Course Description of  

Computer Engineering (CE)  
B. SC. Program.

(CE) First Year

First Term:

MAT 121 Mathematics III. 3Cr. 4-2-0 Hrs/wk  
Ordinary differential equations: linear, homogeneous, nonhomogeneous, variation of  
parameters, series solution. Fourier series. Laplace transform: definitions and theorems,  

PHY 121 Modern Physics. 3Cr. 4-1-1 Hrs/wk.  
Special theory of relativity. Quantum effects: particle aspects of electromagnetic radiation,  

ECE 131 Electric Circuits I. 4Cr. 4-1-2 Hrs/wk.  
Time domain analysis in capacitive and inductive DC and AC circuits. Introduction to the sinusoidal systems. Phasors.

ECE 133 Measuring Instruments and Electronic Transducers. 3Cr. 3-0-1 Hrs/wk.  
Introduction to measurements and measuring instruments and systems. Bridges. Cathode ray oscilloscope and applications. Introduction to data acquisition systems. Electronic transducers for measuring temperature, force, displacement, sound, light, and ionic potential.

CE 101 Structured Programming and Data Structures. 4Cr. 4-1-1 Hrs/wk.  
Internal representation of data. An in-depth study of recursion. Abstract data structures via  
pointers. Stacks, queues, lists, trees, and graphs with applications.

GNS 101 Technical Report Writing. 1Cr. 1-0-0 Hrs/wk.  
Technical terms and abbreviations. Translation. Formats and methods of writing: reports, bids, CV, correspondence. etc.
Second Term:

**MAT 132 Mathematics IV. 3Cr. 4-2-0 Hrs/wk**

**ECE 132 Electric Circuits II. 4Cr. 4-1-1 Hrs/wk.**

**ECE 142 Basic Electronics. 4Cr. 4-1-2 Hrs/wk.**
Fundamental physics of semiconductor devices. Various circuit models of diodes, bipolar junction and field effect transistors. Basic amplifier design. DC biasing and small signal analysis.

**EME 132 Electric Energy Sources and Applications. 2Cr. 2-0-1 Hrs/wk.**
Conventional and unconventional energy sources. Electric energy storage systems (e.g. batteries). Solar energy and applications. Wind energy and applications. Transmission of electric energy. Electric energy utilization. Lighting systems. Lamps, characteristics and applications.

**CE 112 Fundamentals of Logic Design. 4Cr. 4-1-2 Hrs/wk.**

**GNS 102 Word Processing. 1Cr. 0-0-1 Hrs/wk.**
Use of a software for word processing. Writing of texts and mathematical equations. Graphic representation. Tables.
(CE) Second Year

First Term:

MAT 241 Special Functions and Integral Transforms. 3Cr. 4-2-0 Hrs/ wk.

MAT 271 Introduction to Discrete Mathematics. 3Cr. 3-1-0 Hrs/wk.
Logic, mathematical induction, sets, relations, functions, introduction to trees, combinatorics, algebraic structures, congruences, group and their factor groups, lattices, Boolean algebra, fields.

CE 201 Advanced Algorithms. 4Cr. 4-2-2 Hrs/ wk.
Design and analysis of efficient algorithms for sorting and searching. Storage management. Combinational algorithms: shortest paths, maximum flows, dynamic programming, backtracking, heuristic algorithms.

ECE 241 Electronic Circuits. 4Cr. 4-2-2 Hrs/ wk.

ECE 243 Digital Electronics. 3Cr. 3-1-1 Hrs/wk.
Logic gate families, memory devices, PLA, buffers, three state devices. A/D and D/A converters.

EN 211 Engineering Problems of the Environment I. 1Cr. 1-0-0 Hrs/ wk.
An introduction to the engineering design of measures to limit impacts on the environment. Global and local cycles in the hydrosphere, atmosphere and biosphere, energy and materials balance in environmental problems, source control of pollutants. The process of establishing environmental goals is discussed.
Second Term:

**MAT 252 Introduction to Probability and Statistics. 3Cr. 3-2-0 Hrs/ wk.**

**CE 232 Database Systems. 3Cr. 4-1-1 Hrs/wk.**
Introduction to database systems. Access methods and file systems to facilitate data access. Hierarchical, network, relational and object-oriented data models. Query languages for models. Embedding query languages in programming languages. Database services including protection, integrity control and alternative views of data. High level interfaces including application generators, browsers, and report writers. Introduction to transaction processing. Database system implementation.

**CE 212 Digital System Design. 4Cr. 4-2-2 Hrs/wk.**
Multifunction minimization of combinational circuits, formal and informal methods. MSI and LSI logic design. Synchronous sequential circuits. Control unit. Asynchronous sequential circuits.

**ME 252 Mechanical Engineering. 4Cr. 4-1-1 Hrs/wk.**

**CIE 202 Civil Engineering. 3Cr. 3-1-0 Hrs/wk**
Analysis of statically determinate beams, rigid frames and trusses. Design and analysis of metallic and nonmetallic structures, including reinforced concrete.

**EN 212 Engineering Problems of the Environment II. 1Cr. 1-0-0 Hrs/wk.**
Continuation of EN 211.
First Term:

MAT 361 Numerical Methods. 3Cr. 3-1-1 Hrs/ wk.

CE 321 System Programming. 4Cr. 4-1-2 Hrs/wk.
Programming in assembly language, macro assembler, loaders and linkers. Languages for system programming.

CE 311 Introduction to Microprocessors 4Cr. 4-1-1 Hrs/ wk.

ECE 355 Digital Signal Processing. 3Cr. 3-1-1 Hrs/ wk.

ECE 357 Communication Theory and Systems. 3Cr. 4-1-1 Hrs/wk.
Spectral analysis. Linear modulation techniques; AM, DSB, SSB, VSB. Exponential modulation techniques: FM, PM. Analog pulse modulation: PAM, PPM, PWM, PCM, delta modulation. Digital modulation techniques: ASK, PSK, FSK. Examples of communication systems.

EM 311 Operations Research and Industrial Planning. 1Cr. 1-0-0 Hrs/ wk.
Theory and computation of optimal selection of decisions under certainty. Linear programming. Introduction to the design, scheduling, and control of production systems.
Second Term:

CE 304 Information Technology. 3Cr. 3-1-2 Hrs/ wk.
Introduction to the design and use of computer-based information systems. Software and hardware used in information systems, information system design, applications of information systems in different industries. The Internet: the foundations, resources, and uses of the Internet, emphasizing practical skills for finding, reading and authorizing materials.

CE 314 Computer Architecture. 4Cr. 4-1-1 Hrs/wk.

CE 322 Operating Systems. 4Cr. 4-1-1 Hrs/ wk.

CE 312 Microprocessor Interfacing. 3Cr. 3-1-1 Hrs/ wk.
Microprocessor architecture. Architecture and design of microprocessor based systems. Principles of hardware and software interfacing. I/O techniques: polling, interrupt, DMA, daisy-chaining. Applications: interfacing to instruments, data acquisition systems, other examples selected from several disciplines.

EM 322 Introduction to Marketing. 1Cr. 1-0-0 Hrs/wk.
Study of the nature and scope of marketing. Market segmentation and marketing mix. Marketing research and marketing information systems.

Elective (1)

CE 302 Formal Languages. 3Cr. 3-1-1 Hrs/wk.
Formal definition of programming languages, including specification of syntax and semantics. Global properties of algorithmic language including scope of declarations, storage allocations, groupings of statements, binding time of constituents, subprograms. List processing, string manipulation and data description languages. Run-time representation of program and data structures.

Or

ECE 382 Control Systems Theory and Design. 3Cr. 3-1-1 Hrs/wk.
(CE) Fourth Year

First Term:

**CE 433 Introduction to Artificial Intelligence. 3Cr. 4-1-0 Hrs/ wk.**
Basic ideas and techniques underlying the design of intelligent computer systems. Heuristic search, problem solving, game playing, knowledge representation, logical inference, planning, reasoning under uncertainty, expert systems, learning perception, language understanding.

**CE 401 Software Engineering. 4Cr. 4-1-1 Hrs/wk.**
Design of computer programs including top-down and object oriented design, analysis, testing, user interface, and documentation. Data structures and graphic I/O. Applications.

**CE 411 Applications of Real Time Computer Systems. 3Cr. 3-1-1 Hrs/ wk.**
Principles of application of real time computer systems to engineering problems. Topics include: computer characteristics needed for real time use, mini/ micro computer operating systems, man-computer communication, basic digital logic design, analog signal processing and conversion, and inter-computer communication. Topics investigated via laboratory using a microprocessor system.

**EM 431 Engineering Economy. 2Cr. 2-0-0 Hrs/ wk.**
Economic decision process in the design and implementation of real engineering projects. Topics covered are: investment choice, general accounting principles including balance sheets and income statements; equivalence; interest and financial mathematics; present and annual worth, the benefit/cost ratio, and the internal rate of return; multiple alternatives; income tax effects on depreciation; inflation, loans, risk analysis and the coast of capital; and retirement and placement analysis.

**CE 491 Project I. 3Cr. 2-0-4 Hrs/wk.**
Supervised projects in small groups of students aimed at providing practical experience in some aspects of computer hardware, computer software, and information processing. This is accomplished through lectures, discussions, field visits and individual design.

*Elective (2)*

**CE 435 Introduction to Computer Vision. 3Cr. 3-1-1 Hrs/ wk.**
Fundamental issues and techniques of computer vision. Image formation edge detection and image segmentation, shading, texture, stereo, motion, shape representation.

*Or*

**CE 413 Distributed Systems. 3Cr. 3-1-1 Hrs/ wk.**
Overview of distributed systems, as an extension of uniprocessor operating systems to span networks. The impact of networking on each of the subsystems, including basic architectural models; network-transport message-passing and remote procedure call; network-wide virtual memory; distributed file systems; encryption, and multi-site concurrency control, replication, and error recovery.
Second Term:

CE 414 Computer Networks. 4Cr. 4-1-1 Hrs/ wk.

ECE 454 Image Processing. 3Cr. 4-1-1 Hrs/wk.
Theory and application of digital image processing. Multidimensional signal processing. Random field models of images. Sampling, Quantization, image compression, enhancement, restoration., segmentation, shape description, reconstruction of pictures from their projections, pattern recognition. Applications include biomedical images, time-varying imagery, robotics, and optics.

CE 402 Computer Graphics. 3Cr. 3-1-1 Hrs/wk.

EM 442 Engineering Management. 2Cr. 2-0-0 Hrs/wk.
Basic management models used to optimize operation systems. Discrete and continuous-time. Markov chains and their application in modeling queues, inventories and production process behavior.

CE 492 Project II. 3Cr. 2-0-4 Hrs/wk.
Continuation of CE 491.

Elective (3)

CE 404 Computing System Evaluation. 3Cr. 3-1-1 Hrs/ wk.

Or

CE 406 Expert System Applications. 3Cr. 3-1-1 Hrs/ wk.
Definition of expert systems, knowledge engineering, knowledge-based programming, knowledge acquisition methodology, technology transfer issues, evolution of the technology as applied to business and government problems, current and future impact. Case studies.