Uttrakhand Technical University, Dehradun
www.uktech.in

SCHEME OF EXAMINATION
&
SYLLABI
For
M.Tech. in Computer Science (2012-13)
Uttarakhand Technical University, Dehradun

Teaching scheme for M.Tech. (Computer Science)

Semester 1:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Title</th>
<th>Course Code</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Software Engineering</td>
<td>CS-183</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Advance Computer Network</td>
<td>CS-184</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Elective-I</td>
<td>See (Annexure-1)</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Elective-II</td>
<td>See (Annexure-1)</td>
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Semester 2:

<table>
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<tbody>
<tr>
<td>1.</td>
<td>Advance DBMS</td>
<td>CS-198</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Advance Data Structure and File System</td>
<td>CS-197</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Elective-III</td>
<td>See (Annexure-1)</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Elective-IV</td>
<td>See (Annexure-1)</td>
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Semester 3:

<table>
<thead>
<tr>
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</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Distributed Computing</td>
<td>CS-284</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Elective-V</td>
<td>See (Annexure-1)</td>
<td>4</td>
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<tr>
<td>3.</td>
<td>Seminars on Computer Engineering</td>
<td>CS-381</td>
<td>4</td>
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<td>4.</td>
<td>Project</td>
<td>CS-382</td>
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Semester 4:

<table>
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<th>S.No.</th>
<th>Course Title</th>
<th>Course Code</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>Thesis</td>
<td>CS-481</td>
<td>16</td>
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</tbody>
</table>
# List of Courses

Annexure 1

## Elective-I

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Title</th>
<th>Course Code</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Advance Data Modeling</td>
<td>CS-188</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Multimedia System</td>
<td>CS-189</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Real Time System</td>
<td>CS-190</td>
<td>4</td>
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</table>

## Elective-II

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<th>S.No.</th>
<th>Course Title</th>
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<th>Credit</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Distributed Operating System</td>
<td>CS-290</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Foundation of Computer Science-I</td>
<td>CS-181</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Advance Algorithm Techniques</td>
<td>CS-187</td>
<td>4</td>
</tr>
</tbody>
</table>

## Elective-III

<table>
<thead>
<tr>
<th>S.No.</th>
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<th>Course Code</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Foundation of Computer Science-II</td>
<td>CS-182</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Data Warehousing and Mining</td>
<td>CS-289</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Network Security and Cryptography</td>
<td>CS-191</td>
<td>4</td>
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</tbody>
</table>

## Elective-IV

<table>
<thead>
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<th>S.No.</th>
<th>Course Title</th>
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<th>Credit</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Oracle System Administration</td>
<td>CS-195</td>
<td>4</td>
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<tr>
<td>2.</td>
<td>Web Technology</td>
<td>CS-283</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>Mobile Computing</td>
<td>CS-288</td>
<td>4</td>
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</tbody>
</table>

## Elective-V

<table>
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<th>Course Title</th>
<th>Course Code</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Genetic Algorithm &amp; Neural Network</td>
<td>CS-199</td>
<td>4</td>
</tr>
<tr>
<td>2.</td>
<td>Unix System Administration</td>
<td>CS-196</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>OO Analysis &amp; Design</td>
<td>CS-281</td>
<td>4</td>
</tr>
</tbody>
</table>
Software Engineering

CS183  

The software crisis, principles of software engineering, programming-in-the-small vs. programming-in-the-large, The Software Lifecycle, Software and systems engineering: overview, examples and industrial realities Project Management - Project Planning and Scheduling, Team organisation  

Case studies  

SRS (Software requirement specification). Design for reuse, design for change, design notations, design evaluation and validation, coding and testing, software maintenance and reliability.  


Reference Books

Advanced Computer Network

CS184

Prerequisite: Computer Network

IPv6, Next Generation IP protocol, Wireless Networks, GSM, CDMA, Mobility in networks, Mobile IP, Mobile TCP, TCP extensions for high speed network, IP multicasting, BSD Sockets, TCP/IP programming.

Mobility in network. Security related issues.IP Multicasting. Multicasting routing protocols, address assignments, session discovery, etc.TCP extensions for high-speed networks, transaction-oriented application, other new option in TCP.


Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.

Case study
Study of various network simulators, Network performance analysis using NS2

Reference Books:

2. Schiller, “Mobile Communication,”
4. Stevens, “Network Programming,”
Advance Algorithm Techniques

CS187  
L T P  Credits  3 0 2 4


Approximation algorithms, Linear programming concepts, NP hard optimization problems. Parallel algorithms models and basic operations, Parallel algorithms -- Linear recurrences, matrix operations, Graph partitioning, Cache aware and cache oblivious algorithms -- Matrix multiplication, computational effort of an algorithm, randomized algorithms. Computational geometry, algorithms for string matching, network flow problems, Maximum flow -- Ford-Fulkerson method.

Reference Books:


Advance Data Modeling

CS188  
L T P  Credits  4 0 0 4


Conceptual Object Data Model – XML and Web Data – XML Schema – Distributed Data bases – OLAP and Data Mining – ROLAP and MOLAP


Reference Book:


**Multimedia Systems**

<table>
<thead>
<tr>
<th>CS189</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Introduction to Multimedia, Multimedia Objects, Multimedia in business and work. Multimedia hardware, Memory & Storage devices, Communication devices, Multimedia software’s, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools.

Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture.


Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression.

Multiple monitors, bitmaps, Vector drawing, lossy graphic compression, image file formatic animations Images standards, JPEG Compression, Zig Zag Coding.

Video representation, Colors, Video Compression, MPEG standards, MHEG Standard recent development in Multimedia.

**Reference Books:**

3. David Hillman “Multimedia technology and Applications” Galgotia Publications.
4. Mark Nelson “Data Compression Book” BPB.
Real Time System


Task Assignment and Scheduling: Different task model, Scheduling hierarchy, offline vs Online Scheduling, Clock Drives.

Model of Real Time System: Processor, resources, temporal parameter, Periodic Task Model, Sporadic Task Model, Precedence Constraints and Data Dependencies, Scheduling hierarchy

Scheduling of Periodic Task: Assumptions, fixed versus dynamic priority algorithms, schedulability test for fixed priority task with arbitrary deadlines.

Scheduling of Aperiodic and Sporadic Tasks: Assumptions and approaches, deferrable, sporadic servers, slack stealing in deadline driven and fixed priority systems. Two level scheme for integrated scheduling, Scheduling for applications having flexible constrains.


Multi Processor Scheduling: Model of multi processor and distributed systems, Scheduling algorithms for end to end periodic tasks in homogeneous/heterogeneous systems, Predictability and validation of dynamic multiprocessor system.

Real time Communication: Model of real time Communication, Priority base service

For switched network, Weighted Round Robin Service, Medium access Control Protocol, Real Time Protocol.

Reference Books:

Distributed Operating Systems


Reference Books:


Foundations of Computing Science I

CS181

L T P Credits
4 0 0 4

Prerequisites: Knowledge of basic concepts on Sets, different operations on sets, binary operations, functions.

RELATION: Type and compositions of relations, Pictorial representation of relations, Equivalence relations, Partial ordering relation. Function: Types, Composition of function, Recursively defined function Mathematical Induction: Piano’s axioms, Mathematical Induction, Discrete Numeric Functions and Generating functions, Simple Recurrence relation with constant coefficients, linear recurrence relation without constant coefficients, Asymptotic Behavior of functions, Algebraic Structures: Properties, Semi group, monoid, Group, Abelian group, properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

Prepositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram,


Introduction to defining language, Kleene Closure, Arithmetic expressions, Chomsky Hierarch y, Regular expressions, Generalized Transition graph.
finite Boolean algebra, functions of Boolean algebra.

Conversion of regular expression to Finite Automata, NFA, DFA, Conversion of NFA to DFA, Optimizing DFA, FA with our Moore machine, Mealy machine, Conversions.

Reference Books:
Advanced Database Systems

CS198  L T P  Credits
        4 0 0  4

Object-relational databases, active databases, and distributed databases. Topics covered include object-relational type extension, active rules and their design, distributed database design, distributed query processing and optimization, distributed concurrency control, and multidatabases. An overview of other modern database technologies, such as parallel databases, multimedia databases, spatial and temporal databases, data warehousing and data mining, deductive databases, and uncertainty in databases, is also given.

Reference Books:


Genetic Algorithms and Neural Networks

CS199  L T P  Credits
        4 0 0  4


Reference Books:

Unix Network Programming

CS196 L T P Credits


Reference Books:


Advanced Data Structure & File System

CS197 L T P Credits

Prerequisite: Data Structures

Contents:

Arrays, Linked Lists, Stack, Queue, Dqueue, Priority Queue, Tree, Binary Search Tree, Heap Tree, Threaded Tree, Fibonacci Tree, Tree Traversal, Binomial Tree, B, B+ Tree, AVL Tree, Graphs, Graph Traversal, Spanning Trees, Shortest Path, Hashing.

Reference Books:

2. Tanenbaum, “Data Structures using C and C++, PHI
Regular expressions and finite Automata: Regular languages, Finite automata, Union, Intersections & complements. Non deterministic Finite automata, Kleene’s theorem.

Regular & Non regular languages: Criterion for regularity, minimal Finite Automata, Pumping lemma, Decision problems, languages & computers.

Context-free grammars: Derivation Trees & Ambiguity, An Unambiguous CFG for algebraic expressions, simplified forms and normal forms.

Pushdown Automata: Definition, Deterministic pushdown automata, A PDA corresponding to a given context-free grammar, context-free grammar corresponding to a given PDA, parsing.

Context-free and Non-Context-free languages: The pumping lemma for context-free languages, Intersections & complements of context-free languages, decision problems involving context-free languages.

Turing Machines: Definitions, computing partial functions, combining Turing machine, variation of Turing machines, Non-Deterministic Turing Machines, Universal Turing Machine, Church-Turing Thesis.

Graph Theory: Introduction, Isomorphism, Sub-graphs, walks, paths and circuits, connected graphs, disconnected graphs and components, Euler graphs, Operations on graphs, more on Euler Graphs, Hamiltonian paths and circuits, The traveling salesman problem, Chromatic number, Chromatic partitioning, Chromatic polynomial, Matchings.

Continuous-Parameter Markov chains and Queuing Theory: Introduction, The Birth and death process, other special cases of the Birth-Death Model, Non-Birth-Death processes.

Reference Books
2. Narsingh Deo – Graph Theory with Applications to Engineering & Computer Science – Prentice Hall of India.


Data visualization & Overall Perspective. Data Visualization. Putting it All Together.

Appendices: A : Data Visualization. B : Big Data-Better Returns : Leveraging Your Hidden Data Assets to Improve ROI. C : Dr. E.F. Codd’s 12 Guidelines for OLAP. D : Mistakes for Data warehousing Managers to Avoid.

**Reference Books:**

1. Berson, “Data Warehousing, Data Mining & OLAP”.


REFERENCES BOOK
Oracle System Administration

CS195

Web Technology

CS283


Introduction to JSP, JSP processing, JSP Application Design, Tomcat Server, Implicit JSP objects, Conditional Processing, Declaring variables and methods, Error Handling and Debugging, Sharing data between JSP pages - Sharing Session and Application Data.


Reference Books:
3. Joel Sklar , “Principal of web Design” Vikash and Thomas Learning
6. Hans Bergsten, “Java Server Pages”, SPD O'Reilly
Issues in Mobile Computing, Overview of wireless Telephony, IEEE 802.11 & Blue Tooth, Wireless Multiple access protocols, channel Allocation in cellular systems.

Data Management Issues, data replication for mobile computers, adaptive Clustering for Mobile Wireless networks.


Mobile Agents Computing, Security and fault tolerance, transaction processing in Mobile computing environment.

Ad hoc network, Routing Protocol, Global State Routing (GSR), Dynamic State Routing (DSR), Fisheye State Routing (FSR), Ad hoc On-Demand Distance Vector (AODV), Destination Sequenced Distance – Vector Routing (DSDV).

**Reference Books:**


REFERENCES BOOKS
5. Hans-Erik Eriksson, Magn