CATALOGUE DESCRIPTION OF STUDY PLAN COURSES

2020-2021

Faculty Requirements

Course No.	Course Name	C.H.	Pre-requisite
MATH 110	**Calculus I**	**3**	**-**
This course involves a study of limits, continuity, derivatives and integrals; computations of derivatives-sum, product, and quotient formulas, chain rule, implicit differentiation, applications of derivatives to optimization problems and related rate problems; mean-value theorem; definite integrals and fundamental theorem of calculus; application of definite integrals to computations of areas (length, surface) and volumes.			

Course No.	Course Name	C.H.	Pre-requisite
EE 112	**Calculus II**	**3**	**MATH 110 Calculus I**
Techniques of integration: integration by parts, trigonometric integrals, trigonometric substitutions, partial fractions, rationalizations, half-angle substitution, and improper integrals. Applications of definite integrals: areas between two curves, volumes by washers and cylindrical shells, arc length, and area of a surface. The concept of infinite series and tests of convergence. Power series: Maclaurin and Taylor. Polar coordinates, graphs in polar coordinates, and areas in polar coordinates			

Course No.	Course Name	C.H.	Pre-requisite
PHYS 120	**General Physics I**	**3**	**-**
Fundamental topics in classical physics (mechanics) motion in one dimension and two dimensions, circular motion, and energy			

Course No.	Course Name	C.H.	Pre-requisite
PHYS 121	**General Physics Lab I**	**1**	**PHYS 120 General Physics I or Simultaneously**
Experiments of various physical principles. Experimental procedures and scientific method. Comparison between experimental data and theoretical values.			

Course No.	Course Name	C.H.	Pre-requisite
PHYS 220	**General Physics II**	**3**	**PHYS 120 General Physics I**
Fundamental topics in classical physics(Electrostatics) electric fields, electric potential and capacitance, direct current, and magnetic fields.			

Course No.	Course Name	C.H.	Pre-requisite
PHYS 221	**General Physics Lab II**	**1**	**PHYS 220 General Physics II or Simultaneously**
A set of laboratory experiments related to the topics and principles of General Physics II.			

Course No.	Course Name	C.H.	Pre-requisite
EE201	**Computer Skills II**	**3**	**Computer Skills Test**
Language syntax, data types, the concept of variable scope, selection (if-then-else and switch), repetition control structures (for, while loops), array, functions, string manipulation, pointers, structures, classes, and file I/O.			

Course No.	Course Name	C.H.	Pre-requisite
ME 107	**Engineering Workshop**	**1**	**-**
Carpentry, black smith and welding, workshop manual skills, electrical wiring, sheet metal forming, and turning.			

Course No.	Course Name	C.H.	Pre-requisite
IE 323	**Economy and Engineering Management**	**3**	**3rd level**
Fundamentals of engineering economy. Cost concepts. Time value of money. Economic analysis of alternatives. Replacement analysis. Engineering management.			

Course No.	Course Name	C.H.	Pre-requisite
CE 106	**Engineering Drawing**	**1**	**-**
Introduction to Engineering Drawing using AutoCAD, drawing layout, points, lines, layers, coordinate system, geometric construction, modifying tools, text and numerals, and isometric pictorials. Drawing applications in various engineering fields.			

Course No.	Course Name	C.H.	Pre-requisite
CE 200	**Ethics and Technical Writing**	**2**	**ENG 120 English Language**
Technical communication, process of writing, presentations, relationship between ethical standards and technology, analysis of ethical dilemmas.			

Course No.	Course Name	C.H.	Pre-requisite
PE 201	**Renewable Energy applications & sustainability**	**1**	**-**
Emerging renewable energy technologies and integrating sustainable building design practices.			

Mandatory Department Requirements

Course No.	Course Name	C.H.	Pre-requisite
ME 108	**Descriptive Geometry**	**1**	**None**
Basic and advanced concepts in 2D and 3D geometrical modeling and design. Isometric and pictorial projections of solids/machine parts. , preparation of assembly drawings			

Course No.	Course Name	C.H.	Pre-requisite
ME 205	**Engineering Materials**	**3**	**Pass 26 hours**
To introduce the students with the fundamentals of atomic bonding, crystal structure and crystal defects, diffusion in solids and solid solutions, equilibrium phase diagrams in binary alloys, Iron-carbon phase diagram, and principles of heat treatment of alloys			

Course No.	Course Name	C.H.	Pre-requisite
ME 206	**Engineering Materials lab**	**1**	**ME 205 Engineering Materials**
Identification of ferrous and nonferrous materials. Nondestructive tests. macroscopic examination (Macro etching), preparation of specimens for optical microscopic examinations, mechanical properties tests (hardness test, impact, creep), thermal analysis (construction of Pb-Sn phase diagram). Heat treatment of steel (Annealing, normalizing processes), hardenability test (Jominy end quench test)			

Course No.	Course Name	C.H.	Pre-requisite
ME 211	**Dynamics**	**3**	**CE 221 Statics**
Kinematics and kinetics of particles and rigid bodies. Work and energy, impulse and momentum; system of particles. An introduction to vibrations.			

Course No.	Course Name	C.H.	Pre-requisite
ME 224	**Strength of Materials I**	**3**	**CE 221 Statics**
States of stress and strain, hook's law, torsional stresses, axial deformation, internal forces in beams; bending and shearing diagrams and stresses, beam design, compound stresses, stress transformation			

Course No.	Course Name	C.H.	Pre-requisite
ME 225	**Strength of Materials Lab**	**1**	**ME 224 Strength of Materials I**
Introduction to stress and deformation analysis of basic structural materials subjected to axial, torsional, bending, and pressure loads.			

Course No.	Course Name	C.H.	Pre-requisite
ME 221	**Thermodynamics 1**	**3**	**1501120 General Physics (1)**
Thermodynamic and energy (Heat & Work), Energy Transfer, Properties of pure substances, Energy analysis of closed and open systems, Thermodynamic processes and a cycle, Second law of thermodynamics and Entropy. Heat Engine and Heat Pump.			

Course No.	Course Name	C.H.	Pre-requisite
ME 222	**Thermodynamics 2**	**3**	**ME 221 Thermodynamics 1**
Power Cycles, Air-Standard cycles, Otto, Diesel and Joule cycles. Vapor power cycles, Carnot cycle, Rankin cycle, The Regenerative cycle and modifications, Refrigeration cycle, Non-reactive gas mixtures, Air-Water vapor (Psychrometrics) mixture, Combustion of H-C fuels.			

Course No.	Course Name	C.H.	Pre-requisite
ME 306	**Mechanical Drawing**	**1**	**CE106 Engineering Drawing**
Theory and application of technical drawing using software (PTC CREO), drawing instruments and their use. Drafting techniques: geometrical construction, sectional views, basic techniques of dimensioning. Screws and fasteners, pictorials, working and assembly drawings.			

Course No.	Course Name	C.H.	Pre-requisite
ME 315	**Applied Math. for Eng.**	**3**	**CEE 203 Advanced Engineering Math I**
Complex analysis, Power Series, Taylor Series, Fourier analysis and partial differential equations			

Course No.	Course Name	C.H.	Pre-requisite
ME 323	**Thermodynamics Lab**	**1**	**ME 221 Thermodynamics I.**
Performing laboratory experiments such as Work to heat, specific heat ratio, Gas fuel calorific value, Refrigeration cycle, Flash and fire point of a fuel, Marcet boiler, Viscosity measurement, and instant gas heater.			

Course No.	Course Name	C.H.	Pre-requisite
ME 331	**Theory of Machines**	**3**	**ME 211 Dynamics**
Kinematics of machines; motions of mechanisms; design mechanisms to have given motions; graphical and analytical analysis of position, velocity, and acceleration; relative motion.			

Course No.	Course Name	C.H.	Pre-requisite
ME 335	**Dynamics of Machinery**	**3**	**ME 331 Theory of Machines.**
Geometry and the motions of the parts of a machine and the forces that produce this motion. This includes relative motion analysis and design of gears, cams, and linkages, considering static and dynamic forces graphically and analytically.			

Course No.	Course Name	C.H.	Pre-requisite
ME 341	**fluid mechanics I**	**3**	**CEE 203 Advanced Engineering Math I**
Properties of fluids, pressure and fluid statics, conservation laws, Bernoulli's equation, momentum and energy principles, dimensional analysis and similarity, and flow in pipes.			

Course No.	Course Name	C.H.	Pre-requisite
ME 342	**Fluid Mechanics lab**	**1**	**ME 341 fluid mechanics I**
Performing laboratory experiments such as viscosity and density measurements, jet dispersion, venturi and orifice meter, laminar and turbulent flow, center of pressure, stability of floating body, impact of a jet, series and parallel pumps, flow in pipes.			

Course No.	Course Name	C.H.	Pre-requisite
ME 430	**Machine Design 1**	**3**	**ME 313 Solid Mechanics**
Aspects of machine design: statistical nature, theories of failure and design for strength and design of machine elements..			

Course No.	Course Name	C.H.	Pre-requisite
ME 436	**Machine Design 2**	**3**	**ME 430 Machine Design I**
Cams**,** Spur and helical gears**,** Bevel and worm gears**.** Calculations of normal – and planetary - gears**,** Flexible mechanical elements (Belts and Chains)**,** Clutches Brakes, Shaft, axles and spindles and Design of compound elements.			

Course No.	Course Name	C.H.	Pre-requisite
ME 455	**Heat Transfer**	**3**	**EE 203 Advanced Engineering Math I and ME221 Thermodynamics 1 .**
Steady state conduction, Convection, and Radiation. Transient heat transfer. External and internal forced convection. Free convection, Boiling and Condensation. Introduction to Radiation.			

Course No.	Course Name	C.H.	Pre-requisite
ME 457	**Heat Transfer Lab**	**1**	**ME 455 Heat Transfer**
Design and analysis of systems in which heat transfer processes are central to function and performance; heat energy transfer by conduction, convection and radiation, boiling, condensation, heat exchangers, and pipes.			

Course No.	Course Name	C.H.	Pre-requisite
ME 461	**Engineering Measurements and Instrumentations**	**3**	**ME315 Applied Math. for Eng.**
Principles of measurements and the analysis of experimental data, the basics of electrical measurements and sensing devices, the measurements of pressure, temperature, level, speed, torque, fluid flow and others.			

Course No.	Course Name	C.H.	Pre-requisite
ME 462	**Engineering Measurements and Instrumentations Lab**	**1**	**ME 461 Engineering Instrumentation and Measurements**
The lab contains different topics related to measurements: Principles of measurements and the analysis of experimental data, the basics of electrical measurements and sensing devices, the measurements of pressure, temperature, level, speed, torque, fluid flow and others.			

Course No.	Course Name	C.H.	Pre-requisite
ME ٤٦٦	**Plumbing Systems**	**٣**	**ME ٣٤١ Fluid Mechanics 1**
Learn the fundamentals of pressurized water distribution, sanitary, and storm systems for commercial and residential low-rise buildings. Topics include a general overview of fluids, construction design, plumbing code, pressure flow equations, friction, mechanical pumping, cold and hot water distribution, water heater selection, backflow prevention, and application and system selection.			

Course No.	Course Name	C.H.	Pre-requisite
ME 471	**Mechanical Vibrations**	**3**	**ME 211 Dynamics, EE 203 Advanced Engineering Math I**
Dynamic behavior of mechanical systems under vibration. It will discuss the theory and applications of mechanical vibrations including damped and undamped vibrations for discreet and continuous systems.			

Course No.	Course Name	C.H.	Pre-requisite
ME 472	**Dynamics and Vibrations Lab**	**1**	**ME 471**
Modeling and analysis of oscillatory phenomena found in linear discrete and continuous mechanical systems.			

Course No.	Course Name	C.H.	Pre-requisite
ME 4٧٣	**Automatic Control Systems**	**3**	**EE 203 Advanced Engineering Math I**
The course contain introduction to control systems, representation of engineering systems, open and closed loop systems, the performance of control systems, stability, PID controller & design of control system.			

Course No.	Course Name	C.H.	Pre-requisite
ME 4٧4	**Automatic Control Systems Lab**	**1**	**ME 473 Automatic Control Systems**
This course contains many experiments related to the industrial applications of automatic control systems theory in life such as: Pneumatic systems control, Hydraulic systems control, Analog computer and Process control.			

Course No.	Course Name	C.H.	Pre-requisite
ME 482	**HVAC 1**	**3**	**ME 455 Heat transfer.**
Review of basic concepts, Psychrometry, Human comfort, Heat transfer in residential buildings, Heating load calculation, Cooling load calculation, Duct design, Supply and Return diffusers.			

Course No.	Course Name	C.H.	Pre-requisite
ME ٥٠٧	**Design and Control of Thermal and Hydraulic Systems**	**3**	**ME ٤٥٥ Heat Transfer**
Device design and system design. Quantitative data for system design including operating characteristics of compressors, turbines, heat exchangers, piping systems, internal combustion engines, hydraulic systems and other component equipment. Component matching and system simulation. Optimization including thermo-economic evaluation and energy analysis.			

Course No.	Course Name	C.H.	Pre-requisite
ME ٥٠٨	Mechanical CAD	3	ME306 Mechanical Drawing + ME436 Machine Design 2
Device design and system design. Quantitative data for system design including operating characteristics of compressors, turbines, heat exchangers, piping systems, internal combustion engines, and other component equipment. Component matching and system simulation. Optimization including thermo-economic evaluation and energy analysis.			

Course No.	Course Name	C.H.	Pre-requisite
ME ٥09	Combustion & Internal Combustion Engines	3	ME 507٤٠٥ Heat Transfer
Introduction to types of internal combustion engines, Performance Characteristics of IC Engines, Operation Principles, Method of Approach, Ideal & Actual Cycles, First law application to Combustion, Pollution & Impact on Environment			

Course No.	Course Name	C.H.	Pre-requisite
ME 575	Internal Combustion Engines Lab	1	ME 571 Internal Combustion Engines
Introduction of reciprocating IC engines and Test rig, Performance Characteristics, Operation Principles, Method of approach, Combustion problems, Pollution & Impact on Environment.			

Course No.	Course Name	C.H.	Pre-requisite
ME 585	Graduation Project 1	1	PASS 116 HOURS
Proposal generation of graduation project as a team effort. Design process, project management and decision making.			

Course No.	Course Name	C.H.	Pre-requisite
ME 587	Graduation Project 2	2	ME 585 Graduation Project 1
Continuation of Graduation Project 1. Final product and project deliverables.			

Course No.	Course Name	C.H.	Pre-requisite
ME 589	Engineering Training	3	Passing 115 C.H
Practical training in an engineering office, factory or an engineering project. (For at least eight continuous weeks**.**			

Elective Courses

Course No.	Course Name	C.H.	Pre-requisite
IE 311	**Manufacturing Processes 2**	**3**	**IE 310 Manufacturing processes 1**
Mechanics of metal cutting, cutting conditions, MRR, chip formation and its types , cutting forces, specific energy and power consumed during cutting. Cutting tools with their types, designs, lives, wear, and failures, cutting fluid, surface finish, tool and machine vibration			

Course No.	Course Name	C.H.	Pre-requisite
IE 454	**Industrial Automation**	**3**	**IE 310 Manufacturing Processes 1**
This course contains many subjects related to the industrial control of systems such as: Relay contactors control, PLC control of production lines and robotic systems, CNC Milling and CNC Turning.			

Course No.	Course Name	C.H.	Pre-requisite
ME ٥43	Computer Aided Manufacturing	**3**	**ME ٥٠٨ Mechanical CAD**
Principles of CAE/CAM including engineering drawing, geometric and surface modelling, and feature-based design. Use of CAE/CAM software in CNC programming, sheet-metal design, Plastic Mold design and manufacturing, 3d printing machines and FEM analysis.			

Course No.	Course Name	C.H.	Pre-requisite
ME 534	Robotics and mechatronics systems	**3**	**ME 473 Automatic Control Systems**
This course contains basic introduction to Robotics and mechatronics systems, kinematics, dynamics, trajectory planning, sensors, motion control systems, basics to microcontrollers.			

Course No.	Course Name	C.H.	Pre-requisite
ME 538	Gas Dynamics	**3**	ME 341 Fluid mechanics
Fundamentals of compressible fluid flow (gas dynamics) in relation to effects of area change (nozzles and diffusers), friction and heat interaction (Fanno and Rayleigh lines and isothermal flow), combustion waves (deflagration, explosion and detonation waves), normal and oblique shock waves and their effects on flow properties (extended diffusers and supersonic airfoils). Applications to flow through pipelines, subsonic, sonic and supersonic flights, turbomachinery and combustion.			

Course No.	Course Name	C.H.	Pre-requisite
ME 539	Renewable Energy Systems Design	**3**	ME 455 Heat transfer
The Renewable and Sustainable Energy Systems course provides a graduate-level understanding of the conversion principles and technology behind various renewable energy sources. It also examines the issues involved in the integration of various renewable energy sources and their economics for heat, power, and transportation needs. Based on the technical and sustainability challenges, the future outlook for each of the sources and systems is discussed. This is a required core course for the Master of Professional Studies in Renewable Energy and Sustainability Systems Program.			

Course No.	Course Name	C.H.	Pre-requisite
ME 540	Fire Fighting Systems Design	**3**	ME 341 Fluid mechanics
The course covers the following topics: Fire protection survey procedure; underground piping design procedure; automatic sprinkler systems; basic hydraulic; hydraulic calculation of sprinkler systems; standpipe system; fire pump calculations.			

Course No.	Course Name	C.H.	Pre-requisite
ME572	**Thermal Power Plants**	**3**	**ME223 Advanced Engineering Mathematics 2 and ME341 Fluid Mechanics I**
This course is concerned with the types, construction, working principles and performance of different types of conventional and non-conventional power plants. The design, construction, operation, and performance of various components of steam, gas, and diesel power plant. It also discusses the basics of nuclear energy and operation of nuclear power plants. The course also covers basics of plant economics and the impact of power plants on the environment.			

Course No.	Course Name	C.H.	Pre-requisite
ME594	**Special Topics in Mechanical Engineering I**	**3**	**4th year level**
Special advanced topics selected from various subjects in mechanical engineering.			

Course No.	Course Name	C.H.	Pre-requisite
ME597	**Special Topics in Mechanical Engineering II**	**3**	**5th year level**
Special advanced topics selected from various subjects in mechanical engineering.			

Support Mandatory Courses from other departments

Course No.	Course Name	C.H.	Pre-requisite
IE 310	**Manufacturing Processes 1**	**3**	**ME 205 Engineering Material**
The basic fundamentals of some Manufacturing processes by which materials can be shaped into useful products are described. These bulk deformation processes include (forging, rolling, extrusion, rod and wire drawing) and sheet-metal deformation processes such as (blanking, deep drawing and bending)..			

Course No.	Course Name	C.H.	Pre-requisite
CE 221	**Statics**	**3**	**Physics (PHYS1120)**
Force vectors and resultant, free body diagram of forces and equilibrium of particles and rigid bodies. Moment of a force about a point and about an axis . Analysis of trusses and frames. Shear forces diagrams and bending moment diagrams. Centroids and moment of an area.			

Course No.	Course Name	C.H.	Pre-requisite
PE 200	**Principles of Electrical Engineering.**	**2**	**PHYS 220 General Physics II**
Circuit laws, Series and parallel circuits, Loop analysis, Nodal analysis, Super-position, Source transformation, Thevenin Theorem, Introduction to alternating current, RL, RC, and RLC Circuits.			

Course No.	Course Name	C.H.	Pre-requisite
PE 334	**Principles Electrical Machinery**	**2**	**PE 200 Principles of Electrical Engineering.**
Introduction to electromagnetic theory , Magnetic field , Ampere law, magnetic flux density , magnetic circuit, Faradays Law , Lenz law.			

Course No.	Course Name	C.H.	Pre-requisite
PE 335	**Principles Electrical Machinery Lab**	**1**	**PE 334 Principles Electrical Machinery**
Introduction to laboratory equipment and machinery, single phase transformer, 3-phase transformer, DC generators and motors , ac machines, Induction motors single and three phase.			

Course No.	Course Name	C.H.	Pre-requisite
EE203	**Advanced Engineering Mathematics I**	**3**	**EE 112 Calculus 2**
Ordinary Differential Equation (ODE), ODE using Laplace transform. Matrices and matrix operations. Linear systems using Gauss Elimination and Cramer's rule.			

Course No.	Course Name	C.H.	Pre-requisite
EE 302	**Numerical Analysis**	**3**	**EE 201 Computer Skills II**
Introduction to approximation techniques, linear and nonlinear equations, interpolation and curve fitting, and numerical differentiation and			

Course No.	Course Name	C.H.	Pre-requisite
EE220	**Engineering Analysis**	**3**	**EE 112 Calculus II**
Vector algebra, artesian, cylindrical and spherical coordinated systems, vector calculus includes line, surface and volume integral. Gradient of a scalar field. Divergence and curl of a vector field. Stokes's Theorem. Fourier series, Partial differential equations.			

Course No.	Course Name	C.H.	Pre-requisite
CHEM 130	**General Chemistry**	**3**	**-**
Fundamentals of chemistry including states of matter, atomic structure, bonding and molecular structure, chemical reaction. Reaction stoichiometry, rate of chemical reactions, equilibrium, thermodynamics and thermo chemistry.			

Course No.	Course Name	C.H.	Pre-requisite
CHEM 131	**General Chemistry lab**	**1**	**CHEM130 General Chemistry**
moles, molar ratio, empirical formula, titration calculations, calorimetric methods of analysis, equilibrium shifts, kinetics of a chemical reaction, properties of aqueous solutions.			