**Course Description of**

**Electronics and Communication Engineering (ECE)**

**B. SC. Program.**

**(ECE) First Year**

**First Term:**

**MAT 121 Mathematics III. 3Cr. 4-2-0 Hrs/wk**

**PHY 121 Modern Physics. 3Cr. 4-1-1 Hrs/wk.**

**ECE 131 Electric Circuits I. 4Cr. 4-1-2 Hrs/wk.**

**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.**

**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 nonconventional 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.
First Term:

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

ECE 221 Solid State Electronics. 3Cr. 4-1-0 Hrs/wk.
Quantum mechanics: Schrodinger equation, infinite potential well, step potential, the finite square potential barrier. Solid state: crystal structure and the reciprocal lattice, crystal binding, free electron Fermi gas, Hall effect, band theory of solids. Semiconductors, density of states, neutrality equation, continuity equation. Dielectric properties of insulators. Diamagnetism, paramagnetism, ferromagnetism, antiferromagnetism, and ferrimagnetism.

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

ECE 261 Electromagnetic Fields and Waves I. 4Cr. 4-1-0 Hrs/wk.

EME 233 Electrical Transformers and Machines. 3Cr. 3-1-1 Hrs/wk.
Study of magnetic circuits, transformers, and electromagnetic energy conversion devices including DC and AC motors and generators.

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**

**ECE 224 Integrated-Circuit Devices. 3Cr. 4-2-0 Hrs/wk.**
The electronics of metal-semiconductor contacts, PN junctions, bipolar transistor and of junction and MOS field-effect transistors. Properties that are significant to device operation for integrated circuits. Silicon device and circuit technology.

**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

ECE 361 Electromagnetic Fields and Waves II. 3Cr. 4-1-1 Hrs/wk.

ECE 351 Signal Processing. 3Cr. 4-1-1 Hrs/wk.

ECE 353 Analog Communications. 4Cr. 4-1-1 Hrs/wk.
Classification of signals and systems. Linear modulation techniques: AM, DSB, SSB, VSB. AM transmission and superheterodyne receivers. FDM. Exponential modulation techniques: FM, PM. Noise effects on linear and exponential modulation techniques.

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

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

**ECE 342 Analog Integrated Circuits. 4Cr. 4-1-1 Hrs/wk.**
Introduction to integrated circuits technology. Difference amplifier. Practical considerations of operational amplifiers: OP-amp error sources, frequency compensation, and stability, slew rate. Linear and nonlinear applications of operational amplifiers. Specialized analogue ICs: comparators, analog switches, operational transconductance amplifiers, balanced modulators, the 555 timer, phase locked loops. Analog CMOS ICs.

**ECE 322 Optical Electronics. 3Cr. 3-1-1 Hrs/wk.**

**ECE 352 Digital Communications. 4Cr. 4-1-2 Hrs/wk.**

**CE 312 Microprocessor Interfacing. 3Cr. 4-1-1 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)_

**ECE 362 Introduction to Microwaves. 3Cr. 3-1-1 Hrs/wk.**

_Or_

**ECE 354 Digital Filtering. 3Cr. 3-1-1 Hrs/wk.**
First Term:

**ECE 441 Digital Integrated Circuits. 4Cr. 4-1-1 Hrs/wk.**

**ECE 451 Communication Systems. 3Cr. 4-1-1 Hrs/wk.**
Concepts of communication systems. Study of several systems which may include: audio systems, telephony, telegraphy, telex, TV and video systems, facsimile systems, radar systems, line-of-sight radio links, satellite systems, teletext, cellular, integrated services digital network ISDN, computer networks, LAN, WAN.

**ECE 481 Control Systems Theory and Design. 3Cr. 3-1-1 Hrs/wk.**

**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 cost of capital; and retirement and placement analysis.

**ECE 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 electronics, communications, computer hardware, and computer software. This is accomplished through lectures, discussions, field visits, and individual design.

*Elective (2)*

**CE 403 Computer Systems Software. 3Cr. 3-1-1 Hrs/wk.**

*Or*

**ECE 461 Antenna Theory. 3Cr. 3-1-1 Hrs/wk.**
Second Term:

ECE 442 VLSI Fabrication and Design. 4Cr. 4-1-2 Hrs/wk.
Fabrication technology. Mask layout, diffusion, monolithic active and passive components, device structure and characterization, parasitic effects. Relation between physical layout and electrical characteristics. MOS transistors will be considered. VLSI design methodology and current trends in VLSI system design.

ECE 452 Optical Information Processing. 3Cr. 4-1-1 Hrs/wk.

ECE 442 Data Transmission and Computer Communications. 3Cr. 3-1-0 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.

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

Elective (3)

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

Or

ECE 482 Digital Control. 3Cr. 3-1-1 Hrs/wk.