# B. Tech in COMPUTER AND COMMUNICATION ENGINEERING

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<td>Engineering Mathematics – III</td>
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MAT 2105: ENGINEERING MATHEMATICS - III [2 1 0 3]

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 2103: DATA STRUCTURES [3 1 0 4]
Introduction, Arrays-The Array as Abstract data type, Sparse Matrix Representation, Transpose of a sparse matrix, Representation of multidimensional arrays, The String abstract data type, Stacks and Queues, Linked Lists: Singly linked lists, Circular lists, Dynamically Linked Stacks and Queues, Polynomial representation and polynomial operations using singly linked list, Singly circular linked list, Doubly

References:

ICT 2151: DIGITAL SYSTEM DESIGN [3 1 0 4]
K-map for simplification, Combinational circuit design, High speed adders, 4 bit ALU design, Sequential circuits-Counters and shift registers, General purpose register design. Multiplication and division hardware design, Control unit design, memory system design and mapping techniques. I/O Interface design

References:

ICT 2152: DIGITAL COMMUNICATION [4 0 0 4]

References:
References:

ICT 2252: ADVANCED PROGRAMMING TECHNOLOGIES [3 0 0 3]
Advanced Java programming - AWT, Database connectivity, Fundamentals of Interpreters, dynamic typing, dynamic scoping (perl), Data processing-regular expressions, string interpolation, hash tables (perl), XML, Web programming: server(PHP), client(Java Script), Overview of scripting languages Python and Ruby, Python basics, list, tuples, sets, strings, dictionaries, control flow, functions, modules, python programs, classes and object oriented programming, Ruby strings, methods, classes, arrays, modules, use of Python Scripts in other platforms.

References:

ICT 2253: EMBEDDED SYSTEMS DESIGN [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 interfacing, data acquisition system, Communication Systems Based on the UARTs, Wireless Communication, Internet of Things.

References:
2. Douglas V Hall “Microprocessor and Interfacing, Programming & Hardware”, (2e), Tata Mcgraw Hill.

ICT 2254: TCP/IP PROTOCOLS [3 0 0 3]

References:

ICT 2261: OPERATING SYSTEMS LAB [0 1 3 2]
Exploring Linux commands, learning vi editor, executing shell scripts, inter process communication using system calls, algorithm implementation for CPU scheduling and paging, deadlock management.

References:

ICT 2262: EMBEDDED SYSTEMS DESIGN LAB [0 1 3 2]
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 board.

FIFTH SEMESTER

ICT 3151: FUNDAMENTALS OF ALGORITHM ANALYSIS & DESIGN [3 0 0 3]
References:

ICT 3152: HIGH SPEED COMMUNICATION NETWORKS AND PROGRAMING [3 1 0 4]


References:
1. William Stallings, “High Speed Networks and Internet”, (2e), Pearson Education, New Delhi, 2002

ICT 3153: PARALLEL PROGRAMMING [3 0 0 3]

Introduction to CPU micro-architecture, Evolution, Cache, Cores, Memory access pattern, Introduction to accelerated computing, coprocessors, comparing the coprocessors, GPUs as parallel computers, Architecture of a modern GPU, Parallel programming languages and models, Serial versus parallel problems, Types of Parallelism, GPUs and CPUs, Amdahl's Law, Flynn's taxonomy, Evolution of graphics pipelines, GPU computing and future trends, Introduction to CUDA C, Function declaration, Threads, Blocks, Grids, Kernels, Warps, Kernel launch, Runtime APIs, CUDA program structure, CUDA programs, Error handling, Memory access efficiency, CUDA Memory hierarchy, Memory as a limiting factor to parallelism, Memory access patterns, Strategies used to optimize Applications, Introduction to CUDA Libraries, CUDA SDK, Profiling, The Message Passing Interface (MPI), How MPI communicates, Bandwidth and Balance Ratios, Considerations for large MPI runs.

References:

ICT 3154: 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 3155: SOFTWARE DESIGN TECHNOLOGY [3 0 0 3]


References:

ICT 3161: RATIONAL UNIFIED PROCESS LAB [0 0 3 1]

Familiarization of Rational unified process & activities (Emphasis on activities Inception, Elaboration, Construction and Transition) which covers the basic software engineering concepts.
ICT 3162: DATABASE SYSTEMS LAB [0 1 3 2]
Application user interface design using VC#, Back end database processing using SQL and PL/SQ in MYSQL. Processing database in ORACLE8 using SQL3, Database design and application development.

References:
1. www.homeandlearn.co.uk/ (for Visual C#)

SIXTH SEMESTER

HUM 4002: ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT [2 1 0 3]

References:

ICT 3251: WIRELESS COMMUNICATION & COMPUTING [4 0 0 4]

References:

ICT 3252: DATA MINING AND PREDICTIVE ANALYSIS [4 0 0 4]
Introduction to data mining, data preprocessing, data warehousing and OLAP technology, concept description, Association rule mining, classification and prediction, clustering, mining complex types of data, applications and trends in data mining.

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

ICT 3261: NETWORK PROGRAMMING LAB [0 0 3 1]
Implementation of algorithm for congestion control and to find the shortest path, Socket programming, Download manager, Encryption-Decryption algorithms, Simple programs on NS2.

References:

ICT 3262: DATA MINING AND PREDICTIVE ANALYSIS LAB [0 0 3 1]
Introduction to data mining tool data pre-processing, association rule mining (apriori, DIC, frequent pattern), classification algorithm, clustering, predictive analysis using rapid miner, implementation of mini project.
ICT 3263: MOBILE APPLICATION DEVELOPMENT LAB [0 0 3 1]
Introduction to Android, Android Emulator (GUI to Design), iPhone introduction, Introduction to XCode, Hands on : iOS Simulator, Introduction to windows mobile application development tools, Mini Project based on Android/IOS/Windows.

References:

SEVENTH SEMESTER

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

References:

ICT 4102: CYBER SECURITY [3 0 0 3]

References:

ICT 4151: WIRELESS SENSOR & ADHOC NETWORKS [4 0 0 4]
Sensor Types, Characteristics of Sensors, Applications, Characteristics of Sensor Networks, Classification of Sensor Networks, WSN vs Ad-hoc networks, Interface to the Internet, Sensor mote Platforms (TELOSB and IRIS), Standardizations, Embedded Operating Systems (RTOS, TinyOS, Contiki), MAC design for WSN, MAC protocols for WSN, The IEEE 802.15.4 MAC protocol Techniques and Protocols in WSNs, Node Clustering Algorithm for WSNs, Time synchronization protocols (NTP, TPSN, RBS, ACS, TDP, RDP), Range-Based and Range-Free Localization protocols, Security attack in Sensor Networks, Security in IEEE 802.15.4

References:
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.

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:
http://dx.doi.org/10.1007/s10489-006-8511-x
III. SOFT COMPUTING

ICT 4009: ARTIFICIAL INTELLIGENCE [3 0 0 3]

References:

ICT 4010: HUMAN COMPUTER INTERACTION [3 0 0 3]
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 4011: NATURAL COMPUTING [3 0 0 3]
Basic notions of biochemistry and molecular biology, DNA computing, Basic Computing Models, DNA computation models, Bacterial Computers and Data Storage, Peptide Computing, Membrane Computing, Chemical Computing

References:

ICT 4012: NEURAL NETWORKS AND 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:

ICT 4014: SOFTWARE ARCHITECTURE [3 0 0 3]

References:
HUM 4013: MARKETING MANAGEMENT [2 1 0 3]

References:

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

References:

OTHER PROGRAMME ELECTIVES

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: