



Syllabus for Faculty of Information Technology

2016 – 2017 (Bachelor Degree Programs)

Computer Science Department courses:

0401110 Discrete mathematics: (Prerequisite: None) [3 Credit hours]

This course provides a brief introduction to mathematical logic and proof techniques, followed by a discussion of sets, functions, and relations. The course also focuses on the mathematical techniques that are frequently used in computing like counting techniques, discrete probability, combinatorics, recurrence relation, graphs, trees, algebraic structures and finite automata.

0401120 Fundamental Computer Programming:

(Prerequisite: None) [3 Credit hours]

A first course in structured programming using C++ to write modular, well documented programs. Topics include structured programming concepts, an overview of problem solving methods, identifiers, data types, operators, variables, various Statements, type conversion, conditional and control structures, functions, arrays and pointers, strings, structures and unions, bitwise manipulation. Weekly programming assignments stress features of structured programming using C++.

0401121 Object Oriented Programming (1):

(Prerequisite: 0401120) [3 Credit hours]

This subject focuses on the practical application of object oriented concepts to the development of business systems. Students will learn how to use object oriented analysis and design techniques to create software models of business systems using



the Unified Modeling Language (UML) and the Rational Rose modeling tool. Students will perform use case analysis to identify initial classes and will progress to detailed class design, defining class attributes, behaviors, hierarchies and relationships. Throughout the course students will work on creating a detailed software model based on a business case study.

0401130 Logic Design (Prerequisite: 0401110) [3 Credit hours]

This course provides students a sound understanding of the fundamentals of digital logic design. It covers, number systems and codes, logic gates, Boolean algebra, simplification of Boolean functions, combinational and sequential logic components and the design of combinational and sequential circuits, counters, registers, and the memory devices. The course demonstrates particular hardware design features such as building logic circuits and operational units.

0401211 Data Structures and Algorithms:

(Prerequisite: 0401121) [3 Credit hours]

This course focuses on the design and implementation of computer programs in a high-level language, with emphasis on proper design principles and advanced programming concepts, including dynamic data structures and recursion. Efficient design, implementation and debugging techniques are stressed. Basic concepts of data structures such as strings, lists, arrays, stacks, queues, trees and graphs, and analysis and design of efficient algorithms for searching, sorting, and merging are examined.

0401315 Algorithm Design and Analysis:



(Prerequisite: 0401211) [3 Credit hours]

A systematic study of designing algorithms, the concept of algorithm efficiency, design analysis and program implementation of different searching , sorting , selection, hashing and graph algorithms, classification of problems by their complexity. It covers the various types of efficiency analysis including worst-case and average-case complexity. A survey of algorithm design methods, including greedy algorithms, divide-and-conquer, dynamic programming, and backtracking. An introduction to NP-complete problems.

0401223 Object Oriented Programming (2):

(Prerequisite: 0401121) [3 Credit hours]

This course follows the latest JAVA language release. It will cover an introduction to Java, Java object oriented programming (OOP) concepts: classes, identifiers, keywords, types, operators, inheritance, overloading, overriding, polymorphism, interfaces, packages, applets, GUI basics, threads, AWT, events, containers, and file I/O. Weekly programming assignments stress features of object oriented and Java new features will be given in the class.

0401325 Advanced Object Oriented programming:

(Prerequisite: 0401223) [3 Credit hours]

Object-oriented design and implementation. Topics include: object and class design, inheritance, polymorphism, interfaces, graphical user interfaces and event-driven programming, exception handling, file input and output.



0401231 Computer Architecture: (Prerequisite: 0401130) [3 Credit hours]

This course covers the basic concepts and design issues in the hardware design of computer systems. Block level design issues, ALU design, central processing unit design, instruction set design, RISC vs. CISC issues, hardwired and micro-programmed control unit design, memory organization, the system bus structure, input/output processors and DMA/Interrupts. Pipeline systems, array processors and data flow architectures are introduced.

0401232 Computer Organization and Design and Organization:

(Prerequisite: 0401130) [3 Credit hours]

Introduction to basic computer organization and how the computer works; The internal organization of the Intel x86-based PCs; Overview of assembly language programming; data representation: machine representations of numbers, and numbering systems; assembly language instruction set; addressing concepts and addressing modes; arrays and hardware stack; procedure definition, parameter passing, and return instructions; recursion; string definition and string manipulation instructions, and structured data definition; macro definition and macro calls; input/output including interrupt handling. A project in real-life applications.

0401233 Operating Systems: (Prerequisite: 0401130) [3 Credit hours]

Principles underlying computer operating systems are presented from a computer designer's perspective. Concepts explained include process concurrence, synchronization, resource management, input/output scheduling, job and process scheduling, scheduling policies, deadlock, semaphore, consumer/producer relationship, storage management (real storage management policies in a multiprogramming environment), virtual memory management (segmentation and paging), and an overview of contemporary operating systems with these principles.



0401240 Fundamentals of Computer Networks:

(Prerequisite: 0401130) [3 Credit hours]

Introduction to computer networks and layered architectures: connectivity, topology, circuit and packet switching, TCP/IP and ISO models; Application layer: C/S model, DNS, SMTP, FTP, WWW, socket programming and network security; Transport layer: TCP and UDP, congestion control; Network layer: internetworking, addressing and routing algorithms and protocols; Data link layer: framing, flow and error control protocols, PPP, MAC and LANs; Physical layer: principles of data communications, circuit switching, coding, multiplexing and transmission media.

0401313 Computational Theory: (Prerequisite: 0401130) [3 Credit hours]

This course introduces the theory of computation through a set of abstract machines that serve as models for computation. Topics include: introduction to basic concepts and languages, recursive definition and regular expression, finite automata and transition graphs, Kleene's theorem and non-determinism, regular languages and decidability, Context-free grammar and Chomsky normal form, pushdown automata and context-free languages, parsing, Turing machines and Chomsky hierarchy.

0401324 Visual Programming: (Prerequisite: 0401121) [3 Credit hours]

In this course, point-and-click methods will be combined with elementary programming concepts to develop Windows applications with a graphical user interface. Topics include input and output tools, control structures, debugging techniques, library functions, file manipulation, GUI programming. Visual C#.NET 2003 is the comprehensive tool set for creating XML web services and Microsoft.NET connected application for windows and the Web using component-oriented C# development language.



0401342 Computer and Computer Security:

(Prerequisite: 0401240) [3 Credit hours]

The course will discuss the basic computer and network security issues. It first reviews basic networking and cryptography concepts, and then study algorithms and protocols used in computer and network security. Further it discusses practical security mechanisms, including Web security, TCP/IP security, firewalls, IPSec, Virtual Private Networks, intrusion detection systems, and concepts like malwares, hijacking, hacking, phishing, etc...

0401443 Wireless Networks:

(0401240) [3 Credit hours]

This course covers cellular and wireless networks and their components. The topics include: first generation analog cellular phone systems; traffic engineering; mobility management; intersystem operation; second generation digital cellular standards: GSM, IS-95 (cellular CDMA); short message service (SMS); 2.5G data services (e.g., GPRS); third generation cellular standards (cdma 2000 and WCDMA/UMTS); location technology, wireless local area networks (802.11), wireless personal area networks (e.g., Bluetooth, Zigbee), wireless metropolitan networks (WiMax), and satellite systems.

0401447 Internet of Things:

(Prerequisite: 0401240) [3 Credit hours]

This course will help students gain adequate knowledge on the Internet of Things. They will be able to understand the potential of the Internet of Things for our society, in terms of impact on the lives of billions of people and on the world economy, understand the underlying technology that powers the Internet of Things, as well as the challenges that comes with such technologies. It includes many real-life examples of IoT devices that are commercially available, and will have a glimpse of the future of the Internet of Things.



0401427 Mobile Programming: (Prerequisite: 0401233) [3 Credit hours]

This course involves a careful examination of mobile device programming. Architecture, design and engineering issues, techniques, methodologies for mobile application development. Emphases are on developing applications as a community that run on the Android platform. Background of Java, XML, and UNIX is required. An insight of today's common procedures for getting mobile application work academically published.

0401428 Smart Card Programming: (Prerequisite: 0401427) [3 Credit hours]

Developing applications (called applets) for smart card with Java card technology. The course includes smart card overview, standards, types, protocols, memory model in Java card, persistent and transient objects, and applet class. Smart card security: Cryptography, firewall, applet security, applet design and optimization, open platform and global platform.

0401445 Cloud Computing: (Prerequisite: 0401233) [3 Credit hours]

This course provides a hands-on comprehensive study of Cloud concepts and capabilities across the various Cloud service models including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), and Business Process as a Service (BPaaS).

0401314 Modeling and Simulation: (Prerequisite(s): 01061101) [3 Credit hours]

Presents a comprehensive introduction to different types of simulation techniques and the concept of time in a simulation, analytical modeling techniques, simulation process and tools, construction of models, random number generation, sampling from distributions, statistical tests for randomness and goodness fit, business and industrial applications.



0401326 Programming and Languages Concepts:

(Prerequisite: 0401211) [3 Credit hours]

The course provides an introduction to the basic paradigms and techniques of imperative, functional, logic, object-oriented, and concurrent programming languages. Using illustrative examples, the student will be exposed to various programming languages representative of the above paradigms.

0401350 Multimedia Systems: (Prerequisite: 0401324) [3 Credit hours]

This course covers contemporary, interactive multimedia systems, cognitive aspects of multimedia, the media elements: text, still images and sound (wave form MIDI, voice) the student will also learn how to integrate time based media, compression and transmission of multimedia, hyper media, putting a multimedia product together, client-server considerations for multimedia delivery, programming development for multimedia, the future in multimedia systems. Laboratory component includes hands-on experience using various macromedia software: Director 8, GIF animator, multimedia authoring packages.

0401351 Human Computer Interactions:

(Prerequisite: 0401342) [3 Credit hours]

The course highlights human-computer interaction strategies from a number of perspectives including that of the engineer, cognitive psychologist, and end-user. Major themes include user centered design and evaluation of usable interfaces, matching computer systems with the cognitive capabilities of users, and an investigation of novel paradigms in human-computer interaction. The course will also focus on the lifecycle of interaction design methodology. Advanced HCI issues will also be introduced in this course.



0401352 Computer Graphics: (Prerequisite: 090201312) [3 Credit hours]

This course involves discussion of some basic types of computer graphic devices, graphics and text modes, point plotting and line drawing, area filing, image array plotting, mathematics and generation of two and three-dimensional transformations: translations, rotations, scaling, rendering reflections, orthogonal and perspective projections.

0401416 Principle of encryption: (Prerequisite: 0401315) [3 Credit hours]

This course is intended to teach the fundamentals of cryptography and computer security in general. It covers security principles, classical encryption and block cypher, modern symmetric cipher, confidentiality using symmetric ciphers, public key cryptosystems and key management, message authentication and hash functions, digital signatures, IP and Web security. Fire walls and trusted systems, software threats (viruses and worms).

0401346 Networks Design and Management:

(Prerequisite: 0401240) [3 Credit hours]

The course Networks Planning and Management will cover business and technical goals of network design. Students will also learn to characterize the internetwork and network traffic. This course defines a disciplined approach to network architecture and design. This approach addresses the critical elements required to successfully design and deploy networks in an increasingly complex environment. There is constant pressure to deploy new features and services while increasing the quality of existing services and network security. In addition, market forces are pressing network operators to closely manage investment in new infrastructure and decrease operations and maintenance costs.



0401435 Digital Image Processing: (Prerequisite: 0401324) [3 Credit hours]

This course provides students with an overview of the concepts and techniques in digital image processing, and to make them familiarized with the various applications in the area of computer vision and image analysis. It covers introduction, neighborhood and block operations, linear filtering and filter design, transforms, analyzing and enhancing images, binary image operations, region-based processing.

Computer Information System Department courses:

0402491 Practical Training:

(Prerequisite: Passing 90 credit hours) [3 Credit hours]

A summer period of 8 weeks spent as a trainee in industry, business, or government agencies for the purpose of familiarizing the student with the real job world and enabling him to apply and relate his academic knowledge to a real work environment. The student is required to participate in computer science related activities and use his time to get acquainted with the computer science related functions and resources used by his employing organization. Besides progress reports, the student is required to submit a final report and do a presentation on his experience and the knowledge he gained during his summer training program.

0402491 Graduation Project (1):

(Prerequisite: Passing 90 credit hours) [3 Credit hours]

The graduation project consists of a sequence of two courses: 0401498 and 0401499. It gives the student the opportunity to apply knowledge acquired in the early years. It aims to develop and measure the capabilities of a student to analyze and solve complex problems. Projects are assigned on a team basis. They are normally proposed by lecturers of the department. However, a student may propose a topic or an area of his/her own research interest. Projects should be problem oriented relevant



to the programmer of study. Students are encouraged to have some original contribution. Each Team will be assigned a supervisor who is in charge of the entire project. In this part of the project the student is expected to develop the skills in gathering information, analyzing and specifying problem requirements. A literature survey and initial plan is written up by the middle of the semester and a requirement specification document is submitted by the end of the semester. A final oral representation before faculty members is given for assessment and to suggest modifications.

0402492 Graduation Project (2): (Prerequisite(s): 0402491) [3 Credit hours]

This course covers the design and implementation phases of the project started in 0401498. The design document is to be submitted and reviewed by the supervisor by the middle of the semester. A final design and implementation report is submitted and oral presentations including a public demo are evaluated by a committee of faculty members.

0402220 Building Web Applications: (Prerequisite: 0401121) [3 Credit hours]

Introduces the concepts and techniques for developing Web-based applications. Emphasis is placed on programming techniques and the basics of database technology required for designing Web-based application interface and managing data on the Web. Students will learn the basics of a computer programming language through hands-on exercises and projects. They will be able to create a web application that works with a database. You won't become an expert programmer, but you will develop knowledge and skills that will be valuable for working with management and programmers to help build better information resources.



0402251 Systems Analysis and Software Design:

(Prerequisite: 0401121) [3 Credit hours]

This course provides the students with an introduction to technical and management issues in systems analysis and design. The course covers various issues such as the SDLC model, CASE tools, the systems analyst and the different roles of a systems analyst in an organization. It introduces students to various information gathering techniques, tools for project management, CPM, PERT charts, issues and models for sampling data sources, ER diagrams, data flow diagrams and data dictionaries. It includes an in-depth treatment of prototyping, the role of the user in prototyping and other issues related to prototyping. It also covers issues in decision-making, process specification techniques and principles of structured design.

0402450 Ethical & Professional issues in Computing:

(Synchronized: 0402492) [1 Credit hour]

In this course students will explore the ethical and moral issues that will confront them in the information technology field. They will examine issues of professional conduct and their responsibilities to society as an information technology professional. A broad range of topics will be covered, including professional codes of ethics, computer crime and security, encryption/privacy/free-speech, safety critical systems, whistle blowing, intellectual property, fraud and unfair business dealings, and software liability.

0402463 Big Data:

(Prerequisite: 0402360) [3 Credit hours]

The course will focus on data mining and machine learning algorithms for analyzing very large amounts of data or big data. Map Reduce and No SQL system will be used as tools/standards for creating parallel algorithms that can process very large amounts of data. It will cover key aspect of big data platform, high level DBUse cases, text analysis and streams.



0402352 Principles of Software Engineering:

(Prerequisite: 0402251) [3 Credit hours]

This course provides students with the motivations behind software engineering, the methodologies, guidelines and practical foundations to generate requirement specifications for large software projects using UML notations. It covers fundamental software engineering concepts, terminology, principles and role, software development life-cycle and process models, software quality issues, software project management considerations, requirements definition, elicitation, modeling analysis and specification. Students are given hands-on practice using selected case studies and mini group projects.

0402360 Database Systems (1): (Prerequisite: 0401211) [3 Credit hours]

This course investigates the concepts and practices necessary for designing, using, and implementing database systems stressing in particular on relational database modeling and design concepts. It covers: database system concepts and architecture, relational data model, relational algebra, SQL, database application development life cycle, conceptual data modeling using entity-relationship (ER) model, enhanced entity-relationship (EER) model and UML model, relational database design by ER- and EER-to-relational mapping, functional dependencies and normalization, disk storage, basic file structures and hashing, indexing structures for files. The associated lab component includes hands-on experience to design and generate simple inquiry and update database systems using Oracle SQL/PLUS Toolkit.

0402444 Distributed Systems: (Prerequisite: 0401233)

The objective of this course is to familiarize the student with the technologies underlying modern enterprise-wide information systems including 2-tier and 3-tier client-server architecture, distributed objects and web based systems, virtual organization and workflow systems, distributed programming using Java,



CORBA/RMI COM/DCOM, distributed services, distributed file systems, distributed database transactions and transaction processing monitors, current and future trends.

0402493 Selected Topics in Computer Science:

(Prerequisite: Dept. approval) [3 Credit hours]

This course covers selected topics in current research and recent developments in the Computer Science field. Content may vary each offering or may be repeated.

0402310 Artificial Intelligence: (Prerequisite: 0401211) [3 Credit hours]

This course provides an introduction to problems and techniques of Artificial intelligence. It swaps the major sub-disciplines of AI such as: problem solving and state-space representation, search strategies and heuristic search techniques, knowledge acquisition and representation schemes, logical reasoning, planning, reasoning under uncertainty , major AI application areas (Natural language processing, machine learning, expert systems, games and robotics). The programming language Prolog will be introduced in the Lab sessions.

0402411 Neural Networks:

(Prerequisite: 0402310) [3 Credit hours]

This course an introduction to the artificial neural networks. Neural computation, Biological and Artificial neural network models. Perception rules, learning rules, perceptron, back propagation neural network algorithm. Hopfield model, humming model algorithm. Carpenter and Grossberg, Cohenon self-organization, function approximation using neural networks.



040262 Database Design and Implementation:

(Prerequisite: 0402360) [3 Credit hours]

This course is built upon concepts; skills gained in Database Systems course. It covers: query processing and optimization, transaction processing concepts and theory, concurrency control techniques, database recovery techniques, database security and authorization, distributed databases and client-server architecture, object-oriented database concepts. Emerging database technologies and applications are introduced.

0402464 Data Mining:

(Prerequisite: 0402360) [3 Credit hours]

This course aims to introduce students to concepts and techniques of Data Mining. Topics covered include: development life cycle, logical data modeling for physical data design; Data mining concepts and tasks, data preprocessing and reduction, classification techniques, association analysis and algorithms, clustering analysis and algorithms, anomaly detection methods, and web mining.

0402212 Knowledge based-system: (Prerequisite: 0401121) [3 Credit hours]

The core aspect of these systems is their ability to deal with knowledge in various forms. This includes the acquisition of knowledge from human experts, other knowledge repositories, or via learning techniques from raw data such as delivered by sensors. Knowledge also has to be stored in an internal format. Topics include KBS fundamentals, knowledge representation, knowledge base construction, knowledge integration in databases, inference engines, and reasoning from incomplete or uncertain information, intelligent decision support



0402231 Fundamentals of Information Systems:

(Prerequisite: 0401211) [3 Credit hours]

This course covers major concepts and architecture of computer information systems; including information concepts; information flow; types of information systems; the role of information in planning operations, control, and decision making; integrated information systems across a range of functional elements, computer information systems in organizations.

0402251 Systems Analysis and Software Design:

(Prerequisite: 0401121) [3 Credit hours]

This course provides the students with an introduction to technical and management issues in systems analysis and design. The course covers various issues such as the SDLC model, CASE tools, the systems analyst and the different roles of a systems analyst in an organization. It introduces students to various information gathering techniques, tools for project management, CPM, PERT charts, issues and models for sampling data sources, ER diagrams, data flow diagrams and data dictionaries. It includes an in-depth treatment of prototyping, the role of the user in prototyping and other issues related to prototyping. It also covers issues in decision-making, process specification techniques and principles of structured design.

0402352 Basics of Software Engineering:

(Prerequisite: 0402251) [3 Credit hours]

This course is an introduction theory and practice for software engineering in terms of software development that includes software principals, requirements, specifications, design, implementation and testing. Student will undertake a term-based project working in small groups based to specify requirements and design.



0402366 Database Systems (2): (Prerequisite: 0402360) [3 Credit hours]

This course is built upon concepts; skills gained in Database Systems course. It covers: query processing and optimization, transaction processing concepts and theory, concurrency control techniques, database recovery techniques, database security and authorization, distributed databases and client-server architecture, object-oriented database concepts. Emerging database technologies and applications are introduced.

0402367 Storing and Retrieving Data: (Prerequisite: 0402360) [3 Credit hours]

This course will discuss basic information retrieval concepts using a domain model of Information Retrieval systems. Emphasis will be on the data structures, techniques and algorithms needed to build information retrieval systems. Topics will include conceptual models of Information Retrieval, file structures, query operations, team operation, document operations, and hardware for Information Retrieval.

04023688 Data warehouses: (Prerequisite: 0402360) [3 Credit hours]

This course aims to introduce students to concepts warehouses, Topics covered include: data warehouse architecture, development life cycle, logical data modeling for a data warehouse, physical data design; relation to data mining concepts and tasks, data preprocessing and reduction, classification techniques, association analysis and algorithms..

0402265 E-Business: (Prerequisite: 0402220) [3 Credit hours]

Types of E-business; Corporate strategic planning for EC adoption; Business design/architecture for EC application; Web-based marketing strategies and models; E- business Project Management; Public Policy and Legal Issues of Privacy; Socio-



Technical Infrastructure for E- business; Risk Management in E- business. Initiatives; E-Transformation; Measuring Effectiveness of E- business Projects; EC and organizational change management; EC and competitiveness; Success and failure in EC implementation; Retailing in E- business; Techniques of consumer behavior analysis in E-Commerce context; Advertisement in E-Business; E-Business in Banking; E-Business and Online Publishing; E-Business in Manufacturing; E-Business and Supply Chain Management; E-Business and Customer Asset Management; B2B E-Business; B2C E- E-Business; Electronic Payment Systems; Mobile Business; Modern trends in developing E-Business systems; Available packages and software tools: technical evaluation.

0402422 User Interface Design: (Prerequisite(s): 0402352) [3 Credit hours]

This course provides a comprehensive introduction to the principles and techniques of human computer interaction (HCI), concepts behind human centered software development, graphical user interface (GUI) design considerations and programming. Topics include: contexts for HCI, user-centered interaction and presentation , speed of use, choosing interaction styles, techniques and devices, menu selection, aspects of screen design, command language and direct manipulation, multi-modal interaction, dialog independence and levels of analysis, balancing functionality and fashion, GUI builders and UI programming environments, handling human failures , design of system messages, help systems.

0402454 Object Oriented Analysis and Design:

(Prerequisite: 0402352) [3 Credit hours]

This course provides an overview of Object Oriented Analysis and Design (OOAD) using the Unified Process, covering the key aspects of the Inception and Elaboration phases, and introducing the Construction and Transition phases in application software design and development. Object and class design, inheritance,



polymorphism, interfaces, graphical user interfaces and event-driven programming, exception handling, file input and output.

0402296 Project Management: (Prerequisite: 0402352) [3 Credit hours]

This course provides an introduction to management concepts, principles, techniques and terminology with particular reference to IS project management. It address issues such as planning, organization, resources, scheduling, control, quality, cost estimation and tools for project management. Project definition, responsibilities of project manager and project team, and project risk evaluation, proposal strategies, technical, management and cost proposal. Structure of a Project management tool; Comparison between some of the available project management software tools.

0402493 Selected Topics in Computer Information Systems:

(Prerequisite: Department approval) [3 Credit hours]

This course aims at introducing new developments in Information Systems not specifically covered in the curriculum and in which the instructor has developed interest and proficiency. The intention is to provide a rapid response to current trends and to widen student's knowledge in Information Systems field. Course content may vary each offering or may be repeated.

Courses from other Faculties:

010601101 Calculus (1): (Prerequisite(s): None) [3 Credit hours]

This course provides various essential mathematical concepts and analytical techniques for problem solving. It covers sequences and series with Taylor, Maclaurin and Binomial series, vector and matrices with linear transformation, eigen values and eigen vector, complex number with its properties, techniques of



differentiation and its application and finally techniques of integration and its application.

010601102 Calculus (2): (Prerequisite: 01601101) [3 Credit hours]

Number Theory: Modular Arithmetic, Integer Representation, Fermat's Little Theorem, Chinese Remainder Theorem, RSA.; Proof Techniques: Methods of Proofs, Applications from Number Theory, Recursive Definitions; Algorithm Correctness; Relations: Closures and Equivalence Relations, Partial Orderings and Lattices, Hasse Diagrams; Recurrence Relations and Generating Functions; Automata Theory: Finite State Machines, Regular Expressions, DFA, NFA and their equivalence, Grammars and Chomsky Hierarchy, Introduction to Turing Machines.; Abstract Algebra: Groups, Homeomorphisms and Lagrange's Theorem, Applications.

016201 Probability and Statistics: (Prerequisite: 01601101) [3 Credit hours]

This course provides a basic knowledge of probability and statistics and applications.

Topics include: Discrete and continuous random variables, Binomial, Poisson, Exponential, Normal and Gamma random variables, joint probability distributions, marginal distributions, expectation of random variables, moment generating functions, transformation of variables, point estimation and interval estimation, testing of hypothesis, linear regression and correlation, analysis of variance techniques, Bartlett's test, Cochran's test. Computer aided learning software like SPSS or SAS is integrated throughout the course.

0106305 Linear Algebra: (Prerequisite(s): 010601101) [3 Credit hours]



Systems of linear equations, matrices, solutions of linear systems determinants, Cramer's rules, n-vectors, vector space, basis dimension, rank of matrix, linear transformations, eigen values and eigen vectors of matrices.

010601103 Physics (1): (Prerequisite(s): None) [3 Credit hours]

Vectors, motion in one dimension, motion in two dimensions , the law of motion, "Newton's law", circular motion,, work and energy, potential energy, linear momentum, rotation-sized steel.

010601104 Physics (2): (Prerequisite(s): 010601103) [3 Credit hours]

Electric field, Gauss's law, voltage, capacitors and insulating materials. Current and resistance, direct current circuits, magnetic field, magnetic field sources, Faraday's law in the magnetic induction.

090201312 Numerical Techniques: (Prerequisite(s): 0106305) [3 Credit hours]

Errors in numerical computations, roots of non-linear equations (bisection method, Newton-Raphson method, secant method), iterative method of linear system of equations (Jacobi method, Gauss-Seidel method). Interpolation (Lagrange polynomial, Newton-Gregoryb polynomial). Curve fitting (least square approximation). Differentiation and integration, initial value problems of differential equations (Euler method, Taylor method, Runge-Kutta methods). Students are required to do lab assignments.