DEPARTMENT OF INFORMATION TECHNOLOGY

M.E. Information Technology
Two Year Degree Programme
Choice Based Credit System
(Full - Time)

HAND BOOK
2017 - 2018
DEPARTMENT OF INFORMATION TECHNOLOGY

VISION

To produce globally competent, quality technocrats, to inculcate values of leadership and research qualities and to play a vital role in the socio-economic progress of the nation.

MISSION

- To partner with the University community to understand the information technology needs of faculty, staff and students
- To develop dynamic IT professionals with globally competitive learning experience by providing high class education
- To involve graduates in understanding need based Research activities and disseminate the knowledge to develop entrepreneur skills
M.E. (INFORMATION TECHNOLOGY)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

1. Engineers will practice the profession of engineering using a systems perspective and analyze, design, develop, optimize & implement engineering solutions and work productively as engineers, including supportive and leadership roles on multidisciplinary teams.

2. Continue their education in leading graduate programs in engineering & interdisciplinary areas to emerge as researchers, experts, educators & entrepreneurs and recognize the need for, and an ability to engage in continuing professional development and life-long learning.

3. Engineers, guided by the principles of sustainable development and global interconnectedness, will understand how engineering projects affect society and the environment.

4. Promote Design, Research, and implementation of products and services in the field of Engineering through Strong Communication and Entrepreneurial Skills.

5. Re-learn and innovate in ever-changing global economic and technological environments of the 21st century.
M.E. (INFORMATION TECHNOLOGY)
PROGRAMME OUTCOMES (PO)

After the successful completion of the M.E. (Information Technology) degree programme, the students will be able to:
PO1: Apply knowledge of computing, mathematical foundations, algorithmic principles, and engineering theory in the modelling and design of systems to real-world problems (fundamental engineering analysis skills).
PO2: Apply and integrate knowledge and understanding of other engineering disciplines to support study of their own engineering discipline.
PO3: Design and conduct experiments, as well as to analyze and interpret data (information retrieval skills). Practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills.
PO4: Analyze a problem, identify, formulate and use the appropriate computing and engineering requirements for obtaining its solution (engineering problem solving skills).
PO5: Understand the appropriate codes of practice and industry standards.
PO6: Identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.
PO7: Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues.
PO8: Communicate effectively, both in writing and orally (speaking / writing skills).
PO9: Understand professional, ethical, legal, security and social issues and responsibilities (professional integrity).
PO10: Formulate and solve moderately complex engineering problems, accounting for hardware/software/human interactions.

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<th>Mapping PO with PEO</th>
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<tbody>
<tr>
<td><strong>PEOs / POs</strong></td>
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<td>PEO4</td>
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<td>PEO5</td>
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1. **Condition for Admission**
   Candidates for admission to the first year of the four-semester M.E / M.Tech Degree programme in Engineering shall be required to have passed B.E / B.Tech degree of Annamalai University or any other authority accepted by the syndicate of this University as equivalent thereto. They shall satisfy the condition regarding qualifying marks and physical fitness as may be prescribed by the syndicate of the Annamalai University from time to time. The admission for part time programme is restricted to those working or residing within a radius of 90 km from Annamalainagar. The application should be sent through their employers.

2. **Branches of Study in M.E / M.Tech**
   The Branch and Eligibility criteria of programmes are given in Annexure 1

3. **Courses of study**
   The courses of study and the respective syllabi for each of the M.E / M. Tech programmes offered by the different Departments of study are given separately.

4. **Scheme of Examinations**
   The scheme of Examinations is given separately.

5. **Choice Based Credit System (CBCS)**
   The curriculum includes three components namely Professional Core, Professional Electives and Open Electives in addition to Thesis. Each semester curriculum shall normally have a blend of theory and practical courses.

6. **Assignment of Credits for Courses**
   Each course is normally assigned one credit per hour of lecture / tutorial per week and one credit for two hours or part thereof for laboratory or practical per week. The total credits for the programme will be 65.

7. **Duration of the programme**
   A student of M.E / M.Tech programme is normally expected to complete in four semesters for full-time / six semesters for part-time but in any case not more than four years for full-time / six years for part-time from the date of admission.

8. **Registration for courses**
   A newly admitted student will automatically be registered for all the courses prescribed for the first semester, without any option. Every other student shall submit a completed
registration form indicating the list of courses intended to be credited during the next semester. This registration will be done a week before the last working day of the current semester. Late registration with the approval of the Dean on the recommendation of the Head of the Department along with a late fee will be done up to the last working day. Registration for the Thesis Phase - I and II shall be done at the appropriate semesters.

9. Electives
The student has to select two electives in first semester and another two electives in the second semester from the list of Professional Electives. The student has to select two electives in third semester from the list of Open Electives offered by the department/allied department. A student may be allowed to take up the open elective courses of third semester (Full Time program) in the first and second semester, one course in each of the semesters to enable them to carry out thesis in an industry during the entire second year of study provided they should register those courses in the first semester itself. Such students should meet the teachers offering those elective courses themselves for clarifications. No specific slots will be allotted in the time table for such courses.

Further, the two open elective courses to be studied in III semester (Full Time programme) may also be credited through the SWAYAM portal of UGC with the approval of Head of the Department concerned. In such a case, the courses must be credited before the end of III Semester.

10. Assessment
The break-up of continuous assessment and examination marks for theory courses is as follows:

- First assessment (Mid-Semester Test-I) : 10 marks
- Second assessment (Mid-Semester Test-II) : 10 marks
- Third Assessment : 5 marks
- End Semester Examination : 75 marks

The break-up of continuous assessment and examination marks for Practical courses is as follows:

- First assessment (Test-I) : 15 marks
- Second assessment (Test-II) : 15 marks
- Maintenance of record book : 10 marks
- End Semester Examination : 60 marks

The thesis Phase I will be assessed for 40 marks by a committee consisting of the Head of the Department, the guide and a minimum of two members nominated by the Head of the Department. The Head of the Department will be the chairman. The number of reviews must be a minimum of three per semester. 60 marks are allotted for the thesis work and viva voce examination at the end of the third semester. The same procedure will be adopted for thesis Phase II in the fourth semester.
11. Student Counsellors (Mentors)
To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach a certain number of students to a member of the faculty who shall function as student counsellor for those students throughout their period of study. Such student counsellors shall advise the students, give preliminary approval for the courses to be taken by the students during each semester, monitor their progress in SWAYAM courses / open elective courses and obtain the final approval of the Head of the Department.

12. Class Committee
For each of the semesters of M.E / M.Tech programmes, separate class committees will be constituted by the respective Head of the Departments. The composition of the class committees from first to fourth semesters for Full time and first to sixth semesters for Part-time will be as follows:
- Teachers of the individual courses.
- A Thesis coordinator (for Thesis Phase I and II) shall be appointed by the Head of the Department from among the Thesis supervisors.
- A thesis review committee chairman shall be appointed by the Head of the Department.
- One Professor or Associate Professor, preferably not teaching the concerned class, appointed as Chairman by the Head of the Department.
- The Head of the Department may opt to be a member or the Chairman.
- All counselors of the class and the Head of the Department (if not already a member) or any staff member nominated by the Head of the Department may opt to be special invitees.

The class committee shall meet three times during the semester. The first meeting will be held within two weeks from the date of class commencement in which the type of assessment like test, assignment etc. for the third assessment and the dates of completion of the assessments will be decided.
The second meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.
The third meeting will be held after all the assessments but before the University semester examinations are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 25 marks for theory / 40 marks for practical and project work will be finalized for every student and tabulated and submitted to the Head of the Department for approval and transmission to the Controller of Examinations.

13. Temporary Break of Study
A student can take a one-time temporary break of study covering the current semester and / or the next semester with the approval of the Dean on the recommendation of the Head of the Department, not later than seven days after the completion of the mid-semester test.
However, the student must complete the entire programme within the maximum period of four years for Full time / six years for Part time.

14. Substitute Assessments
A student who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the end of semester examination may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the third meeting of the respective class committees.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Head of the Department within a week from the date of the missed assessment.

15. Attendance Requirements
The students with 75% attendance and above are permitted to appear for the University examinations. However, the Vice Chancellor may give a rebate / concession not exceeding 10% in attendance for exceptional cases only on Medical Grounds.

A student who withdraws from or does not meet the minimum attendance requirement in a semester must re-register and repeat the same semester in the subsequent academic years.

16. Passing and declaration of Examination Results
All assessments of all the courses on an absolute marks basis will be considered and passed by the respective results passing boards in accordance with the rules of the University. Thereafter, the controller of examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the grade point average (GPA) and cumulative grade point average (CGPA) and prepare the mark sheets.

<table>
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<tr>
<th>Marks Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 to 100 marks</td>
<td>Grade ‘S’</td>
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<td>80 to 89 marks</td>
<td>Grade ‘A’</td>
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<td>70 to 79 marks</td>
<td>Grade ‘B’</td>
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<tr>
<td>60 to 69 marks</td>
<td>Grade ‘C’</td>
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<tr>
<td>55 to 59 marks</td>
<td>Grade ‘D’</td>
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<tr>
<td>50 to 54 marks</td>
<td>Grade ‘E’</td>
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<td>Less than 50 marks</td>
<td>Grade ‘RA’</td>
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<tr>
<td>Withdrawn from the Examination</td>
<td>Grade ‘W’</td>
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</table>

A student who obtains less than 30 / 24 marks out of 75 / 60 in the theory / practical examinations respectively or is absent for the examination will be awarded grade RA.

A student who earns a grade of S, A, B, C, D or E for a course is declared to have successfully completed that course and earned the credits for that course. Such a course cannot be repeated by the student.
A student who obtains letter grade RA / W in the mark sheet must reappear for the examination of the courses.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

S - 10; A - 9; B - 8; C - 7; D - 6; E - 5; RA - 0

Courses with grade RA / W are not considered for calculation of grade point average or cumulative grade point average.

A student can apply for re-totaling of one or more of his examination answer papers within a week from the date of issue of mark sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After the results are declared, mark sheets will be issued to the students. The mark sheet will contain the list of courses registered during the semester, the grades scored and the grade point average for the semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the semester, divided by the sum of the number of credits for all courses taken in that semester.

CGPA is similarly calculated considering all the courses taken from the time of admission.

17. Awarding Degree
After successful completion of the programme, the degree will be awarded with the following classifications based on CGPA.

For First Class with Distinction the student must earn a minimum of 65 credits within four semesters for full-time / six semesters for Part time from the time of admission, pass all the courses in the first attempt and obtain a CGPA of 8.25 or above.

For First Class, the student must earn a minimum of 65 credits within two years and six months for full-time / three years and six months for Part time from the time of admission and obtain a CGPA of 6.75 or above.

For Second class, the student must earn a minimum of 65 credits within four years for full-time / six years for Part time from the time of admission.

18. Ranking of Candidates
The candidates who are eligible to get the M.E / M.Tech degree in First Class with Distinction will be ranked on the basis of CGPA for all the courses of study from I to IV semester for M.E / M.Tech full-time / I to VI semester for M.E / M.Tech part-time.
The candidates passing with First Class and without failing in any subject from the time of admission will be ranked next to those with distinction on the basis of CGPA for all the courses of study from I to IV semester for full-time / I to VI semester for M.E / M.Tech part-time.

19. Transitory Regulations

If a candidate studying under the old regulations M.E. / M.Tech could not attend any of the courses in his/her courses, shall be permitted to attend equal number of courses, under the new regulation and will be examined on those subjects. The choice of courses will be decided by the concerned Head of the department. However he/she will be permitted to submit the thesis as per the old regulations. The results of such candidates will be passed as per old regulations.

The University shall have powers to revise or change or amend the regulations, the scheme of examinations, the courses of study and the syllabi from time to time.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>Department</th>
<th>Programme (Full Time &amp; Part time)</th>
<th>Eligible B.E./B.Tech Programme *</th>
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<tr>
<td></td>
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<td>ii. Environmental Engineering &amp; Management</td>
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<td>iii. Water Resources Engineering &amp; Management</td>
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<td>ii. Construction Engg. and Management</td>
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<td>iii. Geotechnical Engineering</td>
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<td>iv. Disaster Management &amp; Engg.</td>
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<td>ii. Welding Engineering</td>
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<td>ii. Smart Energy Systems</td>
<td>B.E. / B.Tech – Electrical and Electronics Engg, Electronics and Instrumentation Engg, Control and</td>
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<td>S.No.</td>
<td>Department</td>
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<td>Instrumentation Engg.</td>
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<td>iii. Power System</td>
<td>B.E. / B.Tech – Electrical and</td>
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<td>B.E. / B.Tech – Electronics and</td>
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<td>Instrumentation Engg, Electrical</td>
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<td>ii. Rehabilitative Instrumentation</td>
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<td>Instrumentation Engg, Bio Medical</td>
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<td>iii. Micro Electronics and MEMS</td>
<td>Engg, Mechatronics, Telecommunication</td>
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<td>ii. Food Processing Technology</td>
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<td>iii. Industrial Bio Technology</td>
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* AMIE in the relevant discipline is considered equivalent to B.E
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Note: * - Four weeks during the summer vacation at the end of II\(^{nd}\) Semester

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L- Lecture; P- Practical; T- Thesis; CA- Continuous Assessment; FE- Final Examination
### DEPARTMENT OF INFORMATION TECHNOLOGY
### Curriculum for M.E. (INFORMATION TECHNOLOGY)
#### Part-Time

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**Note:** * - Four weeks during the summer vacation at the end of IVth Semester.

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COURSE OBJECTIVES:

- To introduce the basic concepts of one dimensional and two dimensional Random Variables.
- To provide information about Estimation theory, Correlation, Regression and Testing of hypothesis.
- To enable the students to use the concepts of Linear programming problem, PERT-CPM.


Joint Distributions – Marginal and Conditional Distributions – Functions of Two Dimensional Random Variables – Regression Curve – Correlation.

Sampling Distributions – Type I and Type II Errors – Tests based on Normal, t, chi square and F Distributions For Testing Of Mean, Variance And Proportions – Tests for Independence of Attributes and Goodness of Fit.

Design of experiments and statistical quality control: Basic principle of experimental design – completely randomized design – analysis of variance for one way classification or one factor experiments – Randomized block design – Analysis of variance for two way classification or two factor experiments – Latin square design – Analysis of variance for three factor experiments – RDB and LSD comparison.

Formulation – Graphical method – Simplex method – Big M Method – Transportation and assignment problems – Travelling salesman problem - Project Scheduling by PERT and CPM.

REFERENCES:
COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Identify the type of random variable and distribution for a given operational conditions/scene.
2. Study and Design appropriate distribution model for a given problem/system situation.
3. Differentiate/infer the merit of sampling tests.
4. Formulate and find optimal solution in the real life optimizing/allocation/assignment problems involving conditions and resource constraints.

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REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Design data structures and algorithms to solve computing problems.
2. Become familiar with the specification, usage, implementation and analysis of hierarchical data.
3. Understand the usage of graphs and strings and its applications.

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COURSE OBJECTIVES:
- To provide an introduction to the principles and practices of Network Engineering.
- To understand the architecture of the network devices.
- To explore the emerging technologies in network engineering.


Traffic Characteristics and Descriptors – Quality of Service and Metrics – Best Effort model and Guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Gain an understanding of the principles of network engineering.
2. Knowledge of advanced network engineering concepts and techniques.
3. Explore the emerging technologies in network engineering.

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COURSE OBJECTIVES:

- To provide information about wider engineering issues that form the background to developing complex, evolving (software-intensive) systems.
- To plan a software engineering process to account for quality issues and non-functional requirements.
- To employ a selection of concepts and techniques to complete a small-scale analysis and design in mini projects.
- To impart knowledge to translate requirement specifications into a design, and then realize that design practically, all using an appropriate software engineering methodology.
- To provide basic knowledge about software project management.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Learn UML models and tools.
2. Apply design patterns on various applications.
3. Understand the concepts and techniques to complete a small-scale analysis and design in mini projects.

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COURSE OBJECTIVES:
- To acquire the knowledge of using advanced tree structures.
- To learn the usage of heap structures.
- To understand the usage of graph structures and spanning trees.
- To learn the working of various string matching algorithms.

LIST OF EXERCISES
1. Implementation of a Binary Search Tree.
2. Red-Black Tree Implementation.
3. Heap Implementation.
4. Binomial Heaps.
5. Graph Traversals.
7. Shortest Path Algorithms.
10. Study of network simulators like NS2, Glomosim, OPNET.
11. Implementation of client-server communication using TCP.
12. Implementation of UDP client server communication using bind, Sendto, Recvfrom system call.
15. Simulation of BGP/OSPF routing protocol.
16. Simulation of ARP/RARP.

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Design and implement basic and advanced data structures extensively.
2. Design algorithms using graph structures.
3. Design and develop efficient algorithms with minimum complexity using design techniques.

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ITEC201 ADVANCED OPERATING SYSTEMS

COURSE OBJECTIVES:
- To learn the fundamentals of Operating system.
- To gain knowledge on Distributed operating system.
- To know the components and management aspects of Mobile operating systems.


Basic Model of Real Time Systems – Characteristics- Applications of Real Time Systems –
Real Time Task Scheduling – Handling Resource Sharing – Mobile Operating Systems –
Micro Kernel Design – Client Server Resource Access – Processes and Threads – Memory
Management – Filesystem.

Memory Management – Input-Output Management – File System – Interprocess
Communication. Windows XP: Design Principles – System Components – Process and
Thread Management – Memory Management – File System. Iphone iOS4: Architecture and

REFERENCES:
2. Abraham Silberschatz; Peter Baer Galvin; Greg Gagne, “Operating System Concepts”,
2008.

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to
1. Possess a complete overview of process management & memory management of
Operating system.
2. To demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of
Distributed operating system.
3. Familiarize with the various Operating Systems.

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COURSE OBJECTIVES:
• To introduce the students to the recent trends in the field of Computer Architecture
and identify the performance related parameters.
• To understand the different multiprocessor issues.
• To expose the different types of multicore architectures.
• To understand the design of the memory hierarchy.


REFERENCES:

COURSE OUTCOMES:
Upon completion of this course, the student should be able to
1. Identify the limitations of ILP and the need for multicore architectures.
2. Discuss the issues related to multiprocessing and suggest solutions.
3. To understand the different multiprocessor issues.

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28
COURSE OBJECTIVES:

- To learn and implement the computational approaches to Modeling, Feature Extraction.
- To grasp the various search algorithms applicable to Big Data.
- To comprehend the necessity and application of Map Reduce.
- To evaluate and infer streaming data.
- To acquire knowledge of how to handle large data sets.


Big data from different perspectives - Big data from business Perspective: Introduction of big data-Characteristics of big data in the warehouse and data in Hadoop- Importance of Big data- Big data Use cases: Patterns for Big data deployment. Big data from Technology Perspective: History of Hadoop-Components of Hadoop-Application Development in Hadoop-Getting your data in Hadoop-other Hadoop Component.


Processing your data with mapreduce - Getting to know MapReduce – MapReduce Execution Pipeline – Runtime Coordination and Task Management – MapReduce Application – Hadoop Word Count Implementation.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Identify the need for big data analytics for a domain.
2. Use Hadoop, Map Reduce Framework.
3. Apply big data analytics for a given problem.

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ITEC204 MOBILE AND PERVERSIVE COMPUTING

COURSE OBJECTIVES:
- To understand the basics of Mobile Computing and Personal Computing.
- To learn the role of cellular networks in Mobile and Pervasive Computing.
- To expose to the concept of sensor and mesh networks.
- To expose to the context aware and wearable computing.
- To learn to develop applications in mobile and pervasive computing environment.


Application Development – Three tier architecture - Model View Controller Architecture -

REFERENCES:
Sons, 2011.
10. Stefan Poslad, “Ubiquitous Computing: Smart Devices, Environments and Interactions”,

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Design a basic architecture for a pervasive computing environment.
2. Design and allocate the resources on the 3G-4G wireless networks.
3. Analyze the role of sensors in Wireless networks.
4. Work out the routing in mesh network.
5. Deploy the location and context information for application development.

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COURSE OBJECTIVES:

- To understand setting up of Hadoop Cluster.
- To solve problems using Map Reduce Technique.
- To solve Big Data problems.

LIST OF EXERCISES

Cycle I – Data Mining Using Weka
1. Identifying Rules and important Attributes.
2. Executing Classification Algorithms.
3. Deletion of Attribute, Cross Validation and Visualizing.
4. Perform Test Case Scenario.
5. Use Pruning and Reduced Error Pruning.
6. Compare different Classification Algorithms.
7. Clustering Algorithm.
8. Association Rule Mining.

Cycle II – Python Programming
10. Calculate Area for Square, Rectangle and Circle.
11. Run a Test of Knowledge.
12. Finding most frequent words in a text read from a file.

Cycle III – Hadoop
13. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux. After successful installation on one node, configuration of a multi-node Hadoop cluster (one master and multiple slaves).
14. Map Reduce application for word counting on Hadoop cluster.
15. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.
17. Page Rank Computation.
18. Mahout machine learning library to facilitate the knowledge build up in big data analysis.

COURSE OUTCOMES:
Upon of completion of this course, students will be able to
1. Set up multi-node Hadoop Clusters.
2. Apply Map Reduce algorithms for various algorithms.
3. Design new algorithms that uses Map Reduce to apply on Unstructured and structured data.

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### COURSE OBJECTIVES:
- To work on a technical topic related to Information Technology and acquire the ability of written and oral presentation.
- To acquire the ability of writing technical papers for Conferences and Journals.

The students will work for two periods per week guided by student counselor. They will be asked to present a seminar of not less than 15 minutes and not more than 30 minutes on any technical topic of student’s choice related to Information Technology and to engage in discussion with audience. They will defend their presentation. A brief copy of their presentation also should be submitted. Evaluation will be done by the student counselor based on the technical presentation, the report and also on the interaction shown during the seminar.

### COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Face the audience and to interact with them confidently.
2. Tackle any problem during group discussion in the corporate interviews.
3. Acquire the ability to work in the actual environment and to use the technical resources.

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### COURSE OBJECTIVES:
- To train the students in the current thrust area in Information Technology and to have practical knowledge in handling the technical scenario.
- To develop skills on the research topic and to implement the appropriate methods to handle the issue.

The students will individually undertake a research problem in the field of Information Technology in the third semester for Full-Time / Fifth semester for Part-Time. The student will be guided by a staff member. The progress of the research will be evaluated.
every month by a team of staff members. The student has to submit the detailed report on the research problem at the end of Third semester for Full-Time / Fifth semester for Part-Time. The student will be evaluated by a team of examiners nominated by the Head of the Department through a viva-voce examination.

**COURSE OUTCOMES:**
Upon Completion of the course, the students will be able to
1. Conduct independent empirical research to evaluate and present their results responsibly and critically.
2. Present the conclusions with understandability using appropriate tables and graphs in the form of report.
3. Maintain the ethical standards of scientific research and to follow the basic principles in an academic community that requires constant learning and knowledge updation.

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Note: * - Four weeks during the summer vacation at the end of II\textsuperscript{nd} Semester

**COURSE OBJECTIVES:**
- To train the students in the field work related to Information Technology and to have a practical knowledge in carrying out the Information Technology related problems.
- To train and develop skills in solving problems during execution of the problems related to Information Technology.

The students will individually undertake a training program in reputed concerns in the field of Information Technology during summer vacation (at the end of second semester for Full Time / Fifth semester for Part – Time) for a minimum stipulated period of four weeks. At the end of training the student has to submit the detailed report on the training undertaken within ten days from the commencement of the third semester for Full Time / Fifth semester for Part – Time. The student will be evaluated by a team of staff members nominated by the Head of the Department through a viva-voce examination.
COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Apply prior acquired knowledge in problem solving and to demonstrate the use, interpretation and application of an appropriate international Information Technology standard in a specific situation.
2. Analyze a given Information Technology problem and to identify and implement appropriate problem-solving methodology to propose a meaningful solution.
3. Present the solution acquired in the form of written and oral presentation.

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COURSE OBJECTIVES:
- To train the students in the current thrust area in Information Technology and to have practical knowledge in handling the technical scenario.
- To develop skills on the research topic and to implement the appropriate methods to handle the issue.

The students will continue the research problem undertaken during third semester for Full-Time / Fifth semester for Part-Time in the field of Information Technology. The student will be guided by a staff member. The progress of the research will be evaluated every month by a team of staff members. The student has to submit the detailed report on the research problem at the end of Fourth semester for Full-Time / Sixth semester for Part-Time. The student will be evaluated by a team of examiners nominated by the Head of the Department through a viva-voce examination.

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Conduct independent empirical research to evaluate and present their results responsibly and critically.
2. Present the conclusions with understandability using appropriate tables and graphs in the form of report.
3. Maintain the ethical standards of scientific research and to follow the basic principles in an academic community that requires constant learning and knowledge updation.

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PROFESSIONAL ELECTIVES
COURSE OBJECTIVES:

- To understand different forms of intermediate languages and analyzing programs.
- To understand optimizations techniques for single program blocks.
- To apply optimizations on procedures and low-level code.
- To apply and enhance inter procedural optimizations.
- To enhance resource utilization.

Graphical method, Simplex method, Revised simplex method, Duality in linear programming, Sensitivity analysis, Transportation and assignment problems.

Unconstrained optimization techniques: Direct search methods - Descent methods, Constrained optimization: Random search methods - Complex method.

Network representation, Critical path computation, Crashing, PERT calculations, Resource analysis in network scheduling.

Decision making under certainty: Analytic hierarchy process, Decision making under risk, Decision under uncertainty, Game theory: Basic terminologies - Optimal solution of two-person zero-sum games - Solution of mixed strategy games.

Elements of a queuing model, Role of exponential distribution, Pure birth and death models, Generalized Poisson queuing model, Specialized Poisson queues, Pollaczek – Khintchine formula, Queuing decision models.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to:
1. Design and analyze various optimization techniques.
2. Manage procedures with optimal overheads.
3. Ensure better utilization of resources.
COURSE OBJECTIVES:

- To identify the components of managing the data center and understand logical and Physical components of a storage infrastructure.
- To evaluate storage architectures including storage subsystems SAN, NAS, IPSAN, CAS.
- To understand the business continuity, backup and recovery methods.


REFERENCES:

**COURSE OUTCOMES:**
Upon completion of this course the students may be able to
1. Provide a variety of solutions for storing, managing, accessing, protecting, securing, sharing and optimizing information.
2. Evaluate storage architectures, including storage subsystems SAN, NAS, IPSAN, CAS.
3. Understand the business continuity, backup and recovery methods.

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**COURSE OBJECTIVES:**
- To learn about the issues in the design of ad hoc and wireless sensor networks.
- To understand the working of protocols in different layers of ad hoc and sensor networks.
- To expose the students to different aspects in ad hoc and sensor networks.
- To understand various standards and applications in ad hoc and sensor networks.


Routing Protocols and Data Manipulation, Issues in Designing Routing Protocols, Classification of Routing Protocols, Energy-Efficient Routing, Unicast, Broadcast and
Multicast, Geographic Routing. Data Centric and Content based Routing, Storage and Retrieval in Network, Compression Technologies for WSN, Data Aggregation Technique.


REFERENCES:

COURSE OUTCOMES:
Upon completion of this course students should be able to
1. Identify different issues in wireless ad hoc and sensor networks.
2. Analyze the protocols developed for ad hoc and sensor networks.
3. Identify and discuss the standards and applications of ad hoc and sensor networks.

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COURSE OBJECTIVES:
- To understand and work with network devices and technologies.
- To understand and deploy various interior and exterior routing protocols.
- To learn and work with next generation IP (IPv6).


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Develop competence towards design and deployment of Routing on high end computer networks.
2. Work with network devices and technologies.
3. Deploy various interior and exterior routing protocols.

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COURSE OBJECTIVES:

- To learn the importance of semantic web.
- To understand various semantic knowledge representation strategies.
- To learn the concepts of ontology.
- To learn the ontology related tools.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Compare conventional web with semantic web.
2. Analyze and design semantic knowledge representation modes.
3. Construct ontology using different tools.
4. Use semantic web services with web applications.

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COURSE OBJECTIVES:
- To learn the modeling and design of databases.
- To acquire knowledge on parallel and distributed databases and its applications.
- To study the usage and applications of Object Oriented and Intelligent databases.
- To understand the usage of advanced data models.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Develop in-depth understanding of relational databases and skills to optimize database performance in practice.
2. Understand and critique on each type of databases.
3. Design faster algorithms in solving practical database problems.

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COURSE OBJECTIVES:

- To enable the student to understand the differences in the design of data plane and the control plane and the routing, switching and the resource allocation methods and the network management and protection methods in vogue.
- To expose the student to the advances in packet switching in the optical domain, the associated challenges and the possible solution approaches.


Optical Network Architectures – Introduction to Optical Networks; SONET / SDH, Metropolitan-Area Networks, Layered Architecture; Broadcast and Select Networks-Topologies for Broadcast Networks, Media-Access Control Protocols, Testbeds for Broadcast & Select WDM; Wavelength Routing Architecture. Integration of TDM signals, Layers, Framing, Transport overhead, Alarms, Multiplexing, Network elements, Topologies, Protection architectures, Ring architectures, Network Management.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Learn the importance of the backbone infrastructure for our present and future communication needs.
2. Familiarize with the architectures and the protocol stack in use.
3. Understand the differences in the design of routing, switching and the resource allocation methods.

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COURSE OBJECTIVES:
- To be able to understand the Cluster installation and configuration.
- To understand the Parallel programming models & paradigms.
- To familiarize with Job management system and cluster scheduling process.

Overview of cluster computing: Elements of cluster, requirements-classes of cluster-Hardware system structure- Node software- Node hardware: Mother board, Memory, Basic Input Output Stream-Peripheral Component Interconnect (PCI) bus, Node assembly.


Parallel programming with Message Passing Interface (MPI): MPI compilation and running process, Implementation of MPI for clusters-Dynamic process management-Fault tolerance-RMA- Performance measurement - Parallel Virtual Machine (PVM): Overview, Setup, console details Extended PVM.
Goal of workload management software- management activities-Distributed job scheduler-condor: features, architecture- Installation-Configuration –Administration tools.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Learn the Cluster installation and configuration methods and tools.
2. Understand the Parallel programming models & paradigms.
3. Familiarize the job management system and cluster scheduling process.

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<td>To understand the technique of virtualization through theoretical concepts and practical training.</td>
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<td>To become knowledgeable in the rudimentary aspects of cloud application development.</td>
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Getting started with SaaS- Understanding the multitenant nature of SaaS solutions- Understanding OpenSaaS Solutions- Understanding Service Oriented Architecture- PaaS- Benefits and Limitations of PaaS.

Understanding IaaS- Improving performance through Load balancing- Server Types within IaaS solutions- Utilizing cloud based NAS devices – Understanding Cloud based data storage- Cloud based backup devices- Cloud based database solutions- Cloud based block storage.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Improve the performance and availability over that of cluster computers.
2. Perform virtualization through theoretical concepts and practical training.
3. Gain knowledge in the rudimentary aspects of cloud application development.

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COURSE OBJECTIVES:
- To acquire knowledge to adopt green computing practices.
- To understand how to minimize equipment disposal requirements.


The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Minimize negative impacts on the environment.
2. Develop skill in energy saving practices in their use of hardware.
3. Examine technology tools that can reduce paper waste and carbon footprint by user.
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COURSE OBJECTIVES:
- To study, why to be interested in quantum computing.
- To emphasize the prehistory of quantum computing.
- To specify the properties of quantum computing in comparison with randomized computing.
- To learn the basic experiments and principles of quantum physics.
- To understand the basics of Hilbert space theory and the elements of classical reversible computing.

Fundamental Concepts - Global Perspectives, Quantum Bits, Quantum Computation, Quantum Algorithms, Quantum Information, Postulates of Quantum Mechanisms.


REFERENCES:

**COURSE OUTCOMES:**

Upon Completion of the course, the students will be able to

1. Understand and explain the basic notions of Quantum Computing - including Quantum Bits and registers, Quantum Evolution, Quantum Circuits, Quantum Teleportation and the basic Quantum Algorithms known at the present time.
2. Identify the essential difference between the classical paradigm and the quantum paradigm of computation and appreciate why quantum computers can solve currently intractable problems.
3. Work with Quantum Simulator like Revkit 1.3, JQuantum etc to design and verify different quantum circuits.

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**COURSE OBJECTIVES:**

- To understand the mathematics behind Cryptography.
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To get the knowledge of various security practices applied in the field of information technology.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to
1. Apply the basic security algorithms required by any computing system.
2. Predict the vulnerabilities across any computing system.
3. Design a security solution for any computing system.

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COURSE OBJECTIVES:

- To understand the issues involved in mobile communication system design and analysis.
- To understand the concept of frequency reuse.
- To understand the characteristics of wireless channels.

Overview of wireless systems – Physical modeling for wireless channels – Time and Frequency coherence – Statistical channel models – Capacity of wireless Channel- Capacity of Flat Fading Channel — Channel Distribution Information known – Channel Side Information at Receiver – Channel Side Information at Transmitter and Receiver – Capacity with Receiver diversity – Capacity comparisons – Capacity of Frequency Selective Fading channels.


Data Transmission using Multiple Carriers – Multicarrier Modulation with Overlapping Subchannels – Mitigation of Subcarrier Fading – Discrete Implementation of Multicarrier Modulation – Peak to average Power Ratio- Frequency and Timing offset – Case study IEEE 802.11a.


REFERENCES:


COURSE OUTCOMES:

Upon Completion of the course, the students will be able to
1. Acquire knowledge in different modulation schemes and its error probability in wireless system.
2. Learn the fundamental limits on the capacity of wireless channels.
3. Understand the diversity concepts.

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COURSE OBJECTIVES:
- To understand the basics of Internet of Things.
- To get an idea of some of the application areas where Internet of Things can be applied.
- To understand the middleware for Internet of Things.
- To understand the concepts of Web of Things.
- To understand the IOT protocols.


Models for the Internet of Things - Business Models and Business Model Innovation - Value Creation in the Internet of Things - Exemplary Business Model Scenarios for the Internet of Things - Product as a Service (PaaS), Information Service Provider, End – User Involvement, Right - time Business Analysis and Decision making.


REFERENCES:
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles - (Eds.) – Springer – 2011.
4. The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick - Wiley – 2012.

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Identify and design the new models for market strategic interaction.
2. Design business intelligence and information security for WoB.
3. Analyze various protocols for IoT.
4. Design a middleware for IoT.

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COURSE OBJECTIVES:
- To gain knowledge about medical informatics and healthcare informatics.
- To understand the case study of computerized patient record.
- To study and use different tools for clinical information system.
- To apply the knowledge of bioinformatics for systems.

Introduction - Structure of Medical Informatics – Internet and Medicine - Security Issues
Computer based Medical Information Retrieval, Hospital Management and Information System - Functional Capabilities of a Computerized HIS - E-Health Services - Health Informatics – Medical Informatics – Bioinformatics.

Strategic Planning - Selecting a Health Care Information System - Systems Integration and Maintenance - Systems Integration - Regulatory and Accreditation Issues - Contingency Planning and Disaster Recovery.


Automated Clinical Laboratories - Automated Methods in Hematology - Cytology and Histology - Intelligent Laboratory Information System - Computerized ECG, EEG And EMG
- Computer Assisted Medical Imaging - Nuclear Medicine - Ultrasound Imaging


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Design and develop clinical and hospital management system on his own.
2. Work with different medical imaging techniques.
3. Apply the knowledge of bio informatics for biological databases. Learn hybrid representations and its Applications.
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COURSE OBJECTIVES:
- To understand the basic issues and types of text mining.
- To appreciate the different aspects of text categorization and clustering.
- To understand the role played by text mining in Information retrieval and extraction.
- To appreciate the use of probabilistic models for text mining.
- To appreciate the current trends in text mining.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Understand the basic concepts of text mining in Information retrieval and extraction.
2. Apply probabilistic models for text mining.
3. Learn the current trends in text mining.

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COURSE OBJECTIVES:
- To understand the concepts of machine learning.
- To appreciate supervised and unsupervised learning and their applications.
- To understand the theoretical and practical aspects of Probabilistic Graphical Models.
- To appreciate the concepts and algorithms of reinforcement learning.
- To learn aspects of computational learning theory.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to

1. Implement a neural network for an application of your choice using an available tool.
2. Implement probabilistic discriminative and generative algorithms for an application of your choice.
3. Analyze the results of various models.
### COURSE OBJECTIVES:
- To understand and apply Reliability Mathematics to hardware and software systems.
- To understand evolution of software reliability growth models.
- To understand and apply Non-homogeneous Poisson Software Reliability Growth Models.


Basic Concepts – Failure and Faults-Introduction to Software Reliability Growth Models (SRGMs)-General Model Characteristic-Historical Development of models-Model Classification scheme-white box and black box models-models for application during operational phase and testing phase-Markovian models-Jelinski-Moranda model-Goel-Okumoto imperfect debugging model.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Understand the need for flexible models.
2. Understand the quality metrics producing models.

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<tr>
<th>ITEE X0X</th>
<th>3G AND 4G WIRELESS NETWORKS</th>
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COURSE OBJECTIVES:
- To learn various generations of wireless and cellular networks.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

Evolution from GSM, 3G Services and Applications - UMTS network structure - Core network - UMTS Radio access - HSPA – HSUPA- HSDPA- CDMA 1X – WCDMA.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Understand about Wi MAX networks, protocol stack and standards.
2. Understand about the emerging trends of smart phones.
3. Understand the evolution of latest standards like DLNA, NFC and femtocells.

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<th>ITEE X0X</th>
<th>BIOMETRIC IMAGE PROCESSING</th>
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COURSE OBJECTIVES:
- To understand the basic concepts and algorithms of digital processing.
- To familiarize the student with the image processing environments like MATLAB and its equivalent Biometric Image processing environments.
- To expose the students to a broad range of Biometric image processing techniques and issues and their applications, and to provide the student with practical experiences using them.

Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.

Detection and Location of Faces: Statistics-Based method, Knowledge-Based method - Feature Extraction and Face Recognition: Gray value Based method, Geometry Feature Based method, Neural Networks method.


Introduction to Multibiometric - Information Fusion in Biometrics - Issues in Designing a Multibiometric System - Sources of Multiple Evidence - Levels of Fusion in Biometrics - Sensor level, Feature level, Rank level, Decision level fusion - Score level Fusion.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Design an application that incorporates different concepts of Biometric Image processing.
2. Apply and explore new techniques in the areas of Biometric image enhancement, restoration, segmentation, compression, wavelet processing and image morphology.
3. Explore the possibility of Applying Biometric image processing concepts in various domains.

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</table>
COURSE OBJECTIVES:

- To provide scientific foundations needed for the design, implementation, and evaluation of large scale biometric identification systems.

Biometrics- Introduction- benefits of biometrics over traditional authentication systems - benefits of biometrics in identification systems-selecting a biometric for a system – Applications - Key biometric terms and processes - biometric matching methods - Accuracy in biometric systems.


Multi biometrics: Multi biometrics and multi factor biometrics - two-factor authentication with passwords - tickets and tokens – executive decision - implementation Plan.

Case studies on Physiological, Behavioral and multifactor biometrics in identification systems.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Design biometric identification systems.
2. Implementation of biometric identification systems.
3. Evaluation of large scale biometric identification systems.
COURSE OBJECTIVES:
- To explore the design and implementation of distributed systems.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Understand the computer system security.
2. Understand the Security Appliances and Virtualization.
3. Understand the Services Security Policy.

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<th>ITEE X0X</th>
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COURSE OBJECTIVES:
- To gain and understand the complete knowledge of threats within wireless environments.
- To recognize typical vulnerabilities and safeguards for wireless communication to include; Cellular and Personal Communications Services (PCS) network security, secure wireless encrypted e-mail solution, Wireless handheld device security, PAN and LAN security.


Wireless Device security issues - CDPD security (Cellular Digital Packet Data)-GPRS security (General Packet Radio Service) - GSM (Global System for Mobile Communication) security – IP security.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Understand the complete knowledge of threats within wireless environments.
2. Understand the Wireless Device security issues.
3. Understand the basic specifications, Bluetooth security.

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COURSE OBJECTIVES:

- To understand the mathematical foundations needed for speech processing.
- To understand the basic concepts and algorithms of speech processing and synthesis.
- To familiarize the students with the various speech signal representation, coding and recognition techniques.
- To appreciate the use of speech processing in current technologies and to expose the students to real-world applications of speech processing.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Identify the various temporal, spectral and cepstral features required for identifying speech units – phone, syllable and word.
2. Determine and apply Mel-frequency cepstral coefficients for processing all types of signals.
3. Justify the use of formant and concatenative approaches to speech synthesis.
4. Identify the apt approach of speech synthesis depending on the language to be processed.
5. Determine the various encoding techniques for representing speech.

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<th>ITEE X0X</th>
<th>SENSING TECHNIQUES AND SENSORS</th>
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**COURSE OBJECTIVES:**
- To study the sensor characteristics and the fundamental principles of sensing.
- To understand the sensor interface electronics.
- To study selected motion-related sensors.
- To study light and radiation detectors.
- To study selected temperature sensors.
- To study selected chemical sensors.

Light Detectors: Photo diodes – photo transistor – photo resistor – cooled detectors – CCD and CMOS image sensors – thermal detectors – optical design – gas flame detectors
Radiation Detectors: scintillating detectors – ionization detectors – cloud and bubble chambers.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Explain sensor characteristics, physics of sensors, optical components of sensors.
2. Apply sensor interface electronics.
3. Choose and use appropriate motion-related sensors, appropriate light and radiation detectors, appropriate temperature sensors, appropriate chemical sensors.

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Mapping with Programme Outcomes
COURSE OBJECTIVES:

- To understand the issues in the design of web application development.
- To learn the concepts of client side and server side technologies.
- To learn the concept of three tier application using MVC.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to perform the
1. Design and development of web applications using various models.
2. Web application development using HTML and scripting technologies.
3. Web application development using advanced features.
COURSE OBJECTIVES:

- To understand how Decision Management Systems can transform the business.
- To plan the systems with the decision in mind.
- To identify, model and prioritize the decisions.

Principles of Decision Management Systems - Begin with the Decision in Mind - Be Transparent and Agile - Be Predictive, Not Reactive - Test, Learn, and Continuously Improve.


Enablers for Decision Management Systems - People Enablers - The Three-Legged Stool - A Decision Management Center of Excellence - Organizational Change - Process Enablers - Managing a Decision Inventory - Adapting the Software Development Lifecycle - Decision Service Integration Patterns - Moving to Fact-Based Decisioning - The OODA Loop - Technology Enablers.


REFERENCES:
COURSE OUTCOMES:
Upon Completion of the course, the students should be able to
1. Design and implement robust decision services.
2. Monitor ongoing decision-making.
3. Learn methods to improve decision making performance.

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<th>ITEE X0X</th>
<th>CYBER FORENSICS</th>
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COURSE OBJECTIVES:
- To study the fundamentals of computer forensics.
- To have an overview of techniques for Data Recovery and Evidence Collection.
- To study various threats associated with security and information warfare.
- To study the tools and tactics associated with cyber forensics.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students should be able to
1. Apply the concepts of computer forensics.
2. Handle threats associated with security and information warfare.
3. Design tools and tactics associated with cyber forensics.
COURSE OBJECTIVES:
- To know the fundamental concepts of data science and analytics.
- To learn various techniques for mining data streams.
- To learn Event Modelling for different applications.
- To know about Hadoop and Map Reduce procedure.


REFERENCES:

**COURSE OUTCOMES:**
Upon the completion of the course the student should be able to
1. Work with big data platform and its analysis techniques.
2. Design efficient algorithms for mining the data from large volumes.
3. Apply hadoop architecture.

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<th>COURSE OBJECTIVES:</th>
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<tr>
<td>To introduce the theoretical fundamentals of recognition.</td>
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<td>To examine variety of recognition models ranging from simple to the more sophisticated.</td>
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Review of probability theory: conditional probability, Bayes theorem, random variables, distribution function, expectation and variance, joint distribution function of multiple random variables, normal distribution.

Introduction to pattern recognition system, design cycle, introduction to feature extraction and classification, types of learning. Bayesian decision theory, Bayes Classifier, Discriminant functions, Minimum-error-rate classification.

Parameter estimation methods, Maximum-Likelihood estimation, Gaussian mixture models, Bayesian estimation, Expectation maximization method, Hidden Markov models, Dimension reduction methods, Fisher discriminant analysis, Principal component analysis.

Non-parametric techniques for density estimation and pattern classification, Parzen-window method, K-Nearest Neighbour method, linear discriminant analysis, Support vector machines.


**REFERENCES:**
COURSE OUTCOMES:
Upon completion of this course the student will be able to
1. Develop the necessary analytical skills and experiences on pattern recognition

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<tr>
<th>ITEE X0X</th>
<th>HUMAN COMPUTER INTERACTION</th>
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COURSE OBJECTIVES:
• To learn the principles and fundamentals of human computer interaction (HCI).
• To analyze HCI theories, as they relate to collaborative or social software.
• To establish target users, functional requirements, and interface requirements for a given computer application.
• To understand user interface design principles, and apply them to designing an interface.
• To learn user interface designs through usability inspection and user models.
• To know the applications of multimedia on HCI.


REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the students will be able to
1. Interpret the contributions of human factors and technical constraints on human-computer interaction.
2. Evaluate the role of current HCI theories in the design of software.
3. Apply HCI techniques and methods to the design of software.
4. Categorize and carefully differentiate various aspects of multimedia interfaces.
5. Design and develop issues related to HCI for real application.

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<th>ITEE X0X</th>
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COURSE OBJECTIVES:
• To understand the concept and applications of fuzzy logic, neural networks, genetic algorithms and hybrid systems.


Basic concepts of genetic algorithms - encoding - genetic modeling - Evolutionary Strategies - Optimization techniques.


Applications of Fuzzy Logic - Applications of Neural Network - Application of Genetic Algorithm - Applications in Image processing- Applications in Data mining - Applications in other domains.

REFERENCES:

COURSE OUTCOMES:
Upon completion of the course, the student should be able
1. Implement the concept and applications of fuzzy logic, neural networks, genetic algorithms and hybrid systems.
2. Understand the basic concepts of genetic algorithms.
3. Learn the Applications of Fuzzy Logic.

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<tr>
<th>ITEE X0X</th>
<th>MOBILE APPLICATION DEVELOPMENT</th>
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COURSE OBJECTIVES:
- To learn the characteristics of mobile applications.
- To understand the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Develop mobile applications.
2. Understand the Intents and Services.
3. Understand the Google Android Platform.

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<th>ITEE X0X INFORMATION RETRIEVAL</th>
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COURSE OBJECTIVES:
- To understand the basics of Information Retrieval with pertinence to modeling, Query operations and indexing.
- To get an understanding of machine learning techniques for text classification and clustering.

Introduction - Goals and history of IR - The impact of the web on IR - The role of artificial intelligence (AI) in IR – Basic IR Models Boolean and vector space retrieval models – Ranked Retrieval – Text similarity metrics – TF IDF (term frequency/inverse document frequency) weighting - Cosine Similarity.


REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Understand the various applications of Information Retrieval such as Multimedia IR, Web Search.
2. Understand the concepts of digital libraries
3. Understand the collecting and integrating specialized information on the web.

ITEE X0X | MIDDLEWARE FOR COMMUNICATIONS | L | T | P
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COURSE OBJECTIVES:
- To understand the middleware technologies and communication protocols for distributed, dependable, and real-time systems.
- To understand the middleware and/or communication protocols.
- To understand a distributed architecture according to distributed communication requirements.
- To understand real-time communication protocols for distributed dependable systems.
- To understand middleware approaches for WSN.


Transaction Processing Fundamentals Isolation Levels, Optimistic Concurrency Control, Transaction APIs, Container Managed Transactions, Messaging Transactions, Queued Transaction Processing, Web Transactions, Advanced Transactions.


Model Driven Middleware Overview of the OMG Model Driven Architecture (MDA), Capabilities of the MDA, Benefits of the MDA, Overview of Model Driven Middleware, Limitations of Using Modeling and Middleware in Isolation, Combining Model Driven Architecture and QoS-enabled Component Middleware.

REFERENCES:

COURSE OUTCOMES:
Upon Completion of the course, the students will be able to
1. Implement the middleware technologies.
2. Implement the communication protocols for distributed communications.
3. Implement the real-time systems.
4.