

Course Description Catalog

Engr 100- Introduction to Engineering 1(1,0,0)
Course Description (catalog): This course introduces engineering to students, particularly those who are interested in an engineering profession. It covers engineering ethics, teamwork, communication skills, engineering topics, and engineering problem solving skills and design methodology.

Engr 105- Engineering Computing Skills 2(2,0,0)
Course Description (catalog): Problem solving skills and computing using Matlab

Engr 106- Engineering Graphics 2(1,3,0)
Course Description (catalog): An introductory course in engineering graphics focuses on graphical communication. Topics include descriptive geometry elements, visualization, engineering drawing techniques, orthographic projection, pictorial representation, section views, and basic dimensioning. The course incorporates computer aided drafting (CAD) with engineering applications using 2-D drawing. This course is divided in to two sections: drafting (sketching) and CAD. The course begins by teaching the basics of engineering graphics using sketching. Freehand sketching using only a pencil and paper is an important skill for any engineer. It is a means of quickly conveying technical information to others. Through sketching the concepts of pictorial projections, section views, auxiliary views and dimensioning are taught. Once the foundation of engineering graphics is known, these concepts can be applied using computer aided design (CAD) software. AutoCAD is a drawing software package used to create two dimensional engineering drawings.

Engr 201-Statics 3(3,0,0)
Course Description (catalog): The subject of Statics deals with forces acting on rigid bodies at rest covering coplanar and non-coplanar forces, concurrent and non-concurrent forces, friction forces, hydrostatic forces, centroid and moments of inertia. Much time will be spent finding resultant forces for a variety of force systems, as well as analyzing forces acting on bodies to find the reacting forces supporting those bodies. This course also shows how to find the internal forces in structural elements and how they get the centroid and inertia for areas. Students will develop critical thinking skills necessary to formulate appropriate approaches to problem solutions.

Engr 202-Strength of Materials 3(3,0,0)
Course Description (catalog): The course covers strength of materials in depth including the followings: Basic Concepts in Strength of Materials, Direct Stress, Strain, Axial Deformation and Thermal Stress, Torsion, Transverse Shearing Forces, Bending Moments in Beams and Stress Due to Bending, Shearing Stresses in Beams, Combined Stresses and Pressure Vessels, Stress Transformations, Deflection of Beams, Columns.

Engr 203-Dynamics 3(3,0,0)
Course Description (catalog): Fundamentals of particle and rigid body dynamics. Kinematics and kinetics of a single particle and system of particles. Application of Newton's laws and energy and moment principles in solving problems involving particles or rigid bodies in planar motion. Introduction to kinetics of rigid bodies in three dimensions, angular acceleration, angular momentum, instantaneous centre, mechanical vibrations of simple spring-mass systems.

Engr 205-Materials Science 3(3,0,0)
Course Description (catalog): Mechanical, electrical and chemical properties of engineering materials, fundamentals of crystallography, crystal defects, Impurities and imperfections in solids. Atomic diffusion. Single-phase metals and alloys; elastic and plastic deformation, recrystallization and grain growth. Multi-phase materials; phase diagrams and equilibrium microstructural development, Heat treatment process, Studies of the widely used engineering metals, alloys, polymers, composites & ceramics.

Engr 206-Electric Circuits 3(3,0,0)
Course Description (catalog): Resistors, capacitors, inductors, currents; voltages; power and energy; circuit analysis techniques; DC and AC analysis; magnetic circuits and transformers; Introduction to DC and AC machines.

Engr 209-Strength of Materials Lab 1(0,3,0)
Course Description (catalog): Strength of materials lab contains many equipments that can be utilized to introduce the most important concepts of materials and its ability to withstand external loads without failure which is the base of machine and components design. On the other hand strength of material lab will support student information in materials and its properties and strength of materials and types of loadings and types of stresses induced in members due to this loadings. The most important experiments in the field of strength of materials like tensile test, compression test, torsion test, Fatigue test, Hardness test, impact test, and creep test will be discussed.

Engr 307-Engineering Economics 3(3,0,0)
Course Description (catalog): The course covers the following topics: Engineering Economic Decisions; Understanding Financial Statements; Cost Concepts and Behaviors; Time is Money; Understanding Money and Its Management; Principles of Investing; Present Worth Analysis; Annual Equivalent Worth Analysis; Rate of Return Analysis; Depreciation; Taxes; Break-Even Analysis, Cost Estimation; Developing Project Cash Flows; Inflation; Replacement Decisions.

Engr 309-Fluid Mechanics 3(3,0,0)
Course Description (catalog): The course addresses flow classification, fluid properties, fluid in statics, pressure measurements, buoyancy, fluids in motion, continuity equation, pressure gradient in fluid flow, Bernoulli's, Reynold's transport theorem, momentum and energy equations, dimensional analysis and similitude, an introduction to the hydrodynamic boundary layer, and the flow in conduits.

Engr 310-Numerical Methods For Engineering 3(3,0,0)
Course Description (catalog): Introduction to Numerical Methods, Solution of Nonlinear Equations, Solution of Simultaneous Linear Algebraic Equations, Solution of Matrix Eigenvalue Problem, Curve Fitting and Interpolation, Numerical Differentiation, Numerical Integration, Ordinary Differential Equations: Initial-Value Problems, Ordinary Differential Equations: Boundary-Value Problems.

Engr 312-Fluid Mechanics Lab 1(0,3,0)
Course Description (catalog): Conduct experiments in teams, analyze data, and communicate experimental results in written technical reports in order to improve student knowledge and understand of basic concepts of fluid mechanics, experiments done on equipment such as Hydrostatic Bench, Orifice and Jet Flow Apparatus, Bernoulli's Theorem Apparatus, Impact of Jet Apparatus, Piping Loss Test Panel, Open Circuit Wind Tunnel, Turbine Service Unit, Series/ Parallel Pumps, Variable Slope Channel.

Engr 399-Engineering Training (0 credits)
Course Description (catalog): All engineering students are required to undergo a comprehensive "Engineering Training Program" with a reputable and specialized industrial firm. The firm can be in or outside Saudi Arabia relevant to his major area of interest in engineering analysis, design, or construction. The main purpose of this summer training is to enhance the students' practical experience and career abilities. Also, it deepens their engineering knowledge acquired during their academic years in the field of practical experience in real-life engineering projects. Additionally, such a program improves the relationship between the College of Engineering and the governmental and private industrial firms. Also, it can provide the industry with well-trained professionals in the near future. The qualifying student should spend at least eight weeks in a governmental organization, a reputable industrial firm, or a research center that is involved with engineering activities. Prerequisite(s): Department Approval

Engr 133-English Composition I 2(2,0,0)
Course Description (catalog): This is an intermediate level writing class. Students are guided through the stages of the writing process to write paragraphs that are both meaningful and organized, and include a topic sentence with a controlling idea, supporting details, and a conclusion. Students write multi-draft compositions for a variety of practical and academic purposes. Students improve their writing by studying model sentences and paragraphs, basic sentence patterns, mechanics, coordinating conjunctions, transitions and vocabulary.

Engr 134-English Composition II 2(2,0,0)
Course Description (catalog): This course develops writing skills from the paragraph level to the level of the essay. It concentrates on the essential form and function of the writing unit (paragraph or essay) in order to prepare the ground for the academic essay. Specific types of composition are practiced: chronological, cause-effect, comparison/contrast and argumentation. In addition, work on paraphrase and summarizing is undertaken, along with back-up work in some specific structure areas.

Engr 137-Technical Writing 2(2,0,0)
Course Description (catalog): This course introduces students to the fundamentals of writing, designing and conveying technical information to different audiences. Students will learn about technical writing conventions, such as organization, style and tone and illustration and layout as they work through the writing process to produce a variety of common technical documents that they will encounter in their academic work.

Engr 138-Fundamental of Speech Communication 2(2,0,0)
Course Description (catalog): A study of communication theories as applied to speech; practical communicative experiences ranging from interpersonal communication and small-group process through problem identification and

solution in discussion, to informative and persuasive speaking in standard speaker-audience situations.

Chem 140-General Chemistry I 3(3,0,0)

Course Description (catalog): Matter properties and measurement, Atoms and the Atomic Theory, Chemical Compounds, Chemical Reactions, Reactions in Aqueous Solutions, Liquids Solids and Intermolecular Forces, Electrons in Atoms, Periodic Table and Atomic Properties, Chemical Bonding, Valence-Bond, Hybridization of Atomic Orbital, Multiple Covalent Bonds, Molecular Orbital Theory, Liquids and Solids.

Chem 142-General Chemistry II 3(3,0,0)

Course Description (catalog): Properties of Gases: Kinetic-molecular theory of gases, Ideal gas law, Mixtures of gases, Thermo- chemistry, Principles of Chemical Equilibrium, Acids and Bases, Buffer Solutions, Neutralization Reactions and Titration Curves, Solubility and Complex-Ion Equilibria, Spontaneous Change: Entropy and Free Energy, Thermodynamic, Solutions and Their Physical Properties, Chemical Kinetics and Electrochemistry.

Chem 143-General Chemistry Lab 1(0,3,0)

Course Description (catalog): Laboratory safety rules and Evaluation of analytical data, Definition and determination of density, explanation and determination of specific heat, concept of Acids, bases and Heat of Neutralization Reaction and its determination, reversible reactions, concept of equilibrium constant and its determination, Le Chatelier principle and its verification, principle involved in Acid base titrations, indicators, Ionization of electrolytes, determination of dissociation constant of weak acid(K_a), principle involved in complexometric titrations, hardness of water and its determination.

CS 204-Engineering Programming 3(3,0,0)

Course Description (catalog): Introduction to computer systems; problem solving methodology; testing and debugging of programs; variables, declarations, and assignments; input and output; data types; control flow and looping; functions and overloading; streams and input/output; one-dimensional arrays; two-dimensional arrays; pointers and dynamic arrays; structures; abstract data types and classes; inheritance; friends, overloaded operators, and arrays in classes; recursive functions. Three lectures per week. Projects that will require lab work will be assigned weekly.

Deic 101-Islamic creed and contemporary doctrines 2(2,0,0)

Course Description (catalog): Creed: definition, importance, sources, characteristics, study methodology, pillars of faith, influence of creed on individuals and society, belief nullifiers, thought constraints, Study of some contemporary doctrines: secularism, Satan worshipers, Baha'ism, Zionism, Misoneism, Christian fundamentalism. Student is required to memorize part of the holy Quran.

Deic 301-Contemporary Culture Issues 2(2,0,0)

Course Description (catalog): Moderation, Islam globalism and human ties, discrimination and nationalism, Arabic as the medium of education and culture, science and religion, interfaith dialogue, Orientalism and Christianization, Colonialism, Westernization, modernity in literature, Globalization, Terrorism, Development of Moslem nations. Student is required to memorize part of the holy Quran.

Deic 317 Islamic Morals and Ethics 2(2,0,0)

Course Description (catalog): Morals (Ethics: definition and foundations, characteristics, study of model samples of the Prophets' morals and ethics, tools of moral/ethical education in Islam. Concept of profession and its importance in human life, constituents of professional morals/ethics and its constraints, model samples of professional morals/ethics in Islam. Student is required to memorize part of the holy Quran.

Deic 318 Economic System in Islam 2(2,0,0)

Course Description (catalog): Islamic Economy: (its nature and principles, development, and characteristics), the economic problem and how to face it, contemporary economic systems (capitalism, socialism), economic globalism, World Bank and its goals, World Trade Organization and its goals, ownership in Islam: definition, types, constraints. Islam and economic freedom, Production, distribution, expenditure, economic policies in contracts and transactions. Student is required to memorize part of the holy Quran.

Deic 401 Social System in Islam 2(2,0,0)

Course Description (catalog): Society: definition, building blocks of society in Islam, Islamic society attributes, Family in Islam: definition, status, importance, building blocks, marriage and its purposes, spouses' rights, parents, siblings, and relatives' rights, women's status and rights in Islam, Family controversial issues about family system in Islam and responding to those issues (polygamy, inheritance, veil, divorce,...), Family problems and

remedies (women's work, alimony, stewardship, ...). Student is required to memorize part of the holy Quran.

Deic 418 Political System & Human Rights in Islam 2(2,0,0)

Course Description (catalog): Political system: definition, characteristics, State building blocks: homeland, society, authority, goals of state, foundations of state, principles of ruling in Islam, ruler selection, ruler duties, state authority, rights of Moslems and non-Moslems in the Islamic state, Manifestations of implementing the political system in KSA: Governance statute, Shura, judiciary system, security, Hisbah. Human rights in Islam: definition, significance, sources, constraints, Basic rights: (equality, freedom, life, justice, safety), Universal/International Declaration of Human Rights and position of KSA from it, Students are required to memorize part of the holy Quran.

Math 144-Calculus I 4(4,0,0)

Course Description (catalog): This is an introductory course of mathematics for college of engineering students. The course covers the basic concepts and methods of calculus. At the beginning of the course the instructor will provide students the knowledge of the number systems, algebraic operations and functions of single variable with domain and range so that students can learn differentiation of the functions. The main topics to be covered in this course include: Limits, Continuity, Differentiation of functions of a single variable, Exponential, Logarithmic, Trigonometric, Inverse trigonometric functions, Applications of derivatives, Differentials, Curve Sketching, L'Hospital Rule, Mean value theorems, Area and estimating with finite sums, Introduction to integrals and definite integrals.

Math 145-Calculus II 4(4,0,0)

Course Description (catalog): This is an intermediate level calculus course designed for undergraduate Engineering students. This course covers mainly the integration and basic principles of Vectors and their applications. At the beginning of this course, the instructor will give the review of differentiation and integration. In depth, the students will learn the methods of integration and vectors. The topic covered include, Techniques of Integration, Improper Integration, Applications of Integration, Infinite Sequences and Series, (Power series and Taylor series), Polar coordinates, Transcendental Functions, Vectors, Vector Valued Functions.

Math 240-Differential Equations 3(3,0,0)

Course Description (catalog): This course is an introductory course of differential equations for college of engineering students. The course covers different methods and concepts to solve first and second order differential equations. At the beginning of the course we discuss some definitions and terminology about differential equations. Then we move to solving first and second order differential equations. The topics in this course include, linear differential equations, solving first order differential equations, solving second order differential equations, series solutions of second order linear differential equations, solving systems of linear differential equations, Laplace transform and its applications in solving differential equations.

Math 244-Multivariate Calculus 3(3,0,0)

Course Description (catalog): This course is an advanced course in calculus, designed for undergraduate students of engineering. The course covers the basic principles and methods of differentiation and integration of two or more variables. At the beginning of the course, the Instructor will give a review of functions of one variable and its differentiation and integration. Then, the functions of two or more variables with domain and range will be discussed. Throughout the course, the following main topics will be covered: solid analytic geometry; vector calculus; partial derivative; and multiple integrals. The coverage will also include relevant and important applications in the sciences and engineering.

Math 246-Linear algebra 3(4,0,0)

Course Description (catalog): Linear Transformations, Finite dimensional vector spaces, Matrices, Determinants, Systems of linear equations, Applications to areas such as Linear programming, Markov chains, and Differential equations.

Phys 140-General Physics I 3(3,0,0)

Course Description (catalog): The course is an introduction to units, measurements, motion in one and two dimensions, kinematics and dynamics, Newton's laws, work and energy, rotational dynamics, linear and angular momentum, torque, and collisions. Basic calculus and multi-variable algebra will be used.

Phys 141-General Physics II 3(3,0,0)

Course Description (catalog): This course introduces students to the physics of electricity and magnetism and the connections between them. The concepts of electric charge, electric field, electric potential, Kirchhoff Law, Gauss Law, electric and magnetic fluxes, capacitance, resistivity and

resistance, connections in series and in parallel, RC-circuit, magnetic field, magnetic force, magnetic and electric torques, Ampere Law, electromagnetic induction, and Faraday Law and Lenz Law will be taught.

Phys 144-General Phys I Lab 1(0,3,0)
Course Description (catalog): Measure basic constants such as length, weight and time, value of acceleration due to gravity. Design and conduct experiments in mechanics. Analyze and interpret experiment data. Write a scientific report. Draw and interpret a graph. Apply experimental principles and error calculations to mechanics.

Mgt 292-Management fundamental & Skills 3(3,0,0)
Course Description (catalog): The course covers Management fundamentals & Skill, such as, Global Management - Change and Innovation - Appendix: Managing Entrepreneurial Ventures - Decision Making - Strategic Management - Module Planning Tools and Techniques - In class discussion: Ethics Dilemma - Operations Management - Marketing Management - E Business - Marketing Plan - Human Resource Management - Team Building - Foundations of Individual Behaviour- Communication .

ME 102-Mechanical Drawing I 1(0,3,0)
Course Description (catalog): Computer-aided solid modeling concepts, Modeling 3D geometries using solid modeling techniques, Combination of solid modeling techniques to create complex parts, Assembly of 3D parts to form a machine or complete mechanical system, Generating multi-view engineering drawings for 3D parts or assemblies.

ME 202-Thermodynamics I 3(3,0,0)
Course Description (catalog): Thermodynamics concepts and definitions, states, properties, systems, control volume, processes, cycles, units, tables of properties, work and heat, first law, internal energy and enthalpy, conservation of mass, steady-state and uniform state processes, second law, reversible processes, entropy, Clausius inequality, principle of the increase of entropy, efficiencies, irreversibility and availability, power and refrigeration cycles.

ME 203-Thermodynamics II 3(3,0,0)
Course Description (catalog): Basic laws and principles applications to gas power and refrigeration cycles, vapor and combined power cycles, mixtures of gases and vapors, psychrometry, chemical reactions, thermodynamic property relations, and exergy analysis.

ME 204- Thermodynamics Lab 1(0,3,0)
Course Description (catalog): The course covers a wide range of experiments related to thermodynamics concepts. First law of thermodynamics and some thermodynamic relations are investigated. Measure of some fuels properties like calorific value. Thermodynamics cycles will be investigated like Refrigeration, Rankine, Brayton, and Stirling cycle. Compression and expansion of air will be studied. The performance of the solar collector will be investigated. Many parameters will be measured in the internal combustion engines.

ME 206-Measurements & Instrumentations Lab 2(1,3,0)
Course Description (catalog): Introduction to measurement systems and experimental methods, basic concepts, calibration, dynamic response, analysis of experimental data, basic electrical measurements and sensing devices, displacement measurements, pressure measurement, flow measurement, temperature measurement, force, torque and strain measurements. Also some experiments will be conducted.

ME 312-Mechanical Vibrations 3(3,0,0)
Course Description (catalog): This course covers fundamentals of theory and analysis of mechanical vibrations, simple harmonic oscillator, complex phasor representation of harmonic motion, elements of a vibrating system, review of model formulation using Newton's laws and work-energy method, equivalent inertia, spring and damper for lumped parameter and continuous systems, natural frequency and damping ratio, undamped and viscous and dry friction damped free vibrations of SDOF oscillators, Rayleigh-Ritz method, static and dynamic stability vibration of mechanical systems, logarithmic decrement, response of SDOF oscillators to direct harmonic, rotating unbalance, base motion, periodic, transient I and non-periodic loads, vibration instrumentation and isolation. Free and forced vibrations of Two DOF systems. Lagrange's equation. Normal modes and principal coordinates, tuned vibration absorber, introduction to vibration of continuous systems, wave equation and Euler-Bernoulli beam bending vibrations.

ME 325-Heat Transfer 3(3,0,0)
Course Description (catalog): The course addresses the mechanism of heat transfer modes, introduction to conduction, the thermal conductivity of solids, diffusion equation, heat transfer in fins and extended surfaces, multi-dimensional steady-state conduction, transient conduction, lumped

capacitance method, introduction to convection, forced convection, natural convection, hydrodynamic and thermal boundary layers, forced convection external flow, heat exchangers, an introduction to basic radiation.

ME 331-Theory of Machines 3(3,0,0)
Course Description (catalog): Theory of Machines and Mechanisms is a study of linear and angular displacements, velocities, accelerations of points and bodies, and the static and dynamic forces required for the proper design of mechanical linkages, cams systems. The course covers both static force analysis of mechanisms and dynamic analysis of linkages. Mechanisms and applications, vector method of analysis of plane mechanisms, mobility and linkages, cams, position, velocity and acceleration analysis in mechanisms. Static and dynamic balancing and balancing machines, flywheels, and reciprocating engines.

ME 332-Design of Machine Elements 3(3,0,0)
Course Description (catalog): Design of mechanical elements: Initially students will be familiarized with some concepts and definitions, and then they will be introduced to general considerations & procedure of machine design: general principles of machine design, static strength and failure theories, fatigue strength and failure theories. Finally, the students will be introduced to the basic design principles of some machine elements and their selection; shafts, power screws, fasteners, and mechanical springs, bearings; spur and helical gears; flywheels, clutches and brakes. Also, the students will be introduced to the ethical and social impacts of mechanical design.

ME333-System Dynamics 3(3,0,0)
Course Description (catalog): This course introduces students to basic theory and practices of formulation, simulation and analysis of approximate linear discrete mathematical models for mechanical, electrical, fluid, thermal and electromechanical systems, identification of elements of mechanical, electrical, fluid and thermal systems, elements constitutive relations and governing physical laws. analytical solutions of first and second order systems, simulations using MATLAB and SIMULINK, Laplace Transforms applications, transfer function state space representations, and frequency response.

ME 420-Design of Thermal Systems 3(3,0,0)
Course Description (catalog): Designing of a workable thermal system, modelling of thermal equipment, system simulation and optimization, thermodynamic properties and steady-state simulation of large systems. Thermal systems and other related topics in the Saudi Arabian industry.

ME 421-Internal Combustion Engines 3(3,0,0)
Course Description (catalog): Engine classifications and terminology. Engine operating characteristics and performance parameters. Air standard engine cycles including: Otto, Diesel, Dual and two-stroke cycles. Common fuels used in IC engines, combustion reactions and the associated thermochemical calculations. Engine emissions and their control technologies and strategies. Air and fuel induction methods and technologies, the physics of the combustion phenomena. Friction losses, lubricants and lubrication systems.

ME 422-Air Conditioning and Refrigeration Systems 3(3,0,0)
Course Description (catalog): Review of psychrometry. Air conditioning processes. Thermal comfort, Inside and outside design conditions. Ventilation and infiltration. Heating load calculations. Cooling load calculations. Water heating systems layout and design. Air systems design. Refrigeration systems classification. Theoretical and actual vapor compression cycles. Description of different types of expansion valves. Refrigeration load calculations. Absorption chillers.

ME 423-Renewable and Solar Energy 3(3,0,0)
Course Description (catalog): Introduction to energy use and renewable energy sources, Non-conventional energy sources such as nuclear, hydrogen, renewable: solar, wind, wave, fuel-cell and advanced energy systems.

ME425-Mechanical System Lab 1(0,3,0)
Course Description (catalog): The course covers experiments to understand some basic concepts of heat transfer, refrigeration systems, special humidity sensor and vibration module. and make students familiar as much as possible with the devices by getting readings, analyzing the results then comparing with the theoretical calculations for each experiment, and find the differences between the results of the experiments and the theoretical values, then trying to find the basic technical reasons of these differences,

ME 426-Energy Conversion 3(3,0,0)
Course Description (catalog): Energy classification, sources and utilization, energy growth and economics, fossil fuels, combustion, power plants and steam generators, boiler's performance, pollution, energy conversion systems and energy storage.

ME 427–Turbomachinery **3(3,0,0)**
Course Description (catalog): Turbomachinery classifications and terminology. Implementation of dimensional analysis for predicting performance of turbomachines and designing engineering systems. Understand the fundamentals of energy transfer between rotating rotors and fluid flow. Demonstrate the ability to construct velocity diagrams for various turbomachines (axial-flow compressors and turbines, radial-flow compressors and turbines, pumps, fans, blowers, hydraulic turbines) and their relation to design. Perform elementary analysis for determining input/output work of various turbo devices. Turbomachinery emissions and their control technologies and strategies. Design and selection of turbomachines for various engineering applications.

ME 430–Computer Aided Design **3(3,0,0)**
Course Description (catalog): This is a senior-level mechanical engineering course. It exploits the general experience that the students have accumulated throughout the course of their studies. It also introduces students to the analytical basis to CAD software and the three main ways to represent an entity, namely wireframe, surface and solid modelling. The course can be broken down into three main stages. The first stage of the course aims at introducing the concept and importance of CAD as part of the design process. The second stage focuses on mathematical representation and manipulation of geometrical entities. The final stage discusses current applications of CAD in academic and industrial fields, especially ones related to the instructor's field of expertise.

ME431–Finite Element Method **3(3,0,0)**
Course Description (catalog): Definitions and simple finite element formulation, truss, beam, quadrilateral elements, modelling principles and mesh specification, some computer applications in mechanical engineering. Familiarities with windows operating system are essential. Knowledge of numerical methods is strongly recommended.

ME441–Control Systems **3(3,0,0)**
Course Description (catalog): This course introduces the basics of theory of analysis and design of linear feedback control systems, reviews of formulation of linear lumped parameters mathematical models of mechanical, electrical, fluid, thermal and combined systems, block diagrams and state space representations, poles and zeros of transfer function, Block diagram reduction, Mason's gain formula, solution of state equations and state transition matrix, 1st and 2nd order systems response specifications time constants, overshoot, rise and settling times and steady state errors, Routh-Hurwitz stability criterion, system types and static error coefficients, PID control actions and lag-lead compensators frequency response function and Bode plots, Nyquist stability criterions, phase and gain margins, Root Locus design, simulation using MATLAB tool boxes

ME 442-Mechatronics **3(3,0,0)**
Course Description (catalog): The mechatronics course provides the student with a general overview of an integrated electromechanical system, which employs analog and/or digital electronics for sensing, actuation and control. Microprocessor based control systems are given special attention and are covered in detail. An important objective of the course is to demonstrate the integration of measurement systems, control, electronics, programming and mechanics in designing competitive systems. The practical assignments and the project work are designed to enhance planning and team skills.

ME 445–Robotics **3(3,0,0)**
Course Description (catalog): Kinematics modelling and simulation of various robot manipulators, rotation matrix, direct/inverse kinematics and dynamics modelling of robotic systems. Introduction to motion control systems, different control schemes and comparison, stability analysis, joint/configuration spaces; interaction control, impedance/compliance/force control, trajectory planning and control, actuators and sensors for robotics applications.

ME460–Manufacturing Processes **3(3,0,0)**
Course Description (catalog): Metal casting, forming and chip removal processes, cutting tools, cutting fluids, forces and power. consumption. Investigation of conventional and non-conventional manufacturing processes.

ME 467–Nanotechnology **3(3,0,0)**
Course Description (catalog): Nanotechnology is a course that deals with Nano-materials, which is an interdisciplinary introduction to processing, structure, and properties of materials at the nano-meter length scale. The course will cover recent breakthroughs and assess the impact of this promising field. Specific nanofabrication topics include epitaxy, beam lithographies, self-assembly, biocatalytic synthesis, atom optics, and scanning probe lithography. The unique size-dependent properties (mechanical, thermal, chemical, optical, electronic, and magnetic) that result from

nanoscale structure will be explored in the context of technological applications including computation, magnetic storage, sensors, and actuators

ME 481-Undergraduate Research I **3(3,0,0)**
Course Description (catalog): Individual research projects for students, Requires prior approval of, and arrangement with, a faculty research advisor. Prerequisite: Dept. Approval.

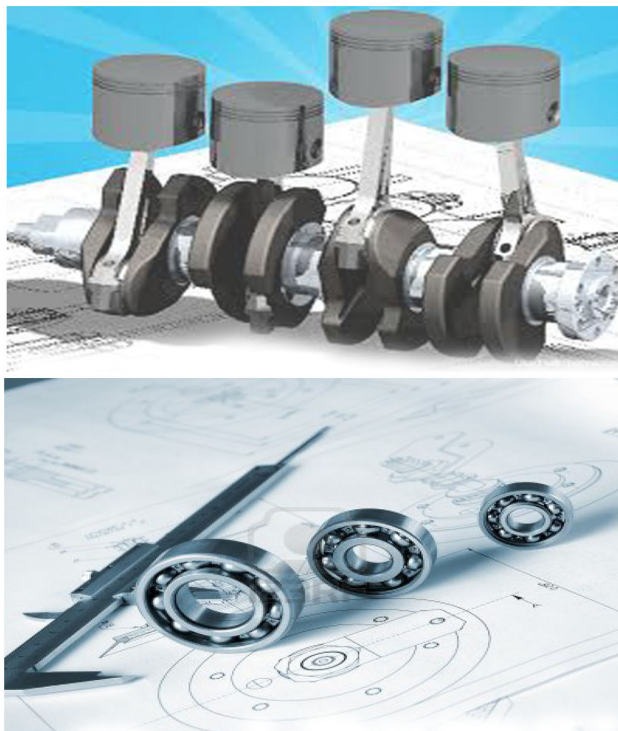
ME 482-Undergraduate Research II **3(3,0,0)**
Course Description (catalog): The second part of ME481. Prerequisite: ME481.

ME 484-Special Topics I **3(3,0,0)**
Course Description (catalog): Topics determined by the course instructor in consultation the department chair. Prerequisite: Dept. Approval.

ME 485-Special Topics II **3(3,0,0)**
Course Description (catalog): The second part of ME484. Prerequisite: ME484.

ME 495-Senior Design I **2(1,0,1)**
Course Description (catalog): Planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. The course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution to his project problem.

ME 496-Senior Design II **2(1,0,1)**
Course Description (catalog): Completion of Senior Design I in planning, design, construction and/or management of an engineering project that handles contemporary engineering problems under the supervision of one or more faculty members. Similar to ME 495 the course allows the student to apply the knowledge attained from the various courses of the undergraduate program to prepare the proper approach of solution and completion to his engineering project.



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