Faculty Requirement (FR)

FR 111 Mathematics I (3-2-0-4)

Real numbers and functions, limits and continuity, derivatives, application of derivatives, methods of integration, definite integral, applications of definite integrals.

FR 112 Physics I (2-2-2-4)

Physical quantities, vectors, linear circular motion, work, power and energy, gravity and gravitation Force , electricity and charge ,the electric field, Coulomb's and Gauss's Law , Potential and current .
Heat And Temperature , heat transfer , light and optical physics.

FR 121 Mathematics II (3-2-0-4)

Linear equation an materials, real vectors spaces, inner product spaces, determinants, eigenvalues and eigenvectors, analytical geometry.
Prerequisite: FR 111 Mathematics I

FR 122 Physics II (2-2-2-4)

Simple harmonic motion and concept of oscillation . Electromagnetic wave spectrum and speed of light ,sound and transverse waves.
Atomic structure ,solid state bonding of atoms , energy band in solids , metals and insulators , wave
Particle duality , introduction to quantum mechanics and wave equation.
Prerequisite: FR 112 Physics I.

FR 123 Engineering Drawing (2-0-3-3)

Introduction and general instruction regarding lettering; instruments and line work. Free hand sketching. Plane geometric constructions. Projection systems-perspective orthographic, axonometric, isometric and oblique projections. First angle, third angle projections. Orthographic and pictorial view. Projections of various objects and auxiliary planes.

FR 212 Probability & Statistics (2-2-0-3)

Probability, introduction to statistics.
Prerequisite: FR 121 Mathematics II

FR 213 Mathematics III (3-1-0-3)

Ordinary differential equations of first order, application of ordinary differential equation, solutions of ordinary differential equations of order greater than one, partial differential equations, Laplace transformation and convolutions, series.
Prerequisite: FR 121 Mathematics II

FR 221 Numerical Analysis (3-0-2-4)
Technical terms and importance of error, algorithm matrices and linear system of equations, solution of algebraic and transcendental equations, interpolation and curve fitting, numerical differential & integral, solution of differential equation.
Prerequisite: FR 121 Mathematics II

FR 222 Discrete Mathematics (3-2-0-4)
Fundamental principle of counting & bi-nominal theory, introduction to graph theory & application, generating functions, recurrence relation (RR), the principal of inclusion and exclusion.
Prerequisite: FR 121 Mathematics II

FR 511, 521 Management & Economy (2-1-0-2)
Basic principles of engineering economy: Decision making relation ship between engineering and management non-monetary factors and multiple objects theory of demand and supply, theory of production, theory of costs, developing cash flows, marketing management, marketing concepts and tools, strategic planning, marketing information system and marketing records, marketing environmental consumer behavior, forecasting and demand.

Communication Courses

COM 121 Principles of Electrical Engineering (3-1-2-4)
Circuit analysis, circuit elements: R, L and C, Omm's law, Kirchoff's law, loop and node methods, Superposition, Thevinin's and Norton's theorem unit impulse, step and ramp functions, single phase ac circuits phasors for analysis, real and reactive power, RMS value, theory of maximum power transfer, resonance phenomenon, two part network parameters. .
Prerequisite: FR 112 Physics I.

COM 211 Electric Circuits Analysis I (3-1-2-4)
Circuit elements; Independent and dependent sources; Network theorems; Maximum power transfer; loop equations and node equations; KL & KVL; unit Impulse ,step and ramp functions and their responses; solution of circuits using Laplase transforms; transient and steady-state responses; concept of complex frequency; introduction to driving point and transfer functions; two port network parameters; basic a.c. circuits and resonance.
Prerequisite: COM 121 Principles of Electrical Engineering.

COM 221 Electronic Devices (3-1-2-4)
Energy levels, semiconductors materials, intrinsic and extrinsic semiconductors, Fermi level in semiconductor, drift and diffusion of carriers, p-n junction theorem, p-n junction diode, bipolar junction transistor, junction field transistor (JFET), metal insulator

semiconductor (MIS) diode, change coupled devices (CCD), metal oxide semiconductor (MOSFET), light emitting diode (LED), LASER and photo detectors.

Prerequisite: COM 121 Principles of Electrical Engineering.

COM 222 Electric Circuits Analysis II (3-1-2-4)

Driving point and transfer functions, characterization of multipart networks by drawing point and transfer impedances and admittances, positive real functions and their properties, driving point functions as positive real functions, synthesis of one/two-port networks, spice applications.

Prerequisite: COM 211 Electric circuits Analysis I.

COM 223 Signals and Systems (3-0-0-3)

Classification of signals and systems; system modeling in terms of differential and difference equations , Fourier series; Fourier transform; Lap lace transform and their application to system analysis; convolution and superposition integrals and their applications; Z-trans forms and application to discrete-time systems; random signals and probability; correlation functions ; spectral density; response of linear systems to random signals, introduction to MATLAB.

Prerequisite: FR 213 Mathematics III.

COM 224, 310 Digital Electronics (2-1-2-3)

Diode and transistor as switches; switching and speed limitations; RTL, DTL, TTL, ECL, I^2L and MOS logic circuits; semiconductor memories, comparators and Schmitt triggers; analog switches; A/D and D/A converters; sample and hold circuits; monostable and stable multivibrators and timing circuits.

Prerequisite: CMP 211 Logic circuits.

COM 225 Analog Electronics (2-1-2-3)

Energy levels and atomic structure, electrical conduction in metals, semiconductors, p-n junction, diode circuits and applications, bipolar transistor circuits, sinusoidal signal, BJT and FET amplifiers, frequency response of amplifiers, feedback amplifier and oscillators, power amplifiers, introduction to differential and operational amplifiers.

***Prerequisite*:** COM 121 Principles of Electrical Engineering**.**

COM 311, 427 Control System Engineering (3-1-0-3)

System classification and modeling, equation of physical system, transfer function, block diagrams, signal flow graphs, Mason's gain formula, time response, control system characteristic, Root locus and frequency analysis.

Prerequisite: COM 223 Signals and Systems.

COM 312 Electronic Circuits (3-1-2-4)

Diode circuits and applications, bipolar transistor circuits, small signal analysis, BTT as an amplifiers, FET circuits, FET small signal analysis, FET as an amplifiers, frequency response, feedback amplifier, oscillators, power amplifiers, an introduction to op-amplifier and differential amplifier.

Prerequisite: COM 221 Electronic Devices.

COM 313 Electromagnetic Fields (3-0-0-3)

Review of vector analysis; electric and magnetic fields; gauss's and Stokes theorems; Faraday's law and time-varying fields; Maxwell's equations and the plane electromagnetic wave theory; propagation and reflection of waves; Transmission line theory; transmission line charts and impedance matching.

Prerequisite:

COM 321, 426 Digital Signal Processing (3-0-0-3)

Sampling and data reconstruction process, Z- transforms, Discrete linear systems, frequency domain design of FIR/IIR digital filer, quantization effects in digital filters, discrete Fourier transforms and FFT algorithms; high speed convolution and its applications to digital filters.

Prerequisite: COM 223 Signals and Systems.

COM 322 Wave Propagation (3-0-0-3)

TEM,TE and TM waves; guided waves; Rectangular and circular waveguides and resonant cavities ; flow of power and power loss; Propagation of radio waves. Ground and sky wave propagation .

Prerequisite: COM 313 Electromagnetic Fields.

COM 323 Control Systems Design (3-0-2-4)

Root locus and frequency response design : phase-lag, phase-lead, PI, PD, and PID compensator design and realization; modern control system design.

Prerequisite: COM 311 Control System Engineering.

COM 324 Communication Theories (3-0-0-3)

Review of Fourier series and transforms, Band pass signal and system representation, AM, DSBSC, SSB,VSB signal generation and detection, concept of mixing, coherent and non coherent detection, FM and PM signal representation, generation and detection, PAM, PDM and PPM, introduction to PCM and A/D Conversion, performance in presence of noise.

Prerequisite: COM 223 Signals of Systems.

COM 411 Electronic Instrumentations (3-0-2-4)

Instrumentation set-up; statistical analysis and errors, electronic measuring instruments: electronic voltmeters and multimeters, CRO construction and measurements, transducers, classifications and applications, digital instruments, counters and timers, DVM's and DMM;s, instrumentation amplifiers, data acquisition and conversion, microprocessor applications.

Prerequisite: COM 224 Digital Electronics.

COM 412 Digital Communications (3-1-2-4)

Review of probability and random processes, Baye’s law; transformation of random variables, sampling theorems, quantization, companding, vector space formulation of

modulation, noise analysis, general modulator and demodulator structure, OOK, FSK, PFSK, MBSK and other modulation schemes, union bond, base band pulse shaping ISI, adaptive equalization, echo cancellation, linear codes, block codes.

Prerequisite: COM 324 Communication Theory.

COM 413 Microwave Engineering (3-1-0-3)

Line-of sight microwave system; path loss calculations; microwave transmitters and receivers; repeater stations; diversity reception; microwave tubes; klystron, magnetron and TWTs, introduction to microwave solid state devices, wave guide circuits and techniques, introduction to radar systems.

Prerequisite: COM 323 Wave Propagation, COM 324 Communication Theory

COM 414 Communication Circuits (2-1-2-3)

Parallel resonant circuits, impedance transformation, tuned amplifiers, large signal operation of amplifiers, near sinusoidal oscillators, superhetrodgno receivers, mixers, M, FM modulation and detection circuits, phase looked loops, carrier recovery circuits, method filters, cross-correlators.to radar.

Prerequisite: COM 312 Electronic Circuits

COM 415 Communication Systems (3-0-2-4)

Radio spectrum, radio rules and regulations, AM and FM radios broadcasting transmitters and receivers, communication transmitters and receivers, television systems, TV bandwidth and synchronization, colour, TV transmitters and receivers.

Prerequisite: COM 223 Signals and Systems.

COM 421 Data Communication (3-0-0-3)

Data transmission, data representations, data communication system, communication channel modes, channel types, channel organization, transmission, impairments, deterministic impairments, random impairment, error determine and correction: parity, hamming codes, cyclic, codes, automatic repeat request, modulation techniques.

Prerequisite: COM 412 Digital Communication.

COM 422 Antenna (3-0-0-3)

Introduction to various types antennas, fundamentals of electromagnetic wave radiation, radiation from this wire and small loops, different types of linear arrays, pattern multiplication, long wire antennas, aperture antennas, wave guide horse, slots and micro strip antennas, multiple antennas.,

Prerequisite: COM 322 Wave Propagation.

COM 423 Communication networks and switching (3-0-0-3)

Elements of teletrafic – erlong's formula, generic switch and ingest formula, space division switching, time division switching, multistage switching, TDM switching, hybrid time and space switching networks, telephone call processing, telephone services, PABX, common cleaned signaling, ISDN.

Prerequisite: COM 412 Digital Communications.

COM 424 Satellite Communications (3-0-0-3)
General overview and technical characterization of satellite communication systems; earth station equipment; satellite link design, power budget; EIRP; G/T ratio of receiver; CNR of satellite system; multiple access techniques- TDM, FDMA, CDMA and modifications, synchronization techniques; communication transponder; direct reception systems; examples of satellites-ARABSAT…etc.
Prerequisite: COM 415 Communication Systems.

COM 511 Mobile Communications (3-1-0-3)
Cellular systems: cell structures, path propagation and loss, inter cell interference, frequency re-use, spectral efficiency, cell capacity and number of channels, cell splitting, network topology, channel utilization schemes: modulation and multiplexing, comparison of FDMA, TDMA, and CDMA schemes, spread spectrum modulation, cellular radios interfaces, GSM, TDMA and CDMA spread-spectrum systems, satellite based systems.
Prerequisite: COM 415 Communication Systems.

COM 512 Optical Communications (3-1-0-3)
Introduction to optical communication; Review of optical sources, fibers and detectors; Optical signaling schemes – IM, PL, PCCM/PL, digital PPM, PFM, PRM; various receiver configurations; noise sources; integrated and Tran impedance amplifier; optical line coding; performance of optical receivers.
Prerequisite: COM 415 Communication Systems.

COM 521 Communication Security (3-1-0-3)
Introduction to security, authentication, non reputation, integrity problems, cryptography: encryption, decryption techniques, digital signatures, network security techniques, case studies, voice, image, communication security protocols.
Prerequisite: CMP 412 Computer Networks I

Computer Courses

CMP 111 Introductions to Computer (2-0-2-3)
Nature of computers, types and evolution. Internal organization and functions, I/O units, storage devices and CPU, data representation and coding, an overview of computer software, operating system, application software, programming language, algorithms, fundamental, programming concepts with application.

CMP 211 Logic Circuits (2-0-2-3)
Number systems, binary arithmetic, logic Gates, Boolean algebra, Karnaugh map, combinational, circuits, sequential circuits, counters, registers, integrated circuits.
Prerequisite: CMP 111 Introductions to Computers.

CMP 221, 420 Operating Systems (2-1-2-3)
Objective and functions of an operating system, multi-programming and multi-processing concepts, memory management, paging and segmentation, process management, mutual exclusion and use of semaphores, deadlock prevention, job scheduling, I/O and file management.
Prerequisite: CMP 111 Introductions to Computers.

CMP 311, 320 Computer Architecture I (2-0-2-3)
Registers, shift registers, binary counters and memory unit, register transfer language, register transfer, bus and memory transfer, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic, shift unit, instruction codes, stored programs organization, computer registers, computer instructions, timing control, instruction cycle, CPU, stack organization, addressing mode, data transfer and manipulation, peripheral, communication controller, memory hierarchy, main memory.
Prerequisite: IT 211 Logic Design.

CMP 312 Microprocessors & Interfacing (2-1-2-3)
Microprocessor organization (8-16 617), cpu, internal structure, instruction set, addressing modes, assembly language, address decoding, parallel and serial interfaces, programmable timing, interrupt handling DMA.
Prerequisite: CMP 211 Logic Circuits.

CMP 313 Automata & Computation (3-0-0-3)
Languages, recurrence, definitions, regular expressions, finite automata, transition graphs, Kleen's theorems, non determinism, finite automata with output, regular languages, non regular languages, decidability, Turing machine, introduction to space and time complicity.
Prerequisite:

CMP 321 Computer Architecture II (3-0-2-4)
Memory organization, memory hierarchy, virtual memory, cash memory, associative memory, input and output organization, interrupt types, principles of parallel processing.
Prerequisite: CMP 311computer architecture I.

CMP 322 μP-Based System Design (3-0-2-4)
Programming based system design, interfacing memory and I/O devices, peripherals, Bit slice processors, microprocessor based system design: exposure to logic analysis and circuit emulation, microcontrollers, architecture of high performance microprocessors. Case studies.
Prerequisite: CMP 312 Microprocessor & Interfacing.

CMP 411, 510 Image Processing (2-0-2-3)

Digital image, basic features, digital image presentation and analysis, linear discrete image transforms, image enhancement and pre-processing, image segmentation, mathematical morphology, introduction to image data compression.

Prerequisite: COM 321 Digital Signal Processing.

CMP 412 Computer Networks I (2-0-2-3)

Introduction, uses of computer networks, computer net topologies, computer net hardware, computer net software, Example nets, example services, OSI model, TC/IP model, ISDN.

Prerequisite:

CMP 421 Computer Networks II (2-1-2-3)

Circuit switching, message switching, packet switch, ATM nets, the internet, the www, network routing, network encoding, network security, intranet, extranet, firewalls.

Prerequisite: CMP 412 Computer Networks I.

CMP 511 Artificial Intelligence (2-0-0-2)

Introduction to basic concepts in A.I, problem and reduction knowledge representation (predicate, frames, associative), search techniques and heuristics application, Petri net, natural language, pattern recognition. (PROLOG)..

Prerequisite:

CMP 512, 520 Neural Networks (3-0-2-4)

Biological considerations, artificial neurons and neural network models & algorithms learning process, implementation to signal processing & classification.

Prerequisite: CMP 312 Microprocessor & Interfacing.

CMP 513 Advanced Computer Architecture (2-0-2-3)

Enhancing the performance of uni-processor, pipeline, processors, vector (Array) processors, multiprocessors, data flow computers, RISC, CISC, Systolic computers.

Prerequisite:

CMP 514 Computer Security (2-0-2-3)

Computer components security, software security, number theory, encryption algorithms, (transposition & substitution), secret key ciphering, public key ciphering, stream ciphers, block ciphers, key management, authentication techniques.

Prerequisite: SE 121 Programming fundamentals.

CMP 515 CAD of Digital Systems (3- 0-0-3)

Structure digital circuit, PLA ‘s, logic gate array, MOS clocking schemes, dynamic MOS storage circuits, memory organization, ROMS, SRAM, DRAM, PLA based finite-state, data and control path synthesis, systolic arrays, register transfer level simulation, placement and routing, CAD tools.

CMP 521 Parallel Processing (2-0-2-3)
Introduction to parallel processing, hierarchy of parallelism, explicit parallelism, implicit parallelism, parallel; algorithm for SIMD, parallel algorithm for pipeline, parallel algorithm for MIMD, VLSI & systolic algorithms, parallel numerical algorithm, parallel non numerical algorithm, performance, of parallel computer.

CMP 522 Real Time Systems (3-1-0-3)
Fundamentals of real time systems design; scheduling, interrupts, process communication and synchronization, design of real time systems, decomposition of real time systems, applications of real time systems, instrumentation for real time applications, real time operating systems. Case studies.

Prerequisite: CMP 312 Microprocessor & Interfacing.

Information Courses

IT 211 Data Structure & Algorithms I (2-0-2-3)
Introduction, data structures types, arrays and representations, linear lists and types, stack and algorithms applications, queue and algorithms applications, sorting and searching, graphs (main concepts), linked list (main concepts).

Prerequisite: SE 121 Programming Fundamentals.

IT 221 Object Oriented programming (2-0-2-3)
Information hiding, encapsulations, Inheritance, classes, overloading (fraction-operator), polymorphism, reusability, all the above subject by using C++.

Prerequisite: SE 121 Programming fundamentals.

IT 222 Data Structure & Algorithms II (2-0-2-3)
Doubly linked list, stack and queue using pointers, tree, binary tree, B-tree, hashing. *Graph (theory).

Prerequisite: IT 211 Data Structure & Algorithms I..

IT 311 Data Processing Techniques (Using JAVA) (2-0-2-3)
File types sequential, index and random, accessing methods, data feeding and retrieval methods, data validation and coding errors tabulation checking methods business and statistical data processing methods.

Prerequisite: IT 221 Object Oriented Programming.

IT 312 Web Technology I (2-0-2-3)
Introduction to open system and the internet reference model, foundations of internet applications, e-mail, file transfer application, MIME, hyper text transfer protocol, www system architecture and operation, standards, information structure, state, dynamic and active pages: HTML, CSS, XML, SGML, mobile codes cgi scripts, study of applications like PGP, SSL, E-commerce, design, study of an internet based business system..

Prerequisite: IT 221 Object Oriented Programming

IT 321 Web Technology II (2-0-2-3)
Document representation (XML, XSL, DID, CSS), knowledge discovery (search engines, meta-data, web-based determining), data management (digital library, electronic document management), trading (spontaneous, deliberative auctions) and security. Case studies.

Prerequisite: IT 313 Web Technology I.

IT 322 Event-driven Programming (2-0-2-3)
Diagram understanding, generalized icons, generalization, iconic operators, user interface as iconic purity, the icon dictionary ID, dictionary OD, the environment of a window application, basic concepts of window programming, the structure of a window program, using child windows, programming with displaying text, receiving commands and data from user.

Prerequisite: SE 121 Programming Fundamentals.

IT 411 Concurrent & Distributed Systems (2-0-2-3)
Operating system structure, process management, interaction between system component (processes, devices and processors), multi exclusion, concurrent programming, semaphores, crash resilience and persistent data, deadlock, transaction processing.

Prerequisite: SE 111 Introduction to computer.

IT 411 System Programming (2-0-2-3)
Function and design of software component of a system, loaders, linkers, assemblers, interpreters, editors, utility routines, Design of some component and their implementation.

IT 412 Information Systems (3-0-0-3)
Information system concepts, interface design using visual-window program, information correction methods information processing and validation, query types reports generation and cross-tabulation.

Prerequisite: SE 322 Event-Driven of Programming (VC++)

IT 413, 420 Information Theory and Coding (3-0-0-3)
Continuous and discrete source and channel models; measure of information; channel capacity; noisy channel coding theorem; linear block codes; convolution codes; algebraic codes and decoding methods.

Prerequisite: COM 412 Digital Communications.

IT 421 Computer Graphics (2-0-2-3)
History of computer graphics, computer graphics display devices, drawing elementary figures, views and world coordinate system, clipping, two dimensional graphics, three dimensional graphics, curves and surfaces.

Prerequisite: SF 121 Programming fundamentals

Software Courses

SE 121 Programming Fundamentals (using C) (2-0-2-3)

Data types, variables, constants, input/output, operators, control of program flow (decisions, loops) functions and program structure, string functions, arrays, pointers, files, structure.

Prerequisite: SE 111 Introduction Computers.

SE 311, 411 Data Base Systems (2-0-2-3)

Architecture of data base system, components of data base system, data base designing and normalization process, data definition system and data manipulation languages (SQL), a study of some data base systems, issues of data security and integrity.

Prerequisite

SE 312, 412 Simulation and Modeling (3-1-0-3)

Overview, plan of action, uses case, static modeling, dynamic modeling, and packaging.

Prerequisite: FR 211 Discrete Mathematics.

SE 321, 421 Software Engineering (2-1-2-3)

Software development life cycle, software team organization, large software projects cost estimation, software design techniques, testing and maintenance, software project management techniques, project involving development of large software package.

Prerequisite: FR 211 Discrete Mathematics.

SE 411 Software Designs (2-0-2-3)

Designing to specifications (a b, initio design) and design recovery from source code (reverse engineering), the design milieu (notation, documentation, configuration control), design techniques (structured, object oriented, software architectures),design patterns), design review and inspections design in the context of requirement change, design matrices.

Prerequisite: IT 221 Object Oriented Programming (Using C++).

SE 423 Logic & Functional Programming (3-1-0-3)

Introduction to logic programming the compilation model of logic programs, theory of logic programs, prepositional logic and predicate logic, proving theorems, semantics and prolog or lisp applications, of logic programs.

Prerequisite:

SE 412 Interactive Interface Developments (2-0-2-3)

Human senses such as sight and touch, their influence on user, interface design, components of interaction, characteristics of HCI, design methodologies, software internationalization, user interface programming, user interface design tools, interface and application integration.

Prerequisite: CMP 312 Microprocessor & Interfacing, SE 322 Event-Driven of Programming (VC++).

SE 413 Investments Decision & Financial Systems (3-0-0-3)
Introduction to the economic principles for decisions on private and public investment, analysis of capacity mathematical models for analysis, recording of transactions and the generation of financial reports. Practical problems.
Prerequisite:

SE 421 Software Quality Management (3-1-0-3)
Introduction to advanced topics relatives managing the quality of projects, causal aspects of software quality, risk and bad quality avoidance, practical techniques for identifying and removing defects, implementation procedures to track the success of tailure of risk and deject solutions.
Prerequisite: SE 321 Software Engineering.

SE 422 Software Project Management (2-2-0-3)
Choosing tailoring a software development life cycle, constructing a software development plan, applying techniques and tools for determining size, effort and cost of software development, constructing a schedule and determining resource requirements and allocations, identifying assessing and managing risks requirements, schedule and resource risks, choosing and using metrics for different purposes such as monitoring progress, controlling resources and estimating rework. .
Prerequisite: SE 321 Software Engineering.

SE 425 Network Security (2-0-2-3)
Symmetric key cryptography, public key cryptography and digital, signatures, see net key distribution (Diffie - Hellman key), public key infrastructure (X.509), network authentication protocols, electronic mail security, (PGP), IP security (V4 V6), web security, system security.
Prerequisite: IT 415 Coding Theory & Techniques, CMP 412 Computer Networks I.

Industrial and Manufacturing Systems Engineering Courses

IMSE111 Manufacturing processes I (2 0 3 3)
Engineering material: Classification, mechanical, physical, electrical and thermal properties of materials, Iron carbon diagram. Welding: Classification, pressure and non pressure welding and their types (Gas welding and arc welding and resistance welding, their equipments and field of applications). Extractive metallurgy (blast furnace, cupola furnaces, steel making furnaces,….). Measurements: Linear (vernier, micrometer,..) and angular (sine bar, bevel protractor,…)
Goal: To introduce the engineering materials and their properties and process of extractive measurement.

IMSE112 Engineering Drawing I (2 0 2 3)

Introduction, principles of geometrical construction, straight line, angles, circles, tangency lines and arcs, tri angles, polygons, construction of geometrical shapes, conical curves, non-conical curves, descriptive geometry , method of projecting point and straight line, three dimensional space, plane, relative positions of two planes and relative positions of straight line and a plane.

Goal: To introduce the principles of geometrical constructions, lines, angles, line projections plane representation.

IMSE121 Manufacturing Process II (2 0 3 3)

Machining, classification of machine tools, cutting tools, lathe machine and operations, capstan and turret lathes; drilling machines and drilling operations, milling machines and milling operations, shaper and planner and their operations, Metal forming, mechanical working process, rolling, drawing, extrusion, upsetting, hot and cold working; forging operations; non conventional metal forming, process – explosive forming, electromagnetic forming .. etc. Casting, types of pattern , pattern design considerations, material and allowances; core and core boxes, core sands, types of molding sands, testing, preparation; casting defects, industrial safety; general safety rules and hazards.

Goal: The students will be able to comprehend the casting process, modeling process, metal cutting and welding. The students will be able to count production cost processed by machines.

IMSE122 Engineering Drawing II (2 0 3 3)

Preview projection, Drawing of Machine elements: fasteners (Screw, bolts, studs, and nuts) welding joints keys, pin joints; springs: representation of different types of springs, pulleys: representation with different arms, bearings and brackets (various types). basic concept of computer graphics Two dimensional drawing , Lines, circles, curves, orthographic and isometric projections using CAD programs, Drawing of Simple Machine elements and assemblies..

Goal: To introduce the machine elements drawing, fastness, bolts, screws, 2-D and 3-D drawings.

FR213 Thermodynamics (2 1 2 3)

Introduction; basic concepts, thermodynamic behaviour of pure substances; steam tables and charts, first low of thermodynamics and its application to flow and non flow processes. Second low of thermodynamics: statement Canot cycle and entropy. Heat transfer fundamentals. Mode of heat transfer, basic lows, heat transfer through plane and cylindrical and composite walls.

Goal: Students should be aware of the basic concept of thermodynamic, use of steam tables and charts, study the first and second low of thermodynamics.

CC121 Principles of electrical engineering (2 1 3 3)

Fundamentals of RLC circuits: series and parallel connection. Ohms and Kirchoff's lows DC and AC supplies. Single and Three phase systems, star and delta connections. Power in single and three phase balanced loads. Power factor. Transformers: types, transformer

action, EMF equation, Constructional details, transformers on load, losses and efficiency, DC machines: types, principle of operation, generated and counter EMF equations, constructional details, power and torque developed, standard characteristic and applications. AC machines: types, Principle of action, EMF induced, constructional details, speed and speed controls of induction motors voltage regulation in synchronous machines. Losses efficiency and power factor.

IMSE211 Engineering Mechanics I (2 2 0 3)

Force systems resultants, moment, couple, equilibrium conditions, structures, virtual work, friction, centoids and moment of inertia.

Goal: To master the basic principles of stationary calculation: force, moment, force and moment equivalence and to analyze a construction and a structure.

IMSE 213Computer Aided Design (CAD) (2 0 3 3)

The digital computer as a design aide, interactive CAD systems, software and use of CAD systems, software applications for various mechanical problems. Auto-Cad and mechanical desktop, 2-dimentional and 3- dimensional, assemblies, plotting.

Goal: To introduce the use of computer for machine element drawings, 2-D, 3-D objects and solid representation.

IMSE 221Materials Science (2 1 3 3)

Geometry of crystals and crystal structure: the space lattices and crystal structures and crystal directions and planes. Crystal structure determination : the Brag's low of X – ray diffraction, the powder method. Crystal imperfection: point imperfections, the geometry of dislocations, other properties of dislocations, surface and volume imperfections.

Goal : The students will be able to comprehend the characteristics of engineering materials and to choose the appropriate engineering material for a need/process.

IMSE 222 Engineering Mechanics II (2 2 3 4)

Kinematics of particles, trajectories, Relative velocity and relative acceleration, plane kinetics of rigid body. Work energy equations. Impulse momentum equation of rigid bodies.

Goal: The students should understand the dynamic motion of rigid bodies.

IMSE 223Fundamentals of Industrial Engineering (3 1 0 3)

History of industrial engineering, scope of industrial engineering, functions of enterprise: production system, product development & design, selection of process and equipment, resource allocation: assignment method and transportation method, location and distribution, processes , jobs and facilities layout: process plans, product analysis, assembly charts, operation process chart, analysis of human machines relationship, design of facility layout, design of line layout for product focus systems using line balance concepts, design of functional layout for processed focus system using load summary and flow chart .

Goal: To equip students with the background of the growth and development of industrial engineering discipline. To comprehend the scope of industrial engineering and its interaction with other science as well as the prospect of work field of the industrial engineering graduate. To comprehend briefly about the industrial engineering methods to enhance the work capability in a system to reach the goal.

IMSE 224 Automatic Control (3 1 0 3)

Principles of feed back control theory, mathematical modeling of physical systems, controller, transfer function, block diagrams and single flow graphs, time domain analysis

of feed back control systems, transient response, study state errors, error constants, stability analysis, frequency domain analysis, Nyquist criterion, body plot, Polar plots, stability analysis, role locus techniques.

Goal: The students should be given an introduction of the control systems in industry and how to analyze the system by root locus, Nyquist stability criteria…etc.

IMSE 225 Engineering Chemistry (2 1 2 3)

Introduction, elements and chemicals,(Iron, steel, silicon, ammonia, sulpheric acid,…), chemical processes (glass, plastic, fertilizer,…), basic consideration on the chemical reactivity and synthesis processes of both organic and inorganic

Goal: The students should acquire the basic chemical knowledge that will enable then to understand the industrial chemical process. Basic considerations on chemical reactivity and synthetic processes.

IMSE 311 Experimental Design (3 1 0 3)

Analysis of variance (ANNOVA), factorial experimentations, regression analysis, Taguchi method, statistical content of quality improvement program.

Goal : To provide students with the basic knowledge of designing an experiment using the appropriate method and data analysis needed.

FR 221 NUMERICAL ANALYSIS (3 0 2 4)

Errors and approximations in numerical calculations. Solution of algebraic and transcendental equations. Solution of Linear System of equations (direct and iterative methods). Solution of Non linear system of equations. Solution techniques eign value problems. Interpolation. Numerical differentiation. Numerical integration, ordinary differential equations. Numerical solution of partial differential equation (computer implementation of the methods)

IMSE 312 Operations Research I (3 1 0 3)

Historical background, Mathematical Modeling- deterministic and probabilistic, situation, Linear programming and solution, duality sensitivity and parametric programming; Integer programming; Transportation and assignment algorithm, dynamic programming, principle of optimality, applications.

Goal : To introduce linear modeling and to solve it by using operational research methods for deterministic problems.

IMSE 313 Production planning and control (3 2 0 4)

Introduction to production planning, market analysis, value analysis concept, factory design, preplanning production, most economic selection of production processes, selection of machines, job shop scheduling , sequencing.

Goal : To comprehend the basic concepts of production system, raw materials flow in production process and existing problems, and its solving techniques related to basic commodity planning and controlling, labor force; and other inputs.

IMSE 314 Mechatronics (3 1 3 4)

Principles of electronics, logic circuits, microprocessor, programmable logic controller (PLC) , applications in industry.
Goal: To introduce the content of automatic manufacturing system by understanding, the principles of electronics, microprocessor applications and recently the programmable logic controllers.

IMSE 315 Theory of Mechanism (3 1 3 4)

Kinematics of terminology, kinematics of machine elements (clutches, brakes, belt drives), kinematics analysis of mechanism, kinematics synthesis of mechanism, dynamic analysis of simple mechanism, cam mechanism, theory of lubricants.

Goal: To introduce the three, four linkages mechanics, kinematics terminology, analysis of simple mechanisms ..etc.

IMSE 321 Industrial Quality Control (2 2 3 4)

Design of quality control systems in manufacturing. Use of statistical methods in quality control, process control charts acceptance sampling plans, OC curves, Process control chart, product control chart.

Goal : To provide students with the knowledge and capability to improve product quality and production process by planning and quality control .

IMSE 322 Engineering Maintenance & Management (2 1 3 3)

Failure (modes and analysis). Basic maintenance systems of equipment, design, operation, and monitoring of a system to efficiently control maintenance cost, maintenance organization and systems, preventive maintenance, maintenance planning & scheduling, maintenance work measurement, labor performance measures and spare parts.

Goal : To provision the students with the comprehension on the importance of maintenance in the effort of quality and productivity improvement. To equip the students with the skill in maintenance managerial analysis, reliability and probabilistic distributions.

IMSE 323 Operations Research II (3 1 0 3)

Nonlinear programming, Stochastic process and Markov chain, steady state and transition probabilities. N-steps transition, distribution of Markov chains, Regular and Absorbing Markov Chains, Simulation theory, Generation of random numbers and generation of random number deviates form various distribution, Simulation of Stock Market. Simulation of inventory problem, simulation of waiting lines and production system, queuing theory behavioral analysis of M/M/1. and M/G/! queuing systems applications Gama Theory. Minimax maxmin criteria, two person zero games, solution of Game problems by game theory.

Goal : To introduce a modeling that can be solved recursively and probabilistic modeling and the solving methods.

IMSE 324 System modeling and Simulation (3 3 0 4)

Introduction to simulation including development of simulation models, random numbers and random number generation, ,model validation and testing, analysis of model output, and an overview of simulation languages, emphasize the use of simulation model in decision making through a series of projects involving decision problems.

Goal: To provision the students with conceptual system to formulate the problems correctly into a model. To be able to do a modeling and analysis to make a decision for improvement and development.

IMSE 325 Industrial Management (3 1 0 3)

Introduction to management, organizational structures, types of costs, cost analysis, breakeven analysis, replacement alternatives, depreciations, regression analysis, wages.

Goal : Able to comprehend management concepts in industry. Able to analyze and evaluate the managerial cases in industry as well as to formulate the ways out to understand the types of cost, break even analysis.

IMSE 411 Computer Aided Manufacturing (3 1 3 4)

Introduction to the application of computers in manufacturing; CNC machine tools; Group Technology; Computer Aided Process Planning; Material Requirement Planning; Computer Aided line Balancing; Computer Aided Manufacturing applications; Automatic Factory; Introduction to Computer Integrated Manufacturing (CIM).

Goal: The student should now the ability of developing, a knowledge applications of computers in manufacturing system and a good knowledge of computer aided process and planning.

IMSE 412 Engineering Economy. (3 1 0 3)

This class is designed to provide students with the with fundamentals of Engineering Economics . Engineers must function as managers in the real world of decision making where the criteria include not only technological excellence, but cost. Time value of money, project screening, and a variety of discounting analysis techniques are learned. We must know when to repair or when to replace, when to make and when to buy. Taxes and inflation can also have significant impact on the viability of projects . This class is designed to introduce students to these fundamentals, and apply them through the use of software and projects.

Goal : To provide students with the basic knowledge of economic consideration in evaluating an engineering proposal and an ability to analyze the economical value of general projects.

IMSE 413 System Safety and Reliability Engineering (3 1 0 3)

Application of statistical and algebric techniques to system reliability, derivation and discussion of failure distributions, analysis of reliability, test of data, Maintenance policies and Mont-Carlo simulation technique.

Goal: To provision the students with the comprehension on the set of problems connected to safety in industry. To introduce the concept of models and goods of reliability engineering for industrial systems.

IMSE 414 Ergonomic (3 1 3 4)

Design and use of machines which are influenced by the human operator. The ways of designing human / machine systems, displace, controls , the workplace, manual materials ,handling systems, hand tools and the work environment are considered so as to match functionality with human capabilities and limitations.

Goal : To provision the students with the comprehension on ergonomics principles and its use in real application especially in industrial field.

IMSE 421 Total Quality Management (TQM) (3 1 3 4)

Introduction to TQM concept in value and quality assurance; Total quality control; Quality gurus principles (Juran, Deming, Crosby), TQM success elements, customer relationship management; KAIZEN strategy Quality function development, bench marling, ISO 9000.

Goal : To provision the students with the perception about quality management development. To provision the students with the basic concept and philosophy of total quality management based on qualified scholars' thinking, like Deming, Juran, Crosby, Ishikawa, etc.

IMSE 422 Engineering Project management. (3 1 3 4)

Analysis of Project as system and breaking up of the project in subsystems, networks scheduling constrain in the network, PERT/CPM. Methods of analyze of the project; resource leveling; time-cost trade-off simulation of a PERT network for the management of the project, CPM/PERT package for project management, Time estimation, project cost control.

Goal : To provision the students with the comprehension on organizational problem, project planning and controlling.

IMSE 433 Measurement and Instrumentation (3 1 3 4)

Basic concept of instrumentations, static and dynamic performance characteristics and calibrations, data handling and error analyzing, transducers, Oscilloscope, stroboscope, interferometer and recorders, measurements and recording of various physical quantities as motion, force torque and power, pressure , temperature , flow level; miscellaneous measurements.

IMSE 433 Facilities Planning (3 2 0 4)

Concepts and methods of plant layout and materials handling for the optimum design of a facility. Information requirement for facility design, conventional and newer quantitative techniques for analyzing material flow, facilities location, space determinations, computerized plant layout techniques, the unit load concept, materials handling equipment selection and automatic storage and retrieval systems. Facilities design for manufacturing and assembly of a mechanical design.

Goal : To enable the students to analyze the location of manufacturing or non-manufacturing business by considering many criteria. To teach students the ability to analyze and to design facility layout by considering the related optimation technique. To

enable the students analyzing plant location or non manufac- turing location by considering many criteria.

IMSE 511 Manufacturing Technology (3 1 0 3)

Modern manufacturing process integrated into total manufacturing systems; CAD/CAM, metal cutting theory, metal forming, metal casting, forming, removal welding process and machinery, fine measurements, inspection and quality assurances.

IMSE 512 Work Study (3 1 0 3)

Productivity and work study, method study , work measurement, form analysis to synthesis

Goal : To comprehend the principles of working method and the motion to increase productivity.

ELECTIVES COURCEC

Flexible Manufacturing System (3 1 0 3)

Introduction of Flexible Manufacturing System, Evolution of FMS types of FMS; FMS concept modern market requirement and modern manufacturing methods; manufacturing strategy for flexibility; FMS layout; FMS primary and secondary equipment development , Installation of FMS, Example of FMS applications

Goal: This course aims to explain the concept of flexible, manufacturing systems (FMS), and gives knowledge about technology when FMS is used.

Network Modeling and Analysis (3 1 0 3)

Introduction, Graph and network definition and formulations. Miscellaneous graph problems and algorithms. Shortest path algorithms and applications, MAX – Flow min-cut algorithms and applications. Minimum cost flow algorithms and applications. Minimum spanning tree algorithms and applications. Matching algorithms and applications.

Goal : To provision the students with the comprehension on network concept and its application to solve industrial problems.

EXPERT SYSTEM (3 1 0 3)

Introduction to Artificial Intelligent (AI), the application of AI in industrial environment, expert system bases, expert system composing, Neural Network

Goal : To provision the students with the comprehension about expert system concept and design and the ability to design an expert system.

Industrial Information System (3 1 0 3)

The meaning and the role of information in business decision making, Development of information technology, System concept and Management information system, Computer based information system principles and Database file organizing, Necessity analysis and management of information system design, Implementation and management of information system evaluation, Information system contribution increase management, Value –added and management cost derivation, Productivity analysis of Information system.

Goal : To provision the students with the comprehension on information system and the development of computer based information technology. To provision the students with the ability to analyze and to design a management information system.

Value Engineering (3 1 0 3)

Introduction to value engineering, objective of value engineering, concept and types of value engineering, function / effect of function / cost of value, cost worth, life cycle of a product and value engineering, steps in value engineering, methodology in value engineering(fast diagram/ matrix method/ other approach in value engineering).

Goal: To introduce to the students the value and functions development of products without altering the main design specifications.

Supply Chain Management. (3 1 0 3)

This class will consider the design, analysis and operational control of manufacturing supply chain systems. Models of the supply chain at the strategic, tactical and operational levels are examined as well as the incorporation of these models in a variety of decision support systems. The role of information technology, including enterprise resource planning software, is studied in the supply chain context.

Goal: To introduce the design and operational control manufacturing. Models of supply chain management at the tactical, operational strategies levels.

Product Design and Development (3 1 0 3)

Concept and planning aspects and product system, work function, quality, techniques specification and standardization, customer satisfaction, human factor in product design, economic analysis, low aspect. Optimization i9n Product designing and proto type making. Analysis of new product marketing

Goal : To provision the students with the comprehension on basic principles in planning and designing new product. To provision the students with the comprehension on life cycle problematic and motivations that provide a background in introducing a product.

Forecasting (3 1 0 3)

Box- Jenkins forecasting and result interpretations, special topics on forecasting, time series analysis, regression analysis.

Goal : To provision the students with the knowledge and comprehension in using univariate scientific forecasting to solve industrial problems.

Decision Support System (3 1 0 3)

Management support system, decision support system, data management, modeling, user interface, company support system, group decision support system, distributed support system

Goal : To provision the students with the comprehension on the concept of decision making support system, database composing technique in decision making support system and its application.