GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(GITAM)
(Deemed to be University, Estd. u/s 3 of UGC Act 1956)
VISAKHAPATNAM • HYDERABAD • BENGALuru
Accredited by NAAC with ‘A’ Grade

REGULATIONS AND SYLLABUS
of
Master of Technology
in
Computer Science & Technology
(w.e.f 2015-16 admitted batch)

A University Committed to Excellence
VISION
To become a global leader in higher education.

MISSION
To impart futuristic and comprehensive education of global standards with a high sense of discipline and social relevance in a serene and invigorating environment.
REGULATIONS AND SYLLABUS
OF
Master of Technology
in
Computer Science & Technology
(w.e.f 2015 -16 admitted batch)
1. ADMISSION

1.1 Admission into M.Tech. in Computer Science & Technology program of GITAM University is governed by GITAM University admission regulations.

2. ELIGIBILITY CRITERIA

2.1 A pass in B.E./B.Tech./AMIE in any branch of Engineering or its equivalent.

2.2 Admissions into M.Tech. will be based on the following:

(i) Score obtained in GAT (PG), if conducted.

(ii) Performance in Qualifying Examination / Interview.

2.3 The actual weightage to be given to the above items will be decided by the authorities before the commencement of the academic year. Candidates with valid GATE score shall be exempted from appearing for GAT (PG).

3. CHOICE BASED CREDIT SYSTEM

3.1 Choice Based Credit System (CBCS) is introduced with effect from the admitted Batch of 2015-16 based on UGC guidelines in order to promote:

• Student Centered Learning
• Cafeteria approach
• Students to learn courses of their choice
• Learning at their own pace
• Inter-disciplinary learning

3.2 Learning goals/ objectives and outcomes are specified leading to what a student should be able to do at the end of the program.

4. STRUCTURE OF THE PROGRAM

4.1 The Program Consists of

i) Core Courses (compulsory) which give general exposure to a Student in Computer Science & Technology and subject related area.

ii) Programme Electives.

iii) Open electives.
4.2 Each course is assigned a certain number of credits depending upon the number of contact hours (lectures/tutorials/practical) per week.

4.3 In general, credits are assigned to the courses based on the following contact hours per week per semester.
   • One credit for each Lecture / Tutorial hour per week.
   • One credit for two hours of Practicals per week.
   • Two credits for three (or more) hours of Practicals per week.

5. MEDIUM OF INSTRUCTION

The medium of instruction (including examinations and project reports) shall be English.

6. REGISTRATION

Every student has to register himself/herself for each semester individually at the time specified by the Institute / University.

7. ATTENDANCE REQUIREMENTS

7.1 A student whose attendance is less than 75% in all the courses put together in any semester will not be permitted to attend the end - semester examination and he/she will not be allowed to register for subsequent semester of study. He/she has to repeat the semester along with his / her juniors.

7.2 However, the Vice Chancellor on the recommendation of the Principal / Director of the Institute/School may condone the shortage of attendance to the students whose attendance is between 66% and 74% on genuine grounds and on payment of prescribed fee.

8. EVALUATION

8.1 The assessment of the student’s performance in a Theory course shall be based on two components: Continuous Evaluation (40 marks) and Semester-end examination (60 marks).

8.2 A student has to secure an aggregate of 40% in the course in the two components put together to be declared to have passed the course, subject to the condition that the candidate must have secured a minimum of 24 marks (i.e. 40%) in the theory component at the semester-end examination.

8.3 Practical/ Project Work/ Industrial Training/ Viva voce/ Seminar etc. course are completely assessed under Continuous Evaluation for a maximum of 100 marks, and a student has to obtain a minimum of 40% to secure Pass Grade. Details of Assessment Procedure are furnished below in Table 1.
### Table 1: Assessment Procedure

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Component of Assessment</th>
<th>Marks Allotted</th>
<th>Type of Assessment</th>
<th>Scheme of Evaluation</th>
</tr>
</thead>
</table>
| 1     | Theory                   | 40             | Continuous Evaluation | i) Thirty (30) marks for mid Semester examinations. Three mid examinations shall be conducted for 15 marks each; performance in best two shall be taken into consideration.  
ii) Ten (10) marks for Quizzes, Assignments and Presentations.  
Sixty (60) marks for Semester-end examinations |
|       |                          | 60             | Semester-end Examination |
|       |                          |                |                    |
| 2     | Practicals               | 100            | Continuous Evaluation | i) Fifty (50) marks for regularity and performance, records and oral presentations in the laboratory. Weightage for each component shall be announced at the beginning of the Semester.  
ii) Ten (10) marks for case studies.  
iii) Forty (40) marks for two tests of 20 marks each (one at the mid-term and the other towards the end of the Semester) conducted by the concerned lab Teacher. |
| 3     | Project work (III Semester) | 100            | Continuous Evaluation | i) Forty (40) marks for periodic evaluation on originality, innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
ii) Thirty (30) marks for mid-term evaluation for defending the Project, before a panel of examiners.  
iii) Thirty (30) marks for final Report presentation and Viva-voce, by a panel of examiners |
| 4     | Project work (IV Semester) | 50             | Continuous Evaluation | i) Twenty (20) marks for Periodic evaluation on originality innovation, sincerity and progress of the work, assessed by the Project Supervisor.  
ii) Fifteen (15) marks for mid-term evaluation for defending the Project, before a panel of examiners.  
iii) Fifteen (15) marks for interim Report presentation and Viva-voce. |
4

<table>
<thead>
<tr>
<th></th>
<th>50</th>
<th>Semester-end Examination</th>
<th>Fifty (50) marks for final Report presentation and Viva-voce assessed by external examiners.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|                | 100| Continuous Evaluation   | Through five periodic Viva-voce exams for 20 marks each, conducted by a panel of examiners. The course content for Viva exams shall be announced at the beginning of the Semester. |

*Panel of Examiners shall be appointed by the concerned Head of the Department*

9. **REAPPEARANCE**

9.1 A student who has secured ‘F’ grade in a Theory course shall have to reappear at the subsequent Semester end examination held for that course.

9.2 A student who has secured ‘F’ grade in a Practical course shall have to attend Special Instruction Classes held during summer.

9.3 A student who has secured ‘F’ Grade in Project work / Industrial Training etc shall have to improve his/her report and reappear for Viva – voce at the time of Special Examination to be conducted in the summer vacation.

10. **SPECIAL EXAMINATION**

10.1 A student who has completed his/her period of study and still has “F” grade in a maximum of three theory courses is eligible to appear for Special Examination normally held during summer vacation.

11. **BETTERMENT OF GRADES**

A student who has secured only a Pass or Second class and desires to improve his/her Class can appear for Betterment Examinations only in Theory courses of any Semester of his/her choice, conducted in Summer Vacation along with the Special Examinations. Betterment of Grades is permitted ‘only once’ immediately after completion of the program of study.

12. **GRADING SYSTEM**

12.1 Based on the student performance during a given semester, a final letter grade will be awarded at the end of the semester in each course. The letter grades and the corresponding grade points are as given in Table 2.
Table 2: Grades & Grade Points

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Grade</th>
<th>Grade Points</th>
<th>Absolute Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>O (outstanding)</td>
<td>10</td>
<td>90 and above</td>
</tr>
<tr>
<td>2</td>
<td>A+ (Excellent)</td>
<td>9</td>
<td>80 to 89</td>
</tr>
<tr>
<td>3</td>
<td>A (Very Good)</td>
<td>8</td>
<td>70 to 79</td>
</tr>
<tr>
<td>4</td>
<td>B+ (Good)</td>
<td>7</td>
<td>60 to 69</td>
</tr>
<tr>
<td>5</td>
<td>B (Above Average)</td>
<td>6</td>
<td>50 to 59</td>
</tr>
<tr>
<td>6</td>
<td>C (Average)</td>
<td>5</td>
<td>45 to 49</td>
</tr>
<tr>
<td>7</td>
<td>P (Pass)</td>
<td>4</td>
<td>40 to 44</td>
</tr>
<tr>
<td>8</td>
<td>F (Fail)</td>
<td>0</td>
<td>Less than 40</td>
</tr>
<tr>
<td>9</td>
<td>Ab. (Absent)</td>
<td>0</td>
<td>-</td>
</tr>
</tbody>
</table>

12.2 A student who earns a minimum of 4 grade points (P grade) in a course is declared to have successfully completed the course, and is deemed to have earned the credits assigned to that course, subject to securing a GPA of 5 for a Pass in the semester.

13. **GRADE POINT AVERAGE**

13.1 A Grade Point Average (GPA) for the semester will be calculated according to the formula:

\[
\text{GPA} = \frac{\sum [C \times G]}{\sum C}
\]

Where

- \(C\) = number of credits for the course,
- \(G\) = grade points obtained by the student in the course.

13.2 To arrive at Cumulative Grade Point Average (CGPA), a similar formula is used considering the student’s performance in all the courses taken, in all the semesters up to the particular point of time.

13.3 CGPA required for classification of class after the successful completion of the program is shown in Table 3.

**Table 3: CGPA required for award of Class**

<table>
<thead>
<tr>
<th>Class</th>
<th>CGPA Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>≥ 8.0*</td>
</tr>
<tr>
<td>First Class</td>
<td>≥ 6.5</td>
</tr>
<tr>
<td>Second Class</td>
<td>≥ 5.5</td>
</tr>
<tr>
<td>Pass Class</td>
<td>≥ 5.0</td>
</tr>
</tbody>
</table>

* In addition to the required CGPA of 8.0 or more, the student must have necessarily passed all the courses of every semester in first attempt.
14. **ELIGIBILITY FOR AWARD OF THE M.Tech. DEGREE**

14.1 Duration of the program: A student is ordinarily expected to complete the M.Tech. program in four semesters of two years. However, a student may complete the program in not more than four years including study period.

14.2 However, the above regulation may be relaxed by the Vice Chancellor in individual cases for cogent and sufficient reasons.

14.3 A student shall be eligible for award of the M.Tech. Degree if he/she fulfills all the following conditions.

a) Registered and successfully completed all the courses and projects.

b) Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of his/her study within the stipulated time.

c) Has no dues to the Institute, hostels, Libraries, NCC / NSS etc, and

d) No disciplinary action is pending against him/her.

15. **DISCRETIONARY POWER**

Not withstanding anything contained in the above sections, the Vice Chancellor may review all exceptional cases, and give his decision, which will be final and binding.
M.Tech. in Computer Science and Technology
Department of Computer Science and Engineering
Effective from academic year 2015-2016 admitted batch

Semester I

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
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<tbody>
<tr>
<td>1</td>
<td>ECS701</td>
<td>Data Structures and Algorithms</td>
<td>CE</td>
<td>4</td>
<td>0</td>
<td>0</td>
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<td>2</td>
<td>ECS703</td>
<td>Advanced Operating Systems</td>
<td>CE</td>
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Semester II

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<td>9</td>
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<td>Comprehensive Viva Voce</td>
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27
29
### Semester III

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### Semester IV

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<td>ECS892</td>
<td>Project work-II</td>
<td>CE</td>
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### Number of Credits

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<th>II</th>
<th>III</th>
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### Open Elective-I

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<th>C</th>
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<td>Human Resource Management</td>
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# PROGRAMME ELECTIVES

## Programme Elective - I

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<th>Course Code</th>
<th>Course Title</th>
<th>Category</th>
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<td>ECS741</td>
<td>Information Retrieval</td>
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## Programme Elective-II

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<th>Category</th>
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<th>C</th>
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<tbody>
<tr>
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<td>ECS742</td>
<td>Advanced Data Mining</td>
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## Programme Elective-III

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<th>Course Title</th>
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<th>T</th>
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<th>C</th>
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<tbody>
<tr>
<td>1</td>
<td>ECS754</td>
<td>Introduction to Big Data Analytics</td>
<td>PE</td>
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<tr>
<td>2</td>
<td>ECS756</td>
<td>Software Verification and Validation</td>
<td>PE</td>
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<td>3</td>
<td>ECS758</td>
<td>Cloud Computing</td>
<td>PE</td>
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</tbody>
</table>
Module I 12hrs
Introduction to Data Structures and Algorithms, Performance Analysis:

Module II 10hrs
Introduction to Graphs, Graph Traversal. Introduction to Trees and Tree Traversals, Binary Search Trees, AVL Trees, B-Trees, Priority Queues.

Module III 10hrs

Module IV 10hrs
Dynamic Programming: General Method, Matrix Chain Multiplication, Longest Common Subsequence, Reliability Design, Traveling Sales Person Problem. Back Tracking: General Method, 8 Queens Problem, Hamiltonian Cycle, Graph Coloring Problem.

Module V 10hrs

Text Book(s)
2. Sartaj Sahni, Data Structures, Algorithms and Applications in C++, 2/e, Universities Press.

References
4. Michel T. Godrich,Roberto Tamassia, Algorithm Design John Weily and Sons
ECS703 : ADVANCED OPERATING SYSTEMS

L T P C
3 1 0 4

Module I

Module II

Module III

Module IV
FAILURE RECOVERY AND FAULT TOLERANCE: Basic Concepts-Classification of Failures – Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Check pointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues - Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols;

Module V
Text Book(s)

References
Module I

Module II
Distributed Database design – A frame work, the design of database fragmentation, the allocation of fragments. Translation of global queries into fragment queries, query optimization.

Module III
Distributed Transaction Management – A framework, transaction atomicity, 2-phase commit, and concurrency control: foundations, distributed deadlocks, timestamps.

Module IV
Reliability: Basic concepts, commit protocols, consistent view of Network, Detection and Resolution of Inconsistencies, check points and cold restart.

Module V
Commercial Systems: Tranclem’s ENCOMPASS, Distributed database systems, IBM’s Inter system communication, feature of distributed Ingres and Oracle.
Heterogeneous databases: General problems – brief study of multibase.

Text Book(s)

References
ECS707: DATA WAREHOUSING AND DATA MINING

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Module I

Introduction to Data Mining: What is Data Mining, Motivating Challenges, The origins of Data Mining, Data Mining Tasks. Data: Types of Data, Data quality, Data Preprocessing, Measures of Similarity and Dissimilarity

Module II

Data Warehouse and OLAP Technology for Data Mining: What is a Data Warehouse? Multi-Dimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Development of Data Cube Technology, Data Warehousing to Data Mining.

Module III


Module IV

Association Analysis: Basic Concepts and Algorithms Problem Definition, Frequent Itemset Generation, Compact Representation of Frequent Itemsets, Alternative Methods for generating Frequent Itemsets, Evaluation of Association Patterns

Module V


Text Book(s)
1. Steinbach, Vipin Kumar, Data Mining by Tan, Pearson Education.
2. Jiawei Han and Micheline Kamber, Data Mining Concepts and Techniques, Morgan Kaufman Publications.

References
1. Margaret H Dunhan, Data Mining Introductory and Advanced Topics, Pearson Education.
2. Ian H. Witten Eibe Frank, Data Mining, Morgan Kaufman Publications.
Module I
Introduction To IRS & Cataloguing And Indexing
10 hrs

Module II
Data Structure & Automatic Indexing
10 hrs

Module III
Document & Term Clustering & User Search Techniques
12 hrs
Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters. Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, Weighted searches of Boolean systems, Searching the Internet and hypertext.

Module IV
Information Visualization & Text Search Algorithms
10 hrs
Introduction, Cognition and perception, Information visualization technologies. Introduction, Software text search algorithms, Hardware text search systems.

Module V
Information System Evaluation & Multimedia Information Retrieval
10 hrs
Introduction, Measures used in system evaluation, Measurement example – TREC results. Models and Languages: Data Modelling. Query Languages, Indexing and Searching

Text Book(s)

References
3. C. J. van Rijsbergen, Information Retrieval, (PDF Version)
ECS743: ADVANCED SOFTWARE ENGINEERING

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Module I 12 hrs

Module II 10 hrs

Module III 09 hrs
Verification and Validation, Software Testing, Critical Systems Validation, Managing People, Software Cost Estimation, Quality Management, Process Improvement, Configuration Management, Version Control, Open source configuration management tools, CVS

Module IV 09 hrs
Alternative paradigms, Extreme Programming, Agile Software Engineering: Models of agile processes, Pair programming, planning in an agile process, testing in an agile process; Clean Room Software Engineering, Introduction to Formal Methods, Soft Systems

Module V 12 hrs
Software Process Assessment and Improvement: The CMMI, a continuous process meta model, a staged process meta model, Integrated Process Improvement; Software Economics, Software Quality, Software Metrics: Various Size Oriented Measures, Halstead’s Software Science, Function Point(FP) Based measures, Cyclomatic Complexity measures; Software Maintenance: Necessity, Categories: Preventive, Corrective and Perfective, Maintenance Cost; Risk Management

Text Book(s)

1. Ian Somerville, Software Engineering, 8/e, Addison Wesley
References

1. Roger S. Pressman, Software Engineering: A Practitioner’s Approach, 6/e, McGraw Hill
Module I

Module II

Module III

Module IV
Other Transforms: HAAR Transform, Discrete Cosine Transform Image compression: Fundamentals, Basic Compression Methods: Huffman Coding, Arithmetic Coding, Run-Length coding, LZW Coding, Contour coding, Predictive Coding, Wavelet Coding

Module V

Text Book(s)
References

Module I

**Project Planning:** Analysis and Appraisal
Generation of project ideas, Scouting for project ideas, Preliminary screening, Project rating index, Cost of project. Investment Appraisal: Social cost benefit analysis, UNIDO approach, Net benefit in terms of economic prices, Measurement of impact on distribution, Savings impact and its value, Income distribution impact, Adjustment for merit and demerit goods Little Mirrless approach, Shadow prices.

Module II

**Project Implementation:** Development of project network, Dummy activities, Activity on node networks, Cyclic network, Forward pass and backward pass computations, Algorithm for critical path, Total slacks, free slacks and their interpretations. Time-cost Trade off Procedure: Schedule related project costs, Time cost trade off, lowest cost schedule. PERT Network: Three time estimates for activities, Estimation of mean and variance of activity times, Event oriented algorithm for critical path, Probability of meeting a schedule date.

Module III

**Network Analysis:** Algorithms for shortest route problems-Dijkstra's, Flyod's, and Dantzig's algorithms; Algorithms for minimal spanning tree- Kruskal's algorithm and Prim's algorithm; Algorithms for maximal flow problems. Maximum flow minimum cut explanation.

Module IV

**Linear Programming Formulation of Network Problems:** A flow network interpretation for determination of critical paths, Time cost trade off and maximal flow, Chance constrained linear programming for probabilistic durations of activities in PERT network.

Module V

**Project Scheduling with Limited Resources:** Complexity of project scheduling with limited resources, leveling the demands on key resources, A simple heuristic program for resource allocation

Textbook(s)

Reference:

Module I  8 Hours

Module II  8 Hours

Module III  8 Hours

Module IV  8 Hours

Module V  8 Hours
Design Of Digital Filters: General Considerations, Design of FIR Filters, Design of IIR Filters From Analog Filters, Frequency Transformations.

Text Book(s)

References
Module I
Fundamentals of GIS, Functions and Features of Components, Data Type, Analysis and Modelling, Role of GIS and Applications

Module II

Module III
Satellite System Parameters, Sensor Parameters, Imaging Sensor Systems, Earth Resources and Meteorological Satellites, Microwave Sensors, Data Acquisition and interpretation

Module IV

Module V
Applications of Remote Sensing in Survey, Mapping, Landuse and Transportation Planning

Text Book(s)

References
2. Engaman, E.T. and Gurney, R.J, Remote Sensing in Hydrology, Springer; Soft cover reprint of the original 1/e, October 8, 2011.
1. Program to perform insertion deletion and search operation on the following:
2. Develop programs to demonstrate at least 3 applications of Stacks.
3. Develop a program to demonstrate the concept of double ended queue.
4. Program to represent a graph by using Adjacency Matrix and Adjacency List representation for the given set of Vertices and Edges. Traverse it by using Breadth First Search and Depth First Search Techniques.
5. Develop a program to perform insertion, deletion and search operations on the following Trees
   a. Binary Search Tree  b. AVL Tree
6. Develop programs for
   a. Heap Sort  b. Merge Sort  c. Quick sort by taking random element as pivot  d. Selection
7. Implement the code for the following problems by using Greedy Method:
   a. Finding Minimum Cost Spanning Tree by using Kruskal’s Algorithm.
   b. Single Source Shortest Path Problem.
8. Implement the code for the following problems using Dynamic Programming:
   a. Matrix Chain Multiplication Problem
   b. String Editing
   c. Traveling Sales Person Problem
9. Implement code for the following problems by using Back-Tracking:
   a. Hamiltonian Cycle  b. 8 Queens Problem
Part-I: Fundamentals of Big Data Analysis Environment
   Distributed and Parallel System Architecture and Configuration: Single and Multi node Hadoop cluster setup
   MapReduce on Word Counting
   NoSQL
   Machine learning and Reasoning with Mahout

Part II: Big data analysis for security
   Deny of Service Attack Analysis

Tutorials and Hands-on Practice labs are available at:
https://sites.google.com/site/bigdatansalabware/

References:
Recommended reading materials:

Email scam

Security analysis
http://bigdatablog.emc.com/2013/01/30/rsa-security-analytics/

Reasoning Reference:
http://machinelearningbigdata.blogspot.com/
http://www.bigdatatraining.in/machine-learning-training/
http://www.slideshare.net/Cataldo/apache-mahout-tutorial-recommendation-20132014

Big data sets:
http://aws.amazon.com/publicdatasets/
http://www.ll.mit.edu/mission/communications/cyber/CSTcorpora/ideval/data/
ECS702 : COMPUTER NETWORKS

Module I  

Module II  
Direct Link Networks - Reliable Transmission - Stop-and-Wait, Sliding Window, Concurrent Logical Channels; Ethernet (802.3) - Physical Properties, Access Protocol, Experience with Ethernet; Rings - Token Ring Media Access Control, Token Ring Maintenance, FDDI, Resilient Packet Ring (802.17); Wireless - Bluetooth (802.15.1), Wi-Fi (802.11), WiMAX (802.16), Cell Phone Technologies; Sensor Networks; Packet Switching - Switching and Forwarding, Datagrams, Virtual Circuit Switching, Source Routing; Bridges and LAN Switches - Learning Bridges, Spanning Tree Algorithm, Broadcast and Multicast, Limitations of Bridges.

Module III  
Internetworking - Simple Internetworking (IP) - What Is an Internetwork? Service Model, Global Addresses, Datagram Forwarding in IP, Address Translation (ARP), Host Configuration (DHCP), Error Reporting (ICMP), Virtual Networks and Tunnels; Routing - Network as a Graph, Distance Vector (RIP), Link State (OSPF), Metrics, Routing for Mobile Hosts; Subnetting - Classless Routing (CIDR), Inter-domain Routing (BGP), Routing Areas, IP Version 6 (IPv6); Multiprotocol Label Switching - Destination-Based Forwarding, Explicit Routing, Virtual Private Networks and Tunnels; Deployment of IPv6.

Module IV  
Module V  
10 hrs
Applications - Traditional Applications - Electronic Mail (SMTP, MIME, IMAP), World Wide Web (HTTP), Name Service (DNS), Network Management (SNMP);
Web Services - Custom Application Protocols (WSDL, SOAP), A Generic Application Protocol (REST), Multimedia Applications, Session Control and Call Control (SDP, SIP, H.323), Resource Allocation for Multimedia Applications;
Overlay Networks - Routing Overlays, Peer-to-Peer Networks (Gnutella, BitTorrent), Content Distribution Networks.

Text Book(s)
1. Larry L. Peterson & Bruce S. Davie, Computer Networks, A Systems Approach, 4/e, Morgan Kaufmann
2. D. Bertsekas, R. Gallager, Data Networks, PHI.

References
2. J.Walrand, P. Varaiya, High Performance Communication Networks, Morgan Kaufmann
6. Darren L Spohn, Data Network Design, TMH.
Module I  
**Introduction:** what is real time, applications of real-time systems, a basic model of a real-time system, characteristics of real-time systems, safety and reliability, types of real-time tasks

Module II  
10 hrs  
Real-time task Scheduling, types of real-time tasks and their characteristics, task scheduling, clock-driven scheduling, hybrid schedulers, event-driven scheduling, earliest deadline first (edf) scheduling

Module III  
11 hrs  
Handling resource sharing and dependencies among Real-time tasks: resource sharing among real-time tasks, priority inversion, priority inheritance protocol (pip), highest locker protocol (hlp), priority ceiling protocol (pcp), different types of priority inversions under pcp, important features of pcp

Module IV  
11 hrs  
Scheduling real-time tasks in Multiprocessor and Distributed Systems: multiprocessor task allocation, dynamic allocation of tasks, real-time communication: basic concepts, real-time communication in a Lan, soft real-time communication in a Lan, hard real-time communication in a Lan

Module V  
10 hrs  
Real-time Databases: basic database concepts, real-time databases, characteristics of temporal data, concurrency control in real-time databases

**Text Book(s):**  

**Reference:**  
Module I  
**Introduction:** Cryptography, Cryptanalysis, Attacks, Services, Security Mechanisms.

**Classical Encryption Techniques:** Symmetric Key Cryptography- Caesar cipher, Monoalphabetic Cipher, Play fair Cipher, Hill Cipher, Poly-alphabetic Cipher, OTP, Transposition techniques, Rotor Machines, Steganography.

Module II  
**Block Ciphers :** Block Ciphers and the Data Encryption Standard: DES Algorithm, Differential and linear cryptanalysis, Triple DES. Block cipher design principles, Block cipher modes of operation, Advanced Encryption Standard, RC6

Module III  
**Arithmetic for Cryptography:** Pseudorandom Number Generation, Prime Numbers, Euler’s Theorem and CRT. Stream Ciphers: RC4 Public Key Cryptography : Principles of Public Key Cryptosystem, RSA Algorithm, Security of RSA. Diffie-Hellman key exchange, Elliptical curve cryptography.

Module IV  

Module V  

**Text Book(s)**

**References**
3. Atul Kahate, Cryptography and Network Security, 2/e, TMH
Module I 10 hrs
**Introduction:** Sequential Pattern Mining concepts, primitives, scalable methods, Transactional Patterns and other temporal based frequent patterns, Mining Time series Data, Periodicity Analysis for time related sequence data, Trend analysis, Similarity search in Time - series analysis;

Module II 10 hrs
Mining DataStream’s, Methodologies for stream data processing and stream data systems, Frequent pattern mining in stream data , Sequential Pattern Mining in Data Streams, Classification of dynamic data streams, Class Imbalance Problem

Module III 11 hrs
Graph Mining, Mining frequent subgraphs, finding clusters, hub and outliers in large graphs, Graph Partitioning, Web Mining, Mining the web page layout structure, mining web link structure, mining multimedia data on the web, Automatic classification of web documents and web usage mining

Module IV 11 hrs
Distributed Data Mining, Distribute data mining framework, Distributed data source, Distributed data mining techniques, Distributed classifier learning, distributed clustering, distributed association rule mining and Challenges of distributed data mining;

Module V 10 hrs
**Outlier Detection:** Outlier Detection Methods, Statistical Approaches, Proximity-Based Approaches, Clustering-Based Approaches, Classification-Based Approaches, Mining Contextual and Collective Outliers, Outlier Detection in High-Dimensional Data

**Text Book(s)**
1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, 1/e, Addison-Wesley, 2006
2. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining: Concepts and Techniques, 3/e, Morgan Kaufmann publishers, 2011

**References**
1. Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, 1/e, Pearson publishers, 2006
# ECS744: AGILE SOFTWARE DEVELOPMENT

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## Module I: Introduction (10 hrs)
**INTRODUCTION:** Agile Methods, Agile Manifesto, and Agile Modelling
- The Agile Manifesto, Agile Methods, XP: Extreme Programming, DSDM, SCRUM, Feature-Driven Development, Modelling Misconceptions, Agile Modelling, Tools of Misconceptions, Updating Agile Models

## Module II: Extreme Programming (10 hrs)
**Extreme Programming**
- Introduction, Core XP Values, The Twelve XP Practises, About Extreme Programming?
- Planning XP Projects, Test First Coding, Making Pair Programming Work

## Module III: Agile Modelling and XP (10 hrs)
**Agile Modelling and XP**
- Introduction, The Fit, Common Practises, Modelling Specific Practises, XP Objections to Agile Modelling, Agile Modelling and Planning XP Projects, XP Implementation Phase

## Module IV: Feature-Driven Development (10 hrs)
**Feature-Driven Development**
- Introduction, Incremental Software Development, Regaining Control: The Motivation Behind FDD, Planning an Iterative Project, Architecture Centric, FDD and XP

## Module V: Agile Methods with RUP and PRINCE2 and Tools and Obstacles (12 hrs)
**Agile Methods with RUP and PRINCE2 and Tools and Obstacles**

## Text Book(s)

## References
ECS714 : SOCIAL NETWORK ANALYSIS

Module I
Network, Relations and Structure
The Social Networks Perspective; Network Data; Boundary Specification and Sampling; Types of Networks; Network Data, Measurement and Collection

Module II
Mathematical Representations of Social Networks
Graph Theoretic Notation; Sociometric Notation; Algebraic Notation; Graphs; Directed Graphs; Signed Graphs; Signed Directed Graphs; Valued Graphs; Valued Directed Graphs; Multi Graphs; Hyper Graphs; Relations; Matrices; Properties

Module III
Structural and Locational Properties
Actor Centrality; Degree Centrality; Closeness Centrality; Betweenness Centrality; Information Centrality; Structural Balance; Clusterability; Generalizations of Clusterability; Transitivity

Module IV
Roles and Positions
Background; Structural Equivalence; Automorphic and Isomorphic Equivalence; Regular Equivalence; Types of Ties; Local Role Equivalence; Ego Algebras

Module V
Dyadic and Triadic Methods
The Dyad Census; The Example and Its Dyad Census; An Index for Mutuality; Simple Distributions on Digraphs; Conditional Uniform Distributions; The Triad Census; The Example and Its Triad Census; Mean and Variance of a Triad Census

Text Book(s)

References
2. David Knoke and Song Yang, Social Network Analysis,2/e SAGE Publications.
3. Robert A. Hanneman and Mark Riddle, Introduction to Social Networks.
ECS754: INTRODUCTION TO BIG DATA ANALYTICS

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Module I 10 hrs

Module II 11 hrs

Module III 11 hrs

Module IV 10 hrs

Module V 10 hrs
**Text Book(s)**
1. Michael Minelli, Michele Chambers, Big Data, Big Analytics, Wiley Publications, 2013
   (MODULE –III)

**References**
2. Frank J. Ohlhorst, Big Data Analytics, 1/e, Wiley, 2012
ECS756: SOFTWARE VERIFICATION AND VALIDATION

Module I 10 hrs
Software Verification and Validation- Introduction, Verification, Method of Verification, Validation, Level of Validation, Principle of testing, context of testing in producing software, White Box testing- Definition, Static testing, Structural testing, Black box testing.

Module II 10 hrs

Module III 11 hrs
Regression Testing, Internationalization Testing-Introduction, Test Phases of Internationalization testing, Enabling testing, Locale Testing, Language testing, Localization testing, Ad-hoc testing- Overview, Buddy testing, Pair Testing, Exploratory Testing, Iterative testing Agile and Extreme Testing

Module IV 11 hrs
Testing of Object-oriented systems: Introduction, Primer on object-oriented software, Differences in OO testing. Usability And Accessibility Testing- what is usability testing, approach to usability, when to do usability testing, how to achieve usability, quality factors for usability, accessibility testing, tools for usability,

Module V 10 hrs
Test planning, Test Management, Test Process and reporting, Software Test Automation- Scope of Automation, Design and Architecture of automation, Process Model for Automation, Test matrices and measurement- Type of Metrics, Project Metrics, Productivity Metrics, Progress Metrics, Release Metrics

Text Book(s)
1. Srinivasan D, Gopalswami R, Software testing, Pearson Education

References
1. M G Limaye, Software Testing, TMH
2. Ian Sommerville, Software Engineering, Pearson Education
Module I 10 hrs
**Understanding Cloud Computing:** Cloud Origins and Influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges
Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models

Module II 10 hrs
**Cloud-Enabling Technology:** Data Center Technology, Virtualization Technology, Web Technology, Multitenant Technology, Service Technology

Module III 10 hrs
**Cloud Infrastructure Mechanisms:** Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication

Module IV 11 hrs

Module V 11 hrs
**Cloud Delivery Model Considerations:** The Cloud Provider Perspective: Building IaaS Environments, Equipping PaaS Environments, Optimizing SaaS Environments. The Cloud Consumer Perspective: Working with IaaS Environments, Working with PaaS Environments, Working with SaaS Services

**Text Book(s)**

**References**
Module I
Introduction: Definition of personnel management, concept of labour, organization and function of the personnel department, personnel policies. Organizational objectives, functions, relationships, organizational structure of formal and organizations, job design

Module II
Manpower planning: Man power forecasting, mobility and promotion problems, job analysis and job description. Selection: Developing sources, methods of recruitment, alternative selection policies, application blanks and qualification card, interviews, psychological testing. Training: The nature of training, objectives in training, types of training, requirements of effective training conventional training techniques, group training, organization development, evaluating training effectiveness. Performance appraisal: Traditional performance appraisal systems, appraisal programs.

Module III
Wage and Salary Administration: Factors affecting compensation policy, equity and compensation, comparable value, job evaluation, job evaluating systems simple ranking, job grading, point systems, factor comparison system, effects of job evaluation on human relations, Expectancy theory and compensation, variable compensation, supplementary compensations.

Module IV
Human Factor Management: Human factors in management behavioural models, motivation, Maslow's hierarchy of needs theory, hygiene approach to motivation, expectancy theory, reinforcement theory McCleland’s needs theory, motivational techniques.

Module V
Leadership: Definition, trait approaches to leadership, leadership behaviour and styles, situational approach to leadership. Communication and Counselling: Nature and importance of communications, channels and structure, communication process, Management by objectives, counselling.

Text Book(s)
References
EME782 : AUTOMATION AND ROBOTICS

Module I


Module II


Module III


Module IV


Module VI


Text Book(s)

References
Module I

Introduction to MOS Technology: Semiconductor Materials, Enhancement mode MOS transistor, Depletion mode MOS transistor, nMOS fabrication, CMOS fabrication, Comparison of NMOS, CMOS, BICMOS, GaAs Technologies.

Module II


Module III

MOS and BICMOS circuit design process: MOS layers, stick diagrams, design rules and layout, 2µ.meter, 1. 2µ.meter CMOS rules. Layout diagrams, Symbolic diagrams. Basic circuit concepts: Sheet resistance, Area capacitance of layers, delay Module, wiring capacitances, choice of layers. Scaling of MOS circuits: Scaling models, Scaling function for device parameters, Limitation of Scaling

Module IV


Module V


Text Book(s)

References
1. Write a program to
   a. Print the IP address of a www.yahoo.com
   b. Print the url of 205.163.22.104
   c. Print all the addresses of www.apple.com
   d. Print the IP address of the local machine
   e. Print the hostname of the local machine
2. Write a program to Identify the well known ports on a Remote System
   By trying to listen to the various well known ports by opening client
   connections. If the exception does not occur then the remote port is active
   else the remote port is inactive.
3. Given a URL, write a program to print the parts of URL.
4. Write a program to display the socket’s port and IP address.
5. Write a program to send & Receive data from DatagramPacket
6. Write a program for Multicast Sniffer
7. Write a program for Multicast sender
8. Write a program for a Chat Application
   One-One: By opening socket connection and displaying what is written
   by one party to the other.
   Many-Many (Broad cast): Each client opens a socket connection to the
   chat server and writes to the socket. Whatever is written by one party
   can be seen by all other parties.
9. Write a program for the Data Retrieval from a Remote Database
   At the remote database a server listens for client connections. This server
   accepts SQL queries from the client, executes it on the database and sends
   the response to the client.
10. Write a program for the Mail Client
    POP Client : Gives the server name, user name and password retrieve
     the mails and allow manipulation of mail box using POP commands.
    SMTP Client: Gives the server name, send e-mail to the recipient using
     SMTP commands- (Core Java 2 pg:163.)
11. Write a program for the Simulation of Telnet
    Provide a user interface to contact well-known ports, so that client-server
    interaction can be seen by the user.
12. Write a program for the Simple file transfer between two systems
    By opening socket connection to our server on one system and sending
    a file from one system to another.
13. Write a program for the TFTP-Client
    To develop a TFTP client for file transfer. (Unix Network programming-
    Stevens)
14. Write a program for the HTTP-Server
    Develop a HTTP server to implement the following commands GET,
    POST, HEAD, DELETE. The server must handle multiple clients.
References

1. Java Network Programming, Harold Orielly
2. An Introduction to Computer Networking, Kenneth C. Mansfield Jr and James Antonakos Pearson Education Asia

Web Resource:

Chandrahas Bhavan - Institute of Technology, Visakhapatnam Campus

Institute of Technology, Hyderabad Campus

Sir Visveswaraiah Bhavan - Institute of Technology, Bengaluru Campus