for Graph, Deadlock Handling Techniques: Prevention, Avoidance, Detection and Recovery.

File and Secondary Storage Management: File Attributes, File Types, File Access Methods, Directory Structure, File System Organization and Mounting, Allocation Methods, Free Space management; Disk Structure, Logical and Physical View, Disk Head Scheduling, Formatting, Swap Management. Protection & Security.

Case Study of UNIX/LINUX

References:

1. Silberschatz and Galvin, Operating System Concepts 6/ed, Addison Wesley.
2. William Stalling, Operating Systems: Internals and Design Principles 5/ed, PHI.
3. Tanenbaum, Modern operating Systems, PHI.
4. J Bach, The Design of UNIX Operating System, Pearson Education.
5. Vijay Mukhi, The C Odessy, BPB.
6. Peterson and Silberschatz, Operating System Concepts, Addison Wesley.
7. P. B. Hansen, Operating System Principles, PHI.
8. K. Christian, The UNIX Operating System, John Wiley.
9. A. N. Haberman, Introduction to Operating System Design, Galgotia.

MSCS201 : Data Structures

Introduction to data structures, Abstract data types
Stacks - Introduction to stack & primitive operation on stack, Stack as an abstract data type, Stack's applications - Infix, post fix & Prefix expressions, Recursion, Multiple stacks
Queues -Introduction to queues, Primitive Operations on the Queues, Queue as an abstract data type, Circular queue, Dequeue, Priority queue.

Linked List - Introduction to the Linked List, Operation on Linked List, Linked List representation of stack and Queue,Header nodes.
Types of Linked List - Doubly Linked List, Circular Linked List
Application of Linked List.

Trees -Basic Terminology of Trees, Binary Trees, Tree Representations as Array & Linked List
Binary tree representation, Traversal of binary trees - In order, Preorder & post order, Application of Binary tree, Threaded binary tree
Balanced tree, AVL tree, B-tree, B+ & B* trees, Conversion of General Tree to Binary Tree, Counting Binary Trees, 2-3 Trees, algorithm for manipulating 2-3 Trees.

Searching - Sequential Searching, Binary search and their Comparison.
Sorting - External & Internal sorting, Insertion sort, Selection sort, Quick sort, Bubble sort, Heap sort, Merge sort, Comparison of sorting methods Algorithms of sorting and searching in Linked list and Arrays.

Tables - Hash table,Collision resolution Techniques.
Graphs - Introduction to graphs, Basic Terminology, Directed, Undirected & Weighted graph, Representation of graphs, Warshall's algorithem for path matrix and shortest path
Graph Traversals-Depth first & Breadth first search.

References:

1. Lipshutz, Data Structure, McGraw Hill.
2. Standish, Data Structure, Addison-Wesley.
3. B. Salzberg, File Structures, Prentice-Hall, 1988.
4. A.L. Tharp, File Organization and Processing, John Wiley and Sons, 1988.
5. A. M. Tennenbaum, Y. Langsam and M. J. Augenstein, Data Structures using C, PHI, 1991.
6. S. Lipschutz, Data Structure, Schaum Series.
7. D. E. Knuth, Fundamental Algorithms, Narosa Publication.

MSCS202: Data Warehousing & Mining

Dss-Uses, definition, Operational Database. Introduction to DATA Warehousing. Data-Mart, Concept of Data-Warehousing , Multi Dimensional Database Structures. Client/Server computing model & Data Warehousing. Parallel Processors & Cluster Systems. Distributed DBMS implementations.

DATA Warehousing: Data Warehousing Components. Building a Data Warehouse. Warehouse Database. Mapping the Data Warehouse to a Multiprocessor Architecture. DBMS. Schemas for Decision Support Data Extraction, Cleanup & Transformation Tools. Metadata.

Business Analysis Reporting & Query Tools & Applications. On line Analytical Processing (OLAP). Patterns & Models. Statistics Artificial Intelligence.

Knowledge Discovery, Data Mining. Introduction to Data-Mining Decision Trees Neural Networks. Nearest Neighbor & Clustering. Genetic Algorithms. Rule Introduction. Selecting & Using the Right Techniques.

Multimedia Data-Mining, Multimedia-Database, Mining Multimedia Data-Mining and the World Wide Web, Data-Mining, Mining and Meta-Data Data Visualization & Overall Perspective Data Visulization. Applications of Data-Mining.

References:

1. Berson, "Data Warehousing, Data-Mining & OLAP", TMH
2. Mallach, "Decision Support and Data Wartehousing System" TMH
3. Bhavani Thrua-is-ingham, "Data-Mining Technologies, Techniques Tools" CRC Press
4. Navathe, "Fundamentals of Database System" Person Education
5. Margaret H. Dunham, "Data-Mining. Introductory & Advanced Topics" Person Education
6. Piter Adriaans, Dolf Zantinge. "Data-Mining", Person Education.

MSCS203 : Theory of Computation

A brief review of Finite Automata, Regular expressions, Regular languages, Deterministic and non-deterministic computations. Pumping Lemma for Regular languages, Context free languages, Pushdown automaton, Pumping Lemma for Context free languages, Grammar types and Chomsky Hierarchy. Turing Machines (TM), Variations of TM's, Universal Turing Machines (UTM), Church-Turing Thesis, Relation of Languages to Automata. Turing computable functions, Halting problem, Solvability, Undecidability and Computability.

References:

1. J.E.Hopcraft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computation", Pearson Education
2. Cohen, "Introduction to Computer Theory", John Wiley.
3. M. Sipser, Introduction to Theory of Computation, PWS Publishing Corporation, 1997.
4. J.E. Hopcroft, J.D. Ullman, Introduction to Automata Theory, Languages and Computation, Addison-Wisley, 1979.
5. T.C. Martin, Theory of Computation, Tata McGraw-Hill
6. H.R. Lewis, C.H. Papadimitrou, Elements of the Theory of Computation, PHI.

MSCS204 : Software Engineering

SOFTWARE **:** Software Characteristics, Components & Applications, Software Engineering - A Layered Technology, Software Process Models - Linear Sequential Model, Prototype & Rad Model., Evolutionary Software Process Model – Incremental Model and Spiral Model.
SOFTWARE PROJECT MANAGEMENT **:** Project Management Concepts – People Problem and Process
S/W PROCESS AND PROJECT METRICS : Metrics in The Process and Project Domains . Software Measurement –Size Oriented, Function Oriented Metrics, Extended Function

SOFTWARE PROJECT PLANNING: Objectives, Scope, Project Estimation, Decomposition Techniques, Empirical Estimation Models.

ANALYSIS CONCEPT AND PRINCIPLES : Requirement Analysis, Communication Techniques, Analysis Principles, Software Prototyping, Specifications.

ANALYSIS MODELING: Elements of The Analysis Modeling, Data Modeling . Functional Modeling and Information Flow, Behavioral Modeling, Data Dictionary.

DESIGN CONCEPTS AND PRINCIPLES: Design Process, Design Concepts, Design Principles, Effective Modular Design .

DESIGN METHODS : Architectural Design Process, Transform Mapping and Transaction Mapping,Interface Design, - Internal and External Design, Human omputer Interface Design, Interface Design Guidelines, Procedural Design,

S/W Quality Assurance : Quality Concepts, Matrix for Software Quality, Quality Movement, S/W Q A, S/W Review, Formal Technical Reviews, Formal Approaches to Sqa, S/W Reliability, ISO 9000quality Standards

S/W TESTING MODELS : S/W Testing Fundamentals, Test Case Design, White and Black Box Testing, Basic Path Testing, Control Structure

S/W TESTING STRATEGIES : Strategic Approach To S/W Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging

S/W REUSE : Reuse Process,Building Reuse Components, Classified And Retrieving Components, Economics Of S/W Reuse
COMPUTER AIDED S/W ENGINEERING: Introducing of Case, Building Block For Case, Taxonomy Of Case Tools, Integrating Case Environment, Integrating Architecture, Case Repository

References:

1. Software Engineering By R.S.Pressman
2. An Integrated Approach To Software Engineering By Pankaj Jalote

MSCS205 : Data Communication and Computer Networks

Introduction to Computer Networking: Use, advantage, structure of the communications network topologies the telephone network, analog to digital communication.

Communication Between Analog Computers & Terminals Layered Protocols, Network & The OSI Models, Traffic control and accountability wide area and local area networks, connection oriented and connectionless networks, classification of communication protocols polling/selection systems, non-priority system priority system, rotation for layered protocols foals of layered protocols, network design problems, communication between layers, A parametric illustration, introduction to standards organizations and the ISO standard.

Polling/Selection, Satellite and Local area Networks: Binary synchronous control, other BSC system, conversion using satellite communication SPUS, and the Tele-port primary attribute of a LAN, IEEE LAN standards, LAN topology and protocols.

Switching and routing in Network: Telephone switching system, message switching, packet switching, packet switching support to circuit switching networks.

The X.25 & Digital Networks: Layers of x.25, features of x.25 flow control principles, other packet type, x.25 logical channel states time out and time limits, packet formats, flow control and windows x.25 facilities, other standards layer the pad, communication networks communication between layers, advantage of digital networks, Digital's switching, voice transmission by packet.

Personal Computer Network: Personal computer communications, characteristics, using the personal computers as server linking the personal computer to mainframe computers, semaphores of vendor offerings. File transfer on personal computers, personal computer and local area networks. Personal computer networks and the OSI models.

TCP/IP: TCP/IP and internetworking, example of TCP/IP operations, related protocols ports and sockets. The IP address structure, major features of IP, IP datagram, Major IP services. IP source routing, value of the transport layer, TCP, Major features of TCP, passive and active operation, the transmission control block (TCB), route discovery protocols, examples of route discovery protocols, application layer protocols.

References:

1. Tannanhaum, A.S. : Computer Network, PHI – 1995.
2. Martin J.: Computer Network and Distributed processing, 1985.
3. Black : Computer Network; Protocols, Standards and Interface PHI – 1995.
4. Black : Data Network; Concepts, Theory and Practices, PHI
5. Starlings, William : Local Networks; and Introduction Mack Publishing Co.
6. Comer; Internetworking : Principles, Protocols Architecture, PHI with TCP/IP
7. Crichlow : Introduction to Distributed and Parallel Comp.
8. Ahuja : Design and Analysis of Computer Communication Network, McGraw Hill Co.
9. Chorafas: Designing and Implementing Networks, McGraw Hill Co.

MSCS301 : Programming in C++

OOAD and OOP, Object Oriented Programming paradigm and design; General Concepts: Object, Class, Data Abstraction and Encapsulation, Inheritance, Polymorphism, Dynamic Binding, Message Passing; Benefits of OOP, Object-oriented Languages.

Object oriented Programming using C++: Data Types, Operators, Classes and Objects, Constructors and Destructors, Operator Overloading, Type Conversions, Inheritance, Pointers, Virtual Functions, Polymorphism, Stream I/O in C++, File Processing, Templates, Standard Template Library, Program defined exceptions, Events; Introduction to Class Wizard, Application Wizard and MFC.

Use of OOAD and OOP concepts in different areas: - Object-oriented Software Engineering, Object-oriented OS.

References:

1. B. Stroustrup, The C++ Programming Language, Addison-Wesley.
2. E. Balagurusamy, Object oriented Programming with C++, 2/ed, TMH.
3. G. Booch, Object Oriented Analysis and Design, Addison-Wesley.
4. Rumbagh et. Al., Object Oriented Modeling, PHI.
5. R. S. Pressman, Software Engineering – A Practitioner's Approach, McGraw Hill.

MSCS302: JAVA Programming

Java Programming: Introduction, Operator, Data types, Variables, Methods and Classes, Multi threaded programming, I/O Java applet.

Java Library: String handling, I/O exploring JAVA, Networking, Applet Classes, Event Handling, Introduction to AWT, Working with windows, Graphics, AWT Controls, Layout manager and menu, Images, Additional Packages.

Software Development Using Java: Java Bean, Java Swing, Java Servlets, Migrating from C++ to Java, Application of JAVA, Dynamic Billboard Applet.

Image Menu: An image based menu, Lavatron Applets, Scrabblets JDBC, Brief functioning of Upper Layer E-mail and their applications.

References:

1. Naughton, Schidt, "The Complete Reference JAVA2", TMH
2. Balagurusamy E, "Programming in JAVA, TMH
3. Dustin R. Calway, "Inside Serviets" Addison Wesley
4. Mark Wutica, "Java Enterprise Edition" QUE
5. Steven Hoizner, "Java2 Black book" Dreamtech

MSCS303: Design and Analysis of Algorithm

Elementary Data Structures, Basic Computational Models.

Simple Algorithms. Analyzing Algorithms, Asymptotic Notation.

Design Methods : General Consideration, Algorithm design paradigms and representative problems: Divide and Conquer (Binary search, Merge Sort, Quick Sort, Arithmetic with Large integers, etc.), Greedy Method (Minimal Spanning Tree, Shortest Paths, Knapsack, etc.), Dynamic Programming (Chained Matrix Multiplication, Optimal Storage on Tapes, Shortest Paths, Optimal Search Trees, etc.), Backtracking (8-queens problem, Graph Colouring, Hamiltonian Cycles, etc.), Branch and Bound (0/1 Knapsack problem, Travelling Salesperson, etc.), Approximation (Graph Colouring, Task Scheduling, Bin Packing, etc.), Probabilistic Algorithms (Numerical Integration, Primality Testing, etc.).

Graph Algorithms: BFS, DFS and its applications.

Polynomial Evaluation and Interpolation, Fast Fourier transforms.
Intractable Problems : Basic Concepts, Nondeterministic Algorithms, NP Completeness, Cook's Theorem, Examples of NP-Hard and NP-Complete problems. Problem Reduction.

Lower Bound Techniques: Comparison tree, Reduction, Adversary argument.

References:

1. A.Aho, J. Hopcroft and J.Ullman, The Design and Analysis of Computer Algorithms, Addison Wesley.
2. E. Horowitz and S. Sahani, Fundamentals of Computer Algorithms, Galgotia, New Delhi.
3. S.E.Goodman and S.T.Hedetniemi, Introduction to the Design and Analysis of Algorithms, McGraw Hill.
4. G.Brassard and P.Bratley, Algorithmics, PHI.
5. S.K.Basu, Design Methods and Analysis of Algorithms, PHI, 2005.

MSCS304 : Mobile and Wireless Computing

EXISTING WIRELESS SYSTEMS: Introduction, Global System for Mobile Communications (GSM), Personal Communications Services (PCS), International Mobile Telecommunications 2000 (IMT-2000) Wireless local area networks, Wireless local loops.

WIRELESS AND MOBILE COMPUTING : Overview of the history, evolution, and compatibility of wireless standards; the special problems of wireless and mobile computing;

MOBILE COMMUNICATION SYSTEMS : Introduction, mobile Internet protocol; mobile aware adaptation; extending the client-server model to accommodate mobility; mobile data access; the software packages to support mobiule and wireless computing; Mobile/Cellular System Infrastructure, Registration, Handoff Parameters and Underlying Support. Roaming support Using System Backbone. The role of middleware and support tools; performance issues; Multicasting, Security and Privacy.

SATELLITE SYSTEMS : Introduction, Types of Satellite Systems, Characteristics of Satellite System, Satellite System Infrastructures, Call Setup, Global Positioning System.

RECENT ADVANCES: Introduction, Ultra-Wideband Technology, Multimedia Serveces Requirements, Mobility Management for Integrated Systems; Multicast in Wireless Networks; MANET Route Maintenance/Repair; Design Issues in Sensor Networks; Bluetooth Networks; Threats and Security Issues.

References:

1. Introduction to Wireless and Mobile Systems, Dharma P. Agrawal, University of Cincinnati Qing-An Zeng, University of Cincinnati, ISBN: 0-534-40851-6, © 2003
2. Internetworking with TCP/IP Vol. 1: Principles, Protocols, and Architecture, 4/e, Comer, Douglas E., Prentice Hall 2000. ISBN 0-13-091449-5
3. Computer Networks and Internets with Applications, 3/e, Comer, Douglas E., Prentice Hall 2001. ISBN 0-13-018380-6
4. Computer Networking, Kurose & Ross, Addison-Wesley 2001
5. Data & Computer Communications 6th ed., Stallings, William, Prentice-Hall 2000
6. Computer Networks 3rd ed., Tanenbaum, Andrew, Prentice-Hall 1996

MSCS305 (i) : Fuzzy Logic & Neural Network

Statistical concepts and Reasoning theories. Probability and Bayes' Theorem. Certainity factors and Rule-Based systems. Bayesian networks.
Working of Human Mind. Discourse and Pragmatic processing. Semantic Nets and Frames. Fundamentals of Neural networks and Building techniques. Discovery and Analogy. Neural net learning and Genetic learning. Formal learning theory.

A.I. techniques, pattern recognition, Level of, speech recognition representation in A.I. properties of internal representation. Introduction to Predicate Calculus: Predicates and Arguments, connectives, Simplifications of strategies, extracting answers from Resolution Refutation. Control strategies.

Dempster-Shafer Theory. Parallelism in Reasoning system. Distributed reasoning systems. Default reasoning, default logic. Logics for non monotonic reasoning. Symbolic techniques for representing and using uncertain knowledge. Definition, Concept, and framework of Fuzzy Logic. Fundamental changes to the idea about Set membership and corresponding changes to the definition of Logic Operations. Defining fuzzy sets, used in representing a list of Propositions.

Commonsense ontologies. Memory organization. Case based reasoning. Perception. Robot Architectures. Graphical representation of networks. Matching. Forward and backward production system. Using deduction systems to generate Robot Plans. Heuristic graph search process .
Real Life Applications of Fuzzy Logic and Neural Networks.

References:

1. Principles of Artificial Intelligence. By Nils J. Nilsson, Narosa Publishing House, N.Delhi.
2. Artificial Intelligence Elaine Rich,Tata MC Graw, N.Delhi.
3. 3.Principal of Artificial Intelligence, Nelson, Springer-Verlag.
4. P. Hajek, Metamathematics of Fuzzy Logic, Kluwer Academic Publishers.
5. Harris, J., An Introduction to Fuzzy Logic Applications, Kluwer Academic Publishers, Dordrecht, 2000, ISBN 0-7923-6325-6.
6. Investment in Mutual Funds using Fuzzy Logic By Kurt E. Peray, Foreword by Chemical Publishing Co., Inc., New York.

MSCS305 (ii) : Artificial Intelligence

Introduction: Definition and meaning of artificial intelligence, A.I. techniques, pattern recognition, Level of, speech recognition representation in A.I. properties of internal representation.

Production System: Different types of tracing, strategies, graph search strategies, Heuristic graph, search procedure, AND/OR graph, relationship between decomposional and compatible systems, searching Gate Tree, min-max search game playing, actual game playing.

Introduction to Predicate Calculus: Predicates and Arguments, connectives, Simplifications of strategies, extracting answers from Resolution Refutation. Control strategies.

Rule Based Deduction Systems: Forward and backward deduction system, resoling with AND/OR graph, computation, deduction and program synthesis, central knowledge for rules based deduct systems.

Managing Plans of Action: Plan interpreter, planning decisions, execution monitoring and re-planning domain of application robot motion planning and game playing.

Structural Object Representation: Semantic networks semantic market matching deductive operations on structured objects.

Architectural for A.I. Systems: Knowledge, acquisitions representation IMAGES PROCESSING, Natural language processing.

References:

1. Introduction to artificial Intelligence Eugene Charnik Drew MC mott
2. Artificial Intelligence Elaine Rice.
3. Principal of Artificial Intelligence, Nelson, Springer-Verlag.
4. Artificial Intelligence Application Programming: Tim Jones, Wiley dreamtech

MSCS305 (iii) : Network Security and Cryptography

Introduction of Cryptography: Introduction To security: Attacks, Services & Mechanisms, Security, Attacks, Security Services, Conventional Encryption: Classical Techniques, Conventional Encryption Model, and steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operations.

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, CR2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement of Encryption Function.

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key, Key Management, Fermat's & Euler's Theorm, Primality, Chinese Remainder Theorem.

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Function Birthday Attacks, Security of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signature, Authentication Protocol, Digital Signature Standard (DDS) Proof of Digital Signature Algorithm.

Network & System Security: Authentication Applications: Kerberos X-509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP),S/Mine Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

References:

1. William Stallings, "Cryptography and Network Security: Principles and Practice"' Prentice hall, New Jersey
2. Johannes A. Buchmann, "Introduction to Cryptography" Springer-Verlag
3. Atul Kahate, "Cryptography and Network Security" TMH
4. Network Security Bible : Eric Cole, Wiley dreamtech India Pvt. Ltd.
5. Practical Cryptography "Bruce Schneier" Wiley dreamtech India Pvt. Ltd.

MSCS305 (iv) : Distributed and Parallel Computing

Parallel and high-performance computers, Models and parallel computers, Basic communication operations, Performance and scalability, MPT and open MP programming.
Distributed processing potential, Forms of Distributed processing strategies, Hexagon Distributed computing, client server model.

References:

1. Kumar, Grama, Gupta and Karypis : Introduction to Parallel Computing, Bejjamin Benjamin Cummings Publishing Co.
2. Tannanbaum, A.S. : Computer Networks, prentice-Hall.
3. Martin, J : Design and Strategy for Distributed Data Processing, Prentice Hall.
4. Martin, J. : Computer Networks and Distributed Processing, Prentice-Hall.
5. Stallings, William : Local Networks; An Introduction Macmillan publishing Co.