Established in the year 2001, the department has developed itself as a center of excellence, providing opportunities for innovation and research, with well-equipped computer laboratories and dedicated faculty.

The students are given freedom to organize contents or seminars and are encouraged to take part in co-curricular and extra-curricular activities without compromising the quality of learning. The academic curriculum for the courses offered in the department and the technical skills of the students have been appreciated by the industries that visited MIT. Alumni are working as Software Professional in top industries like Google, Microsoft, Oracle, Cisco, IBM, Intel, Samsung R&D, Honeywell, Flipkart, Toshiba, KPIT Cummins, Deloitte etc., and higher job offers per student testify the quality and excellence of the department.

**Academic Programmes Offered**

- **B.Tech in Information Technology (from 2000)**
- **B.Tech in Computer and Communication Engineering (from 2013)**
- **M.Tech in Software Engineering (from 2006)**
- **M.Tech in Network Engineering (from 2005)**
- **Ph.D.**

**B.Tech. in Information Technology**

B.Tech. in Information Technology meets the computational needs of business with an emphasis on technology. The exponential growth of user expectations and the increasing workload in the industry sector has created immense requirements for professionals in the field of Information Technology. The Department of Information and Communication Technology has envisioned these requirements for producing smart IT professionals and designed a program to meet the challenges in the Information Technology. The course contents focuses on complete Software Development Life Cycle, Database System, Knowledge Discovery and Application Development in Internet Technology with judicious blend of technical skills. Also students are encouraged to undergo professional certification in latest technologies.

**B.Tech. in Computer and Communication Engineering**

The current and future trends in Electronics and Telecommunication sector require engineers with expertise in both Computer Science (Software Development) and Electronics Communication focusing on Mobile Communication and Computing. The B.Tech. in Computer and Communication broadly covers the subjects in Computer Science, Communication Networks, Cloud Computing and Big Data Analytics. The program also includes the latest tools and technologies with certification for real life application development. Highlight of this course is Professional Certification in:

- Wireless and Mobile Application Development
- Cloud Computing
- Rational Unified Process

**M.Tech. in Network Engineering**

M.Tech. in Network Engineering is aimed at producing high quality engineers/ researchers for the fast growing field of telecommunications. Students will be provided with cutting edge technologies in computer communication and hands-on experience in the latest trend setting areas such as network management and network design. Exclusive labs are set-up with CISCO network components, D-Link wireless network equipment's HP open view software (Network Management Tool) and QualNet simulation software. In addition, as a part of the course, training for certifications of CISCO Network Academy Program (CNAP) and Rational Unified Process (RUP) are provided.

**M.Tech. in Software Engineering**

M.Tech. in Software Engineering is a unique program with focus on state-of-the-art techniques in software engineering activities in the context of contemporary specification, process engineering, design, testing etc. The course is well planned in consultation with leading software industries in India and abroad.

**Specialized Facilities**

- Cloud Computing Laboratory
- Wireless Sensor Networks Laboratory
- High Performance Computing Laboratory
- Data Analytics Laboratory
- Training for CISCO Network Academy Program (CNAP) Certification
- Exclusive labs are set-up with CISCO network components, D-Link wireless network components, HP Open View Software (Network Management Tool) and QualNet Simulation Software
- The digital library, well-fortified with IEEE, ACM, Science Direct and other online journals and magazines
- Training the students in various emerging technologies and software modeling tools like IBM Rational Rose, Software Architect, IBM Infosphere etc.
Faculty List

Professor and Head
Dr Preetham Kumar, Ph.D (NITK, Surathkal)

Professor
Dr Manohar Pai M M, Ph.D (University of Mysore)
Dr Radhika M Pai, Ph.D (NITK, Surathkal)
Dr Balachandra, Ph.D (Manipal University)
Dr Smita N Pai, Ph.D (Manipal University)
Dr Manjula Shenoy, Ph.D (Manipal University)

Associate Professor
Dr Sanjay Singh, Ph.D (Manipal University)
Dr Poornalatha G, Ph.D (NITK, Surathkal)

Assistant Professor - Selection Grade
Ms Chandrakala C B, M.Tech
Mr Santhosha Rao, M.Tech
Mr Ajith Shenoy K B, M.Tech

Assistant Professor - Senior Scale
Mr Ghanashyama Prabhu, M.Tech
Ms Manjula C B, M.Tech
Ms Rashmi Naveen Raj, M.Tech
Mr Santosha Kamath, M.Tech
Ms Girija V Attigeri, M.Tech

Assistant Professors
Ms Diana Olivia, M.Tech
Ms Divya S, M.Tech
Ms Sucheta Kolekar, M.Tech
Mr K. Krishna Prakasha, M.Tech
Mr Sanoop M., M.Tech
Mr Raghavendra Ganiga, M.Tech
Mr Ramakrishna M, M.Tech

Assistant Professors
Ms Archana Bhat, M.Tech
Mr Rajesh K., M.Tech
Ms Chetana Pujari, M.Tech
Ms Nirmatha Nayak, M.Tech
Ms Sangeetha T S, M.Tech
Ms Anju R, M.Tech
Ms Pooja B, M.Tech
Ms Smitha A, M.Tech
Mr Tribikram Pradhan, M.Tech
Ms Namrata Mariam Chacko, M.Tech
Mr Akshaya K C, M.Tech
Ms Aiswarya, M.Tech
Ms Veena K. M., M.Tech
Ms Veena Mayya, M.Tech (On Contract)
Ms Aparna Nayak, M.Tech (On Contract)
Ms Swathi B P, M.Tech (On Contract)
### B. Tech in INFORMATION TECHNOLOGY

#### THIRD SEMESTER

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#### Credits

- Third Semester: 16 credits
- Fourth Semester: 17 credits
- Fifth Semester: 16 credits
- Sixth Semester: 17 credits
- Seventh Semester: 16 credits
- Eighth Semester: 18 credits

Total: 80 credits

References:
4. Narasingh Deo, “Graph theory with Applications to Computer Science”, PHI, 2012

ICT 2101: OBJECT ORIENTED PROGRAMMING [4 0 0 4]
Introduction, Data Types, Variable and Arrays, type conversion and casting, Operators and control statements, Classes and Inheritance, Packages and Interfaces, Array list and Vectors, String Handling, Exception Handling, Input/Output, Applet architecture, initialization and termination, applet display methods, HTML applet tag, Passing parameters to applets.

References:

ICT 2102: DIGITAL SYSTEMS [3 1 0 4]
Number Systems, Boolean algebra and logic gates, Simplification of Boolean function using Boolean theorem, K-Map, tabulation method, Combinational circuits, Synchronous sequential logic, Asynchronous sequential logic, Memory Devices.
References:

ICT 2103: DATA STRUCTURES [3 1 0 4]

References:

ICT 2104: PRINCIPLES OF DATA COMMUNICATION [4 0 0 4]

References:

ICT 2111: OBJECT ORIENTED PROGRAMMING LAB [0 0 3 1]
Programs based on the following concepts: classes, inheritance, polymorphism, threads, interfaces and packages, string handling and file handling, applets.

ICT 2112: DIGITAL SYSTEMS LAB [0 0 3 1]
Verification of Boolean algebra and De Morgan theorems, simplification and implementation of Boolean expressions using K-maps. Combinational logic Adders, subtractors, multiplexers, Decoders, encoders, shift registers, code converters. Counters - Asynchronous and Synchronous counters, Shift register counters.

ICT 2113: DATA STRUCTURES LAB [0 0 3 1]
Applications of stacks, Arithmetic expression conversion and evaluation using stack, queues, Linked lists-singly linked lists, circular linked lists, doubly linked lists, polynomial addition using circular linked lists, Binary Trees, Binary search tree operations, graph traversal technique, different sorting and searching techniques.

FOURTH SEMESTER

MAT 2205: ENGINEERING MATHEMATICS - IV [2 1 0 3]
Basic Set theory, Axioms of probability, Sample space, conditional probability, total probability theorem, Baye's theorem. One dimensional and Two dimensional random variables, mean and variance, properties, Chebyschev's inequality, correlation coefficient, Distributions, Binomial, Poisson, Normal and Chi square. Functions of random variables: One dimensional and Two dimensional, F & T distributions, Moment generating functions, Sampling theory, Central limit theorem, Point estimation, MLE, Interval estimation, Test of Hypothesis: significance level, certain best tests; Chi square test

References:

ICT 2201: COMPUTER NETWORKS [3 0 0 3]

References:
ICT 2202: COMPUTER ORGANIZATION & MICROPROCESSOR SYSTEMS [3 1 0 4]

Microprocessor: 8086 Architecture, Instruction Set, stacks and subroutines, procedures, programs, interrupts, Keyboard, interrupts related to interrupts, Pin diagram. Computer Organization: Introduction, Execution Unit, Control Unit, Memory Unit, Input & Output

References:

ICT 2203: DATABASE SYSTEMS [3 0 0 3]

Database and database users, Relational Databases, Introduction to SQL, Intermediate SQL, Advanced SQL, Database design and ER model, Relational database design, Transaction management, Concurrency control, Recovery system, Recovery system, Types of DBMS.

References:

ICT 2204: SOFTWARE ENGINEERING [3 0 0 3]


References:

ICT 2211: MICROPROCESSOR SYSTEMS LAB [0 0 3 1]

To implement programs related to memory access based on arithmetic instructions, logical instructions, branch instructions, procedures and macros (addition, multiplication, division), unpacked BCD arithmetic, Packed BCD arithmetic, Sorting, Searching, Code conversion, GCD, LCM, Recursive functions. Implement the programs using various interrupts to input from keyboard and display, menu driven programs. Programs related to string instructions are implemented. Video RAM related programs are implemented towards the end.

ICT 2212: DATABASE SYSTEMS LAB [0 0 3 1]

Application user interface design using VC#, Back end database processing using SQL and PL/SQL in MYSQL, Processing database in ORACLE8 using SQL3, Database design and application development.

ICT 2213: SOFTWARE ENGINEERING LAB [0 1 3 2]

Requirement collection for given problem statement, identify constraint, functional, non functional requirements. Design UML diagrams using IBM rational software architecture tool. Implement the given problem statement using java, apply black box and white box testing.

FIFTH SEMESTER

ICT 3101: OPERATING SYSTEMS [4 0 0 4]

Introduction to operating system, Process management: Process concept, Threads, CPU Scheduling, Process synchronization, Handling deadlocks, Memory management: Main memory, Virtual memory, Storage Management: File systems, Disk scheduling, RAID Structure, Case study: The LINUX operating System, virtualization.

References:

ICT 3102: EMBEDDED SYSTEMS [3 1 0 4]

An overview of Cortex M- ARM Architecture, The RISC and ARM design philosophy, ARM addressing modes, ARM I/O Programming, Memory management, debugging, instruction set, ARM processor exceptions and modes, programming using ARM C language, interrupts multi threading, I/O programming and Hardware software synchronization LED ADC, DAC, keyboard, LCD, UART, stepper motor etc, serial port
Conquer, Dynamic paging, Backtracking and Branch and Bound.

algorithms, implementing algorithms such as Greedy, Divide and

communication using system calls, implementing scheduling

Exploring Linux commands, executing shell scripts, inter process

its specifications, Mini project Using above mentioned web design tools.

and develop scripting languages (Java script, VBScript and Perl) and Use of XML and

and develop dynamic web pages using different client / Server side

students are required to develop mini project using raspberry pi kit.

segment, stepper motor, DAC, ADC, In addition to above list of experiments

experiments on timers and interrupts, interfacing LCD, keyboard, 7

rotate, branch instructions, code conversion, sorting, Fibonacci series,

Familiarization of Cortex M keil software, familiarization of data transfer, rotate, branch instructions, code conversion, sorting, Fibonacci series, experiments on timers and interrupts, interfacing LCD, keyboard, 7 segment, stepper motor, DAC, ADC. In addition to above list of experiments students are required to develop mini project using raspberry pi kit.

ICT 3112: INTERNET TOOLS & TECHNOLOGY LAB [0 0 3 1]

Design and develop a static web page using XHTML and CSS. Design and develop dynamic web pages using different client / Server side scripting languages (Java script, VBScript and Perl) and Use of XML and its specifications. Mini project Using above mentioned web design tools.

ICT 3113: OPERATING SYSTEMS AND ALGORITHMS LAB [0 1 3 2]

Exploring Linux commands, executing shell scripts, inter process communication using system calls, implementing scheduling algorithms, implementing algorithms such as Greedy, Divide and Conquer, Dynamic paging, Backtracking and Branch and Bound.

ICT 3103: INTERNET TOOLS & TECHNOLOGY [3 0 0 3]

Basic concepts of the Internet and internet browsers, fundamentals of Website design, Websites building tools and languages, basics of XHTML (text, fonts, colors, images, lists, tables, frames, forms), Scripting and Scripting Languages (VB Script, Java Script).

References:

3. Larry Wall, Jon Orwant, Tom Christiansen, “Programming Perl”, (4e), O’Reilly, 1991

ICT 3107: DESIGN & ANALYSIS OF ALGORITHMS [3 1 0 4]


ICT 3111: EMBEDDED SYSTEMS LAB [0 1 3 2]

ICT 3102: DISTRIBUTED SYSTEMS [3 0 0 3]


References:


ICT 3110: DISTRIBUTED SYSTEMS [3 0 3 2]


References:

ICT 3202: DATA WARE HOUSING & DATA MINING [4 0 0 4]
Data warehouse definition, Warehouse schema, Data Warehousing Architecture, OLAP, Data cube, Data cleaning, Data Integration and transformation, Data reduction, Data mining Introduction, Association rule mining, Clustering Techniques, Classification and Prediction, Web Mining.

References:
1. Jiawei Han and Micheline Kamber, “Data Mining Concepts And Techniques”, (2e), Morgan Kauffmann Publishers, 2008

ICT 3211: COMPUTER NETWORK LAB [0 0 3 1]
Basic TCP and UDP based socket programming, Client Server based C programs: to determine whether a string is Palindrnome, to reverse a string, sorting of numbers, File Server Operations, Chat Server, Database operations, Multiple Client Single Server, simple DNS implementation

ICT 3212: DATA WARE HOUSING AND DATA MINING LAB [0 1 3 2]
Introduction to data warehousing tool (IBM's Infosphere), creating physical data model, data flows, control flows and OLAP cube using Infosphere tool, association rule mining (apriori, DIC, frequent pattern), classification algorithm, clustering, implementation of mini project.

ICT 3213: ADVANCED TECHNOLOGY LAB [0 0 3 1]
The lab exercises are designed to familiarize students with the more recent trend in the software Industries. The recent technologies such as: J2ME, android, etc., can be considered.

SEVENTH SEMESTER

HUM 4001: ESSENTIALS OF MANAGEMENT [2 1 0 3]

References:

ICT 4101: BUSINESS INTELLIGENCE [3 1 0 4]
Contexts for HCI, Processes for user-centered development. Different measures for evaluation, Usability heuristics and the principles of usability testing, Physical capabilities that inform interaction design, Cognitive models that inform interaction design. Social models that inform interaction design. Principles of good design and good designers, Accessibility, Interfaces for differently-aged population groups

References:

ICT 4102: INFORMATION AND WEB SECURITY [3 0 0 3]

References:
ICT 4111: DATA ANALYTICS LAB [0 1 3 2]
Basic Map Reduce programing on a given dat using sqoop to transfer data between Hadoop and relational databases, using scripting language pig latin for constructing data flows for extract, transform, and load (ETL) processing and analysis of large datasets, using query language Hive for data summarization, ad hoc queries, and the analysis of large datasets stored in Hadoop-compatible file systems, using machine learning and data component mahout.

EIGHTH SEMESTER

ICT 4297: SEMINAR
- Each student has to present a seminar individually, on any technical topic of current interest / latest advancement / topics not covered in the syllabus.
- The topic has to be approved by the Department and a report of the same has to be submitted a week before the day of the presentation.

ICT 4298: INDUSTRIAL TRAINING
- Each student has to undergo industrial training for a minimum period of 4 weeks. This may be taken in a phased manner during the vacation starting from the end of third semester.
- Student has to submit to the department a training report in the prescribed format and also make a presentation of the same. The report should include the certificates issued by the industry.

ICT 4299: PROJECT WORK / PRACTICE SCHOOL
- The project work may be carried out in the institution/industry/research laboratory or any other competent institutions.
- The duration of the project work shall be a minimum of 16 weeks which may be extended up to 24 weeks.
- A mid-semester evaluation of the project work shall be done after about 8 weeks.
- An interim project report on the progress of the work shall be submitted to the department during the mid-semester evaluation.
- The final evaluation and viva-voice will be conducted after submission of the final project report in the prescribed form.
- Student has to make a presentation on the work carried out, before the department committee as part of project evaluation.

MINOR SPECIALIZATIONS

I. ADVANCED NETWORK SYSTEMS

ICT 4001: MOBILE COMPUTING [3 0 0 3]

References:

ICT 4002: MULTIMEDIA COMMUNICATIONS [3 0 0 3]

References:

ICT 4003: NEXT GENERATION TELECOM NETWORKS [3 0 0 3]
References:


ICT 4004: SOFTWARE DEFINED NETWORKING [3 0 0 3]

History and Evolution of SDN, Control and Data Plane Separation, Virtual Networking, SDN Nuts and Bolts: Control Plane, Data Plane, Programming SDNs, Use Cases

References:


II. DATA ANALYTICS

ICT 4005: BIG DATA ANALYTICS [3 0 0 3]

Introduction to Big Data Analytics, Overview of Data Analytics Lifecycle, Using R for Initial Analysis of the Data, Advanced Analytics and Statistical Modeling for Big Data Theory and Methods, Advanced Analytics and Statistical Modeling for Big Data Technology and Tools

References:


ICT 4006: INFORMATION RETRIEVAL [3 0 0 3]


References:


ICT 4007: MACHINE LEARNING [3 0 0 3]

Basic concepts of machine learning, Supervised learning setup, LMS, Logistic regression, Perceptron, Exponential family Generative learning algorithms, Gaussian discriminant analysis, Naive Bayes, Support vector machines, Model selection and feature selection, Ensemble methods: Bagging, boosting.

Evaluating and debugging learning algorithms; Learning Theory: Bias/variance tradeoff, Union and Chernoff and Hoeffding bounds, VC dimension, Worst case (online) learning, Practical advice on how to use learning algorithms, Unsupervised Learning: Clustering, K-means, EM, Mixture of Gaussians, Factor analysis, PCA, ICA Reinforcement Learning and Control: Markov Decision Processes (MDPs), Bellman equations, Value iteration and policy iteration, Linear quadratic regulation (LQR), LOG, Q-learning, Value function approximation, Policy search, Reinforce, POMDPs.

References:


ICT 4008: SEMANTIC WEB [3 0 0 3]

Semantic web vision, Describing web resource, Querying semantic web, Ontology languages, Ontology reasoning, Ontology design and management, Ontology programming, Applications of the semantic web

References:

III. SOFT COMPUTING

ICT 4009: ARTIFICIAL INTELLIGENCE [3 0 0 3]

References:

ICT 4012: NEURAL NETWORKS & FUZZY LOGIC [3 0 0 3]

References:

IV. SOFTWARE SYSTEM DESIGN

ICT 4013: ADVANCED SOFTWARE ENGINEERING [3 0 0 3]
Specialized process models—Component based development, Formal methods model, Aspect Oriented S/W Development; Agile view of process—Agile process, agile process models, Applying Web Engineering; Web engineering—initiating web app project, analysis for web apps, design for web apps, testing for web apps; Formal methods—Concepts, formal specifications; Cleanroom s/w engg; Reengineering; Formal Specifications—Specification Qualities, Classification of Specification Styles, Descriptive Specifications: Logic and Algebraic Specifications, Operational Specifications: DFD, FSM, Petri Nets, Introduction to Z

References:
References:

V. BUSINESS MANAGEMENT

HUM 4011: FINANCIAL MANAGEMENT [2 1 0 3]
Introduction to financial management, Principle of accountancy, Sources of long term finance, Valuation of securities, Leverages, Working capital management, Capital budgeting, Cost of capital, Cash management, and Dividend decisions.

References:

ICT 4016: SOFTWARE QUALITY ENGINEERING [3 0 0 3]
Software Quality Engineering helps to understand fundamentals of software quality development, software inspection, testing, verification and validation. It introduces standard software architectures and software quality tools to implement and maintain the software development processes. It provides an insight to the best practices for software platform, PC constraints and user experience.

References:

HUM 4013: MARKETING MANAGEMENT [2 1 0 3]

References:

ICT 4014: OPERATIONS AND SYSTEMS MANAGEMENT [2 1 0 3]

References:

ICT 4017: CLOUD COMPUTING [3 0 0 3]
Fundamentals Of Cloud Computing, Understanding Cloud Architecture And Services, Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), Software-as-a-Service (SaaS), Cloud Security, Business Continuity In Cloud, Cloud Infrastructure, Management And Migration, Hadoop In Cloud Computing

References:

ICT 4018: COMPUTER VISION [3 0 0 3]
Image formation models, Image processing and feature extraction, Computing local features in practice, Motion estimation, Shape representation and segmentation, Evaluating segmenters, Object recognition

References:

ICT 4019: INTERNET OF THINGS [3 0 0 3]

References:

ICT 4020: PATTERN RECOGNITION [3 0 0 3]
Introduction to pattern classification and structural pattern recognition, Bayesian decision theory, Bayesian estimation, Feature selection and extraction, Linear discriminant function, Nonparametric pattern recognition, Algorithm-independent learning, Recognizing structures
References:

ICT 4021: SOCIAL NETWORK ANALYTICS [3 0 0 3]
Introduction to Social Networks, Graph Concepts, Random network models, Network centrality, Small world network models, optimization, strategic network formation and search, Contagion, opinion formation, coordination and cooperation, Applications of SNA, SNA and online social networks

References:

ICT 4022: SOFTWARE CONSTRUCTION [3 0 0 3]
Introduction to software construction, Creating high quality code, Variables, Statements, Code improvements, System considerations, Software craftsmanship

References:

ICT 4023: SOFTWARE RELIABILITY [3 0 0 3]
Concepts of software reliability, Software reliability models, Prediction analysis, Operational profile, Testing for reliability measurement, Fundamentals of measurement, Product metrics

References:

ICT 4024: WEB INTELLIGENCE [3 0 0 3]
Introduction to web intelligence, Search, Indexing and memory, Analyzing sentiment and intent, Databases and their evolution, Map-Reduce, Classification, Clustering and mining, Neural models, Deep learning, Regression and feature selection

References:

OPEN ELECTIVES

ICT 3281: COMPUTER GRAPHICS AND ANIMATION [3 0 0 3]

References:
ICT 3282: DESIGN AND DEVELOPMENT OF WEB APPLICATIONS [3 0 0 3]

Web essentials such as Clients, Servers, and Communication. The Internet-Basic Internet Protocols

References:

ICT 3283: FUNDAMENTALS OF DATA STRUCTURES AND ALGORITHMS [3 0 0 3]

Introduction to algorithms, Arrays, Sparse matrix representation, Stacks and stack operations, Queues and Queue Operations, Linked Lists, Circular lists, Doubly linked lists, Trees and Tree representations, Binary Tree traversals and different operations, Binary search Tree, Heaps, Graph Abstract type-Representations and elementary operations, Sorting and searching techniques.

References: