

FACULTY OF ENGINEERING

List Of Courses Offered For University Of Malaya

Student Exchange (UMSEP) for the 2017/2018 Academic Sesion

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
1.	KIA1001	DRAWING FOR CIVIL ENGINEERS & COMPUTER PROGRAMMING	-	3	/			<p>This course gives introduction to civil engineering drawings such as buildings, walls, foundations, floors, staircases, roofs, trusses, doors, windows, etc. The basics of engineering drawing utilising free hand sketching, and computer aided drafting (Auto CAD) are covered. The fundamental principles of sectional views and isometric views are taught. The student will be able to use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions. The course also gives introduction to the process of computer programming. Basic programming tools and programming procedures are covered. Development of computer codes to solve mathematical and engineering problem are included. This is followed by running the complete computer program codes on PC and finally demonstrating how the developed program can be used to solve a</p>	-

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								particular problem.	
2.	KIA1002	ENGINEERING MECHANICS	-	3	/			The course starts off with introduction to force system and equilibrium; internal forces in structural members and analysis of planar and space trusses. It follows with beam analysis and construction of shear force and bending moment diagrams. Then, the principle of strain energy and virtual works are introduced to calculate the deflection of structures. Finally, the analysis of planar kinetics of rigid bodies and properties of section will be covered in this course.	-
3.	KIA1003	CIVIL ENGINEERING MATERIALS	-	3	/			Introduction to construction materials, Properties of cement and aggregates, Design of concrete mixes, Properties of fresh and hardened concretes, Mechanical, physical and chemical properties of other civil engineering materials, including bricks and blocks, metal and alloys, timber, polymer and fiber-reinforced composites.	-
4.	KIA1004	MECHANICS OF MATERIALS	-	3		/		This course starts off with analysis of stresses, strains and deformation of beams and columns. It follows with torsional theory and formula for circular and non-circular sections together with shear flow and shear centre for beams	-

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								and thin-walled members. Then, it covers the analysis of stress and strain transformations. The course ended with plastic analysis method.	
5.	KIA1005	ENGINEERING SURVEY	-	3		/		The importance and objective of survey works to civil engineers. Basic principles in measurement. Survey concept from whole to parts. Summary of mapping system in Malaysia. Basic elements of a theodolite. Test, use and correction of errors of a theodolite. Procedure of traversing by theodolite, observation, booking, reduction and adjustment of data. Sources of errors in theodolite traversing works and steps required to remove them. Computation of coordinates and area by coordinate method. Principles of levelling. Equipment of levelling. Test and adjustment of a level instrument. Work procedure on levelling, reading, booking and reduction of data. Sources of error in levelling and methods to eliminate them. The theory and principle of stadia method. Measurement by stadia method for horizontal sight distance. Measurement by stadia method for not horizontal sight distance. Substense Bar	-

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								method, Optical Wedge and automatic reduction system. Contour and taking details by tacheometry. Errors in tacheometry works. Principles of planimeter and its usage. Area enclosed by straight lines, coordinate method, bearing method and distances. Computation of area of irregular figures. Trapezoidal and Simpson's rules for computation of area. Computation of earthwork by cross and longitudinal section. Volume by "mean areas" and "end areas, '. Volume based on "prismoidal" formulae. Effect of curvature in computation of earthwork volume based on Pappus's Theorem. Volume from contour and spot levels. Design of circular curve, transition curve and vertical curve. Computation for setting out curve at field. Equation of transition curve. Methods for setting out curve; tape method, two theodolite method and method using control remote station. Problems with sighting distance at field.	
6	KIA2001	THEORY OF STRUCTURE	KIA1002, KIA1004	3	/			The course began with the topic of slope and deflection of statically determinate beams, frames and trusses using Double	-

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					Sem 1	Sem II	Special Sem		
								Integration's, Macaulay's, Moment-Area and Castigliano's Theorem. It is followed by the analysis of statically indeterminate trusses, beams and frames using Slope-Deflection, Moment-Distribution and Flexibility methods. The next topics are moving loads and influence lines, followed by Yield Line Analysis.	
7	KIA2002	SOIL MECHANICS	-	3	/			The course introduces soil as engineering material. It includes an introduction on soil formation and its physical characteristics. Also, includes identification, classification and description of soil for engineering purposes. Application of mechanics on soil such as compaction, permeability and seepage, stresses and effective stresses are also covered. Compressibility and consolidation of soils, one-dimensional consolidation theory and characteristics, consolidation tests, estimation of the magnitude and rate of consolidation settlement. Shear strength of soils, shear strength characteristics, types of shear strength tests, residual shear strength	-
8	KIA2003	FLUID MECHANICS		3	/			This course aims to introduce the fluid	-

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					Sem 1	Sem II	Special Sem		
								mechanics and establish its relevance in civil engineering. It starts with the definition of fluid properties, Pascal law and pressure measurement. The underlying concept of fluid statics and dynamics, the relevant equations and their applications are discussed. Ended with the analysis in boundary layer, flowing fluid in pipelines and dimensional analysis and similitude.	
9	KIA2004	REINFORCED CONCRETE DESIGN	KIA1002, KIA1004	3		/		Introduction to structural design and materials for RC elements based on elastic and Limit State approach. Concepts of balanced design, under-design and over-design. General serviceability and durability requirements. Section analysis of rectangular and flanged beams based on Elastic Method. Design of rectangular and flanged beams for axial load and flexure based on Limit State Method. Shear and torsion resistance of RC elements. Design of rectangular and flanged beams for shear. Curtailments and detailing. Deflection and cracking checks. Deflection check, cracking, requirements for maximum and minimum sections. Introduction to RC	-

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					Sem 1	Sem II	Special Sem		
								slabs and design of one-way spanning solid slabs. Design of two-way spanning solid slabs. Introduction to RC columns and design of short columns for axial load and bending. Design of slender columns. Introduction to RC foundation and design of RC pad footings and strip footings.	
10	KIA2005	WATER RESOURCES		3		/		Introduction to hydrological cycle, water balance, surface water and groundwater flow. Application of statistic and probability in hydrology and water resources management. Introduction to urban hydrology and application to Malaysian systems.	-
11	KIA2006	ENVIRONMENTAL ENGINEERING AND SUSTAINABILITY		3		/		Introduction to environment, standards and legislations and related issues in Malaysia. Water quality parameters, sources and characteristics of water and wastewater. Fundamentals of water and wastewater treatment processes. Introduction to sustainability concepts-Principles of Green Engineering as a Foundation for Sustainability-Climate Change-Water Issues.	-
14	KAEA3143	HIGHWAY ENGINEERING		2	/			Planning and administration of roads and highways, geometric design of roads and junctions, flexible pavement materials,	

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								bituminous mixes, bituminous mix design, flexible pavement design.	
12	KAEA3201	CIVIL ENGINEERING MATHEMATICS I	KXEX2244	2	/			To complete the students with mathematical engineering topics specifically for Civil and Environmental Engineering students.	-
13	KAEA3202	CIVIL ENGINEERING MATHEMATICS II	KAEA3201	2		/		This course introduces students to some numerical techniques in solving problems that could not be solved analytically. Students will be exposed to the numerical solution for non linear equations as well as numerical differentiation and integration. Besides that students will also learn about numerical solution for ordinary differential equation and partial differential	-
14	KAEA3215	REINFORCED CONCRETE DESIGN II	KAEA2217	4		/		Structural System and its applications - Conceptual Design; Analysis of continuous beams and sub-frames under vertical and lateral loading; Moment Redistribution, Design of floor slabs –solid, ribbed and flat slabs; Design of Columns; Design of Foundation Structures - simple, strip and combined footings, Pilecaps; Design of Retaining Structures; Serviceability Limit States – short and long term Deflections and Crackings;	-

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					Sem 1	Sem II	Special Sem		
								Curtailment and Detailings of beams, columns, slabs and footings.	
15	KAEA3218	STRUCTURAL STEEL DESIGN	KAEA1121 KAEA1122	4	/			Introduction to the Steel Structures, Principles of Limit State Design, Design of Tension members, Design of Compression members, Design of Flexural members, Design of Connections	-
16	KAEA3224	THEORY OF STRUCTURE II	KAEA2223	3	/			Principles of strain energy and virtual work, method of virtual work, energy and reciprocal theorem, Maxwell's Theorems and Betti's Law, Castigliano's Theorem; Force or flexibility method of analysis, flexibility matrix method; Moving loads and influence lines for statically determinate structures, Muller-Breslau's Principle, introduction to influence lines for statically indeterminate structures; Plastic analysis method, statical method of analysis, mechanism method of analysis, method of analysis for beams, portal and gable frames.	-
17	KAEA3233	SOIL MECHANICS II	KAEA2132	3		/		The course covers the following topics: Stress distribution in soils, Boussinesq method (elastic theory), methods using tables, graphs and charts. Compressibility and consolidation of	-

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								soils, one-dimensional consolidation theory and characteristics, consolidation tests, estimation of the magnitude and rate of consolidation settlement. Shear strength of soils, shear strength characteristics, types of shear strength tests, residual shear strength. Slope stability, modes of slope failure, analysis of infinite slope, analysis of circular failure surface, Fellenius or Swedish method, Bishop method, stability charts, non-circular failure surface.	
18	KAEA3257	APPLIED HYDRAULICS	KAEA2256	3	/			This course is geared towards the application of hydraulics. It starts with the development of the boundary layer in laminar and turbulent flows. It moves to the study of unsteady flows in pipelines and analysis. The phenomenon of sediment transport is discussed followed by the wave theory-classification and application. Finally, the concept of computational	-
19	KAEA3152	ENVIRONMENTAL ENGINEERING		3		/		Introduction to environment, standards and legislations and related issues in Malaysia. Water quality parameters, sources and characteristics of water and wastewater. Fundamentals of water and wastewater treatment processes,	-

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								disposal of wastewater, sludge treatment, solid waste and hazardous waste management. Air pollution characteristics and control.	
20	KAEA4144	TRAFFIC ENGINEERING		2	/			Introduction to the transportation system, traffic flow theory, traffic flow variables and characteristics, traffic flow studies, road capacity, traffic control and management, traffic signal timing design, parking studies and road safety.	-
21	KAEA4165	CONSTRUCTION MANAGEMENT AND TECHNOLOGY		3		/		Introduction to the civil engineering project phases and cycle. Civil engineering project organization – structures and formation of design and construction organizations. The tendering process, construction contract administration and documentation, bills of quantities, method-related charges, the civil engineering standard method of measurement (CESMM), contract evaluation and variation, civil engineering claims. Types of construction contracts – admeasurement, lump sum, cost reimbursable, target cost contracts and contract strategy. The operational cost estimating technique and risk appraisal. Project planning and the Critical Path	-

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								Method (CPM). Quality management and construction materials management.	
22	KAEA4219	PRESTRESSED CONCRETE DESIGN	KAEA2217 KAEA2223	3	/			Prestressing concepts, structural applications. Material requirements, prestressing methods and system. Limit state design, serviceability classifications, stress limitations. Design of prestressed beam. Cable profile. Prestress losses. Ultimate limit strength check.	-
23	KAEA4226	STRUCTURAL ANALYSIS	KAEA3224	3	/			Introduction of Elasticity; Matrix Stiffness Method – members for plane frame, truss and continuous beams; Introduction to Finite Element Analysis; Elastic Instability of structural frame; Introduction to Structural Dynamics; Yield Line Analysis.	-
24	KAEA4234	FOUNDATION ENGINEERING	KAEA3233	3	/			Foundation design overview, soil bearing capacity and shallow foundation, introduction to machine foundation, pile foundation, earth pressure and earth retaining structures, Site investigation practice.	-
CHEMICAL									
1	KIL1003	PHYS. & ANAL. CHEM 1		2	/			This course presents an introduction to the elements of physical and analytical chemistry as a basic knowledge in chemical engineering. It covers basic concepts of solution and mixture based	-

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								on solubility. Students are exposed to quantitative analytical techniques such as calorimetry and spectrophotometry. Electrical effects such as conductivity and its applications, and acid-base reaction, buffer solutions, ionic speciation are also emphasized.	
2	KIL1002	CHEMICAL PROCESS PRINCIPLES I		3	/			<p>This course first reviews the use and propagation of significant digits. It is followed by introduction to the key systems of units in engineering, including inter-conversion of units. This leads naturally to the major quantities encountered, including ways to estimate (e.g. ideal gas density) or to obtain them (e.g. solubility). Use of advanced thermodynamics for prediction is NOT required. The basic features of key unit operations will be clarified mainly to enable students to identify the typical nature and number of streams associated with each.</p> <p>The focus then shifts to the derivation of the general mass balance equation. This is followed by single unit, non-reactive, steady state mass balance. The use of degrees-of-freedom analysis will be</p>	-

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								illustrated. Introductory unsteady state problems will illustrate the more general use of mass balance. Complications involving gaseous streams, single and multiple chemical reactions, chemical equilibria, physical equilibria, Lever Rule will be introduced in stages. Multiple unit operations will appear in between. The necessity and the proper way to summarize the results with a PFD will be highlighted. The three basic configurations of bypass, recycle and purge, in the presence of complications listed above, will be thoroughly covered until the end of the course.	
3	KIL1004	ENGINEERING DRAWING		2		/		Understanding fundamentals of engineering drawing: geometry, orthographic, isometric, cross section, auxiliary view. Make use of software to produce engineering drawing and common Process Flow Diagram (PFD) & Piping & Instrumentation Diagrams (P&ID) related to chemical engineering process.	-
4	KIL1008	PHYS. & ANAL. CHEM 2		2		/		Expose students to the fundamentals of surface phenomena with emphasis on engineering applications. This includes	-

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								the nature and characterization of solid surfaces as well as the properties, uses and issues, and production of colloidal system. The methods of analytical techniques involving the surface phenomena, which include GC, HPLC, BET equipment, zeta potential meter, and Langmuir trough will be introduced and the interpretation of analytical data will be elaborated in detail.	
5	KIL1001	CHEMICAL ENG. THERMODYNAMICS 1		3		/		In this course, equations of state will be used to model and calculate thermodynamic properties of fluids. The laws of thermodynamics are covered with particular emphasis on application to chemical processes. The First Law of Thermodynamics will be used for determining work, heat and energy of open and closed systems. The Second Law of Thermodynamics and entropy will be introduced. Heat engine, refrigeration and heat pump will be analyzed using the Second Law of Thermodynamics. Finally, thermodynamic cycles (e.g. vapour cycles, gas cycles) will also be introduced.	-
6	KIL1005	NUMERICAL METHODS FOR ENGINEERING		3		/		Students will be introduced to computers and their roles in numerical	-

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					Sem 1	Sem II	Special Sem		
								analysis. Software packages (ex. MATLAB, Excel, Scilab) and basics of programming will be introduced to the students. Students are exposed to find the roots of a single non-linear equation using logical algorithm in MATLAB or built-in functions in Excel. Solution of simultaneous linear equations using direct and indirect methods using nested loops with more complicated operations will follow. This paves the way for the Newton-Raphson method, which combines non-linear root finding algorithm with linear systems. Numerical differentiation and integration is introduced together followed by solving ordinary and partial differential equations. This is followed by numerical optimization problems. Throughout the various methods, there will be emphasis on error estimates and proper use of significant digits.	
7	KIL1006	FLUID MECHANICS I		3		/		This course begins with the properties of the fluids followed by concepts of fluids through deformation under stress. Fluid statics concepts will be explained. This will be followed by the calculation of pressure and hydrostatic head under	-

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					Sem 1	Sem II	Special Sem		
								static conditions. Basics of fluid dynamics such as laminar and turbulent flow, concept of viscosity as the source of friction will be explained. Classification of fluids and the concepts of boundary layer formation and separation will be discussed. Bernoulli's equation without friction, with friction and pump work for incompressible and compressible flows and the effects on pressure drop will be derived from the governing equations. Engineering problems associated with this equation will be solved. Dimensional analysis and the dimensionless numbers in fluid mechanics will be covered. Applications of Bernoulli's equations to measure the flow rate and pressured drop for incompressible and compressible flows using devices such as Venturi meter, orifice meter, rotameter and Pitot tube will be addressed. Various fitting and accessories employed in piping systems including the safety fittings such as pressure relief valves, safety valves and non-return valves etc will be discussed. Calculation of major and minor losses, pumping power etc., leads to the basic	

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								design of fluid transfer system for incompressible fluids. The components and working principles of pumps, fans, blowers and compressors will end the course. The safety precautions and the safety measures for the pumps, fans, blowers and compressors during operation will be covered.	
8	KIL2003	APPLIED STATISTICS	KIL1005	2	/			This course teaches students the use of statistical inference in determining and estimating the characteristics of populations under study. Students will be taught the processes and the requirements to produce a good experimental design based on full factorial and fractional factorial designs. Analysis using ANOVA will complete the course.	-
9	KIL2001	CHEMICAL PROCESS PRINCIPLES 2	KIL1002	2	/			The students are introduced to the forms of energy and the derivation of the general energy balance equation for closed and open systems. Methods to obtain thermo-physical properties will be elaborated. Later students will solve energy balance problems for non-reactive processes. The use of degrees of freedom learnt in an earlier course will be extended. This is followed by	-

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					Sem 1	Sem II	Special Sem		
								reactive energy balance, using both the heats of formation as well as the heat of reaction. This course concludes with the more complex problems that involve simultaneous solutions of mass and energy balances.	
10	KIL2005	CHEMICAL ENG. THERMODYNAMICS 2	KIL1001	3	/			This course focuses primarily on the underlying principles of thermodynamics and the application of these principles to problems related to pure components, mixtures and reacting systems at equilibria. The use of the thermodynamic web and its generalization to any fluids will begin the course. This is followed by the theorem of corresponding state and other major equations of state (EOS). Subsequently, equilibria between coexisting phases or in the presence of chemical reactions will be examined for a closed system. The calculations for the properties of a species in a pure, mixed or reacting system are based upon the application of various fundamental property relations to Gibbs energy; thereby restricted to only providing information on the direction of the driving force for a given system but not	-

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								on the rate with which a system reaches equilibrium. Other thermodynamic models such as NRTL and UNIQUAC would also be used to estimate the thermodynamic properties of complex phase equilibria. The effects of reaction conditions on chemical equilibrium and conversion will also be addressed in this course. Students would also be introduced to the various thermodynamic packages available in HYSYS/ASPEN.	
11	KIL2006	HEAT TRANSFER		3	/			This course introduces basic modes of heat transfer, i.e. conduction, convection and radiation, followed by heat transfer phenomena of boiling and condensation. The course then gives exposure to the experimental and empirical determination of heat transfer coefficients. Basic heat transfer equipment such as double-pipe, shell and tube, plate and spiral exchangers and evaporators are then covered. Finally, students will analyze heat exchanger performance by using log mean temperature difference and NTU-effectiveness methods.	-

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12	KIL2007	MASS TRANSFER	KIL1006	2	/			This course first introduces mass diffusion and flux, leading to Fick's Law and the diffusivity. The Fickian constitutive equation will then be incorporated into the material balance to arrive at the general mass transport equation. Various important scenarios amenable to analytical solution such as diffusion in a stagnant gas film, equimolar diffusion, diffusion with reaction will be examined. With these established, basic experimental methods of evaluating the diffusivity will be covered. For more complex situations including boundary layers and multiphase flows, the concept and application of convective mass transfer coefficient are introduced. Buckingham's π -Theorem is used to deduce its functional dependence. This is again followed by discussions on experimental techniques to determine the mass transfer coefficient. For cases with no empirical data, use and misuse of analogies are examined.	-
13	KIL2002	ORGANIC CHEMISTRY		2		/		The course introduces fundamentals of organic chemistry with emphasis on the application in chemical engineering. The	-

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								course exposes students to molecular structures, origin, reaction paths and industrial applications of various organic chemicals. The core of the subject focuses on an in-depth understanding of organic chemistry in petroleum, natural gas, petrochemicals and oleochemicals processes. The subject will also cover the essentials of polymerisation.	
14	KIL2010	BIOCHEMISTRY		3		/		This course aims to expose students to basics of biochemistry with emphasis on applications in various bioprocesses. Firstly, the structures and functions of microorganisms and biomolecules are introduced. Then, the mechanisms and inhibitions of enzymatic reactions are discussed, followed by typical cell growth pattern, various factors affecting the cell growth and the functions of important metabolic pathways in cells. Lastly, simple enzymatic and cell growth models are applied to determine kinetics of biological reactions.	-
15	KIL2009	REACTION ENGINEERING I	KIL1002	3		/		This course introduces the concept of chemical reaction engineering such as rate expressions, conversion etc. These concepts are used to derive rate equation for reaction, based on pseudo	-

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								steady state assumption, rate limiting step assumptions. The rate equations can be used to derive design equation for different types of reactors (batch, semi-batch, CSTR, PFR) and reaction schemes (constant and variable volume). Based on the knowledge of types of reactors, the experimental data for determination of kinetic parameters can be analysed. The course also covers mass and energy balances to examine the effects on the product yield and multiple steady state phenomenon for non isothermal and adiabatic reactors.	
16	KIL2008	SEPERATION PROCESSES I	KIL1002 KIL2005	3		/		This course exposes the students to the concept of interphase mass transfer in unit operations and the different types of unit operations. The use of the relevant equations e.g. vapour-liquid equilibria (VLE) and liquid-liquid equilibria (LLE) to perform basic calculations in separation processes will be introduced. Lastly, this knowledge will be used to arrive at preliminary designs of distillation, gas absorption and extraction columns.	-
17	KKEK3151	BIOCHEMISTRY		3	/			Expose students with basics of biochemistry with emphasis on	-

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								<p>applications in various bioprocesses. Describe the structure and functions of microorganisms and biomolecules in industrial applications. Describe the mechanisms and inhibitions of enzymatic reactions. Understand various factors affecting the cell growth. Apply simple enzymatic and cell growth models to describe kinetics of biological reactions. Understand the functions of important metabolic pathways in cells.</p>	
18	KKEK3152	MODELLING OF CHEMICAL PROCESS	KKEK2111	2	/			<p>This course enables students to learn the key steps in carrying out process modelling, degrees of freedom analysis, and solving different types of models. Students will be exposed to usage of Matlab and Simulink for process modelling analysis. Students will practise the skills learnt at the different stages via short presentations in class.</p>	-
19	KKEK3153	SIMULATION OF CHEMICAL PROCESSES	KKEK2111	2	/			<p>Exposes students with the use of computer simulation software such as AspenOne or Promax to perform mass and energy balance and simulate common unit operations such as heat exchangers, distillation columns, reactors, etc. Use simulation software to perform simulation of selected chemical</p>	-

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								processes flow sheets.	
20	KKEK3154	PROCESS CONTROL	KKEK3152	3		/		The course will initially cover the dynamic responses of processes using transfer function approach. It is followed by the formulation of the closed loop control block diagram and study of the responses and stability of these closed loop systems using conventional controllers. Design of control systems through frequency based techniques will also be taught along with the Bode stability criteria methods and tuning of controllers. The design of cascade control systems will also be covered at the end of the course.	-
21	KKEK3155	PARTICLE TECHNOLOGY	KKEK1141	3	/			Introduction of particle technology and solids handling issues. In this course students will be involved in equipment design on unit operations related to solids. In addition, the subject of solid-solid mixing and powder storage are also covered.	-
22	KKEK2156	MOMENTUM TRANSFER	KKEK1153 KXEX2245 KXEX3244	3		/		Macroscopic mass and linear momentum balance using vector notation begins the course. This is followed by expression of stresses due to fluid motion, leading to the viscous stress tensor for compact representation. The extended	-

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								<p>Divergence Theorem enables conversion into the differential form, i.e. Cauchy's first equation of motion. The alternative approach based on differential momentum balance yields identical result. Application of the inviscid or Newtonian constitutive equation leads respectively to the Euler equation and the Navier-Stokes equation. Discussions on initial and boundary conditions follow. Sample problems amenable to analytical solutions will be discussed. Software packages and formulation to facilitate numerical solutions will also be touched. The constitutive equations for non-Newtonian fluids widen the applicability of Cauchy's equation, allowing friction factor expressions. The inability to compute even more complex flows reasonably will require.</p>	
23	KKEK3156	PLANT ENGINEERING		3		/		<p>Process plants are complex facilities consisting of equipment, piping systems, instruments, electrical systems, electronics and control systems. The design and engineering of process plants require not only fundamental core chemical engineering but also</p>	-

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								<p>multidisciplinary knowhow. Plant layout principles and system design of air, water, steam, industrial gases supply constitute a major part of the design and engineering effort in order to design a safe and dependable processing facility in a cost effective manner. This course provides the basic knowledge and skills and covers the fundamental principles and concepts used in plant design highlights concepts such as electrical distribution system requirements, fire fighting and centralized refrigeration system design, plant maintenance and commissioning planning, ventilation and other common facilities, principles for designing shut down and start-up procedures, and quality control and monitoring requirements.</p>	
24	KKEK3159	SEPERATIONPROCESSES II	KKEK1222	3		/		<p>Quantitative and qualitative analysis of separation processes involving simultaneous heat and energy balances, i.e. humidification/dehumidification, drying, evaporation, crystallization. Design calculations of the processes. Classification of membranes and membrane processes. Membrane resistances and diffusivities.</p>	-

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25	KKEK3221	REACTION ENGINEERING II	KKEK2220 KKEK2157	2	/			This course introduces the properties, characterization and manufacturing of catalysts used by the catalytic reactions and its criteria. All possible mechanisms for the catalytic reactions based on reaction control, adsorption control and diffusion control will be covered. The course covers also the effects of external mass transfer as well as the internal mass transfer on concentration and temperature profiles inside the pellet and its relation to the effectiveness factor and Thiele Modulus. The above principles are applicable for the design of slurry and plug flow reactors.	-
26	KKEK4163	ENVIRONMENTAL MANAGEMENT		3	/			General perspective of pollution. Environmental ecosystems. Transport and transformation of pollutants. Industrial activities and the environment. residuals management. Improved manufacturing operations. Environmental legislation. Pollution prevention concepts and toolbox. Towards a sustainable society.	-
27	KKEK4167	PROCESS ENGINEERING ECONOMICS		3	/			Introduction to basic economics and engineering economy. Supply, demand and price. Depreciation methods.	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								Inflation and texas. Financial resources. Profit analysis and cash flow. Interest and economic equivalence. investment analysis. Economics decision analysis. Assessment and market prediction. Economic feasibility study of a chemical plant. Capital cost estimation, operational, cost and break-even cost. Alternative proposal assessment and optimization.	
ELECTRICAL									
1	KIE1003	DIGITAL SYSTEM		3	/			An introductory course in digital logic circuits covering number representation, digital codes, Boolean Algebra, combinatorial logic design, combinational logic modules, and sequential logic circuits.	-
2	KIE1004	PROGRAMMING I		3	/			Introduction to computer and C++ as high level programming language, algorithm development, control structure, function, arrays, pointers, and object oriented programming.	-
3	KIE1005	CIRCUIT ANALYSIS I		3		/		This course introduces the fundamental theorems and analysis techniques for problem-solving in electrical circuit theory. It encompasses the techniques for analysing of resistive circuits, the transient response of RL and RC circuits	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								and the sinusoidal response of RLC circuits.	
4	KIE1006	ELECTRONIC PHYSICS		3		/		This course provides a basis for understanding of physics, characteristics and electrical properties of semiconductor materials and devices. This course will also cover the theory of solids, the study of semiconductor in equilibrium, carrier transport phenomena and pn-junctions.	-
5	KIE1007	ELECTRONIC CIRCUIT I		3		/		This course provides an introduction to modern electronic circuit design and to the concepts of active and passive semiconducting devices (diodes, bipolar and FET transistors), and a discussion of their use in a number of basic electronic circuits i.e. amplifiers.	-
6	KIE1008	PROGRAMMING II		3		/		Introduction to classes and objects, object oriented programming: inheritance & polymorphism, operator overloading, templates, stream input/output, exception handling, class string & string stream processing, and data structures & algorithms.	-
7	KIE2003	PROBABILITY AND RANDOM SIGNAL		3	/			Basic probability, Discrete random variables, Summary statistics, Continuous random variables, Laws of large numbers, Detection,	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								Estimation and Stochastic processes.	
8	KIE2004	ELECTRONIC CIRCUIT II		3	/			Design of low frequency amplifiers, frequency response, distortion, noise and gain. Multistage amplifiers. High frequency amplifiers. Hybrid model, Y-parameter and π model. Power amplifier design. Class A, B, C, and D. frequency response, equivalent circuits, RF and IF amplifiers. Low noise amplifier design. Switching circuits. Bi-stable, mono-stable, and A-stable multi-vibrators. Schmitt trigger circuits.	-
9	KIE2005	CIRCUIT ANALYSIS II		3	/			Laplace transform in circuit analysis, Signal Flow Graph Circuit Analysis Techniques, frequency selective circuits, active Filter circuits, Fourier series, Fourier transform, two-port circuits, Attenuator design, Impedance Matching and Network Transformation	-
10	KIE2006	SIGNAL AND SYSTEM		3	/			Time and frequency domain representation of continuous and discrete time signals. Introduction to sampling and sampling theorem. Time and frequency analysis of continuous and discrete linear system. Fourier series convolution, transfer functions, Fourier Transform, Laplace Transform and z-transform.	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
11	KIE2008	COMMUNICATION SYSTEM		3		/		This course provides an introduction to the basic principles that are used in the analysis and design of analog and digital communication systems. This course also presents analytical concepts in modern communication systems analysis and design.	-
12	KIE2009	MACHINES AND DRIVES		3		/		This course introduces the students to the basics of electrical machines and simple drives. It provides opportunities for students to have hands on experience on design and construction of simple machines.	-
13	KEEE3213	ELECTROMAGNETIC THEORY	KEEE1123	3	/			Starting with fundamental postulates of electromagnetism, Faradays law is introduced, leading to the discussion on Maxwells equations. The study of uniform plane wave includes the propagation of time harmonic plane wave in an unbounded homogeneous medium, the concept of pointig vector and the incidence of plane wave. Oevrview of the transmission lines will be explained. The general transmission – line equations can be derived from a circuit model, and the study of time harmonic steady-state properties of transmission line is facilitated by the use	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								of graphical chart. Waveguides and basic antennas will be explained.	
14	KEEE3235	MICROPROCESSOR & MICROCONTROLLER	KEEE2232	3		/		This course introduces the MC6800 and MC6809 microprocessors. The software and hardware aspects of the microprocessors are covered in detail. The students are exposed to the machine language and assembly language. Many examples of using the assembly language to write programs are taught. The course also covers the peripheral chips such as PIA, ACIA and RAM and ROM. The students are taught on how to design a microprocessor system.	-
15	KEEE3253	CONTROL SYSTEM	KEEE2243 KXEX1145	3	/			Linear time invariant systems. Feedback systems. Laplace transforms. Block diagrams. Stability. Disturbance rejection. Signal flow graphs. Root locus. Polar plots. Bode plots. PID controllers and Lead-Lag compensators. State space representation.	-
16	KEEE4265	POWER ELECTRONICS	KEEE1113 KEEE1125	3		/		The course covers the introduction to the power electronics devices, cooling systems and device protection. Power Electronics circuit such as, uncontrolled and controlled DC (single and three phases), different types of DC to DC	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								converter, and single and three phases rectifier and inverter is introduced. The student will be introduced with voltage control technique and pulsed width modulation techniques design.	
17	KEEE3254	ENERGY CONVERSION & HIGH VOLTAGE POWER TRANSMISSION	KEEE2252 KMEE2169	3	/			This course allows the student to have the fundamental knowledge of power generation and transmission. In general, the course is about providing an in-depth knowledge of the modern theory and practice of electrical power systems. They will be able to calculate symmetrical faults, determine the protection requirements and perform insulation coordination studies. This requires analysis and performs design calculations.	-
18	KEEE3221	ENGINEERING ANALYSIS & COMPUTER	KXEX2244	3		/		This course introduces the theory and application of numerical methods for the solution of engineering problems using computers.	-
19	KEEE4253	POWER SYSTEM	KEEE3254 KEEE3221	3	/			This course allows the student to have the fundamental knowledge on electrical power transmission and distribution system. They will be able to calculate load flow problems, asymmetrical faults and the protection requirements. In general, the course is about providing an	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								in-depth knowledge of the modern theory and practice of electrical power systems, and an understanding of the operation and design of electrical power equipment. This requires analysis and performs design calculations.	
MECHANICAL									
1	KIG1001	STATICS		3	/			The course aims at introducing the student to the field of mechanical engineering – solid mechanics. The student will learn to analyze forces acting on particles and rigid bodies in static equilibrium which involve problems in 2D and 3D. The students will be exposed to conceptualize, design, build, and test a load-bearing device or structure.	-
2	KIG1002	FLUID MECHANICS I		3	/			The goal of this course is to impart knowledge, understanding and an appreciation of the field of fluid mechanics. This course includes the study of the basic properties of fluids which encompasses both gases and liquids, the basic concepts of system, control volume and flow field, the basic principles of conservation of mass, energy and momentum, the	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								fundamental equations that govern the behavior of fluids, the application of the principles and equations to the understanding of the operations of various types of flow measuring equipment and the study and analysis of the forces that act on bodies moving through a fluid and vice versa.	
3	KIG1003	MECHANICAL ENGINEERING LAB I AND COMMUNICATION		1	/			The objective of this course is to enable students to apply engineering laws and theories, specifically in Statics (KIG1001) and Fluid Mechanics I (KIG 1002). Emphasis is given on the ability of students to conduct experiments and to prepare written reports.	-
4	KIG1004	BASIC MATERIALS FOR MECHANICAL ENGINEERING		3		/		The course will introduce materials science and engineering, atomic structure and atomic bonding, crystal structure and imperfection, steel characteristic and processing, phase diagram and engineering alloy, Characteristics, processing and application of polymer, ceramic and composite.	-
5	KIG1005	ENGINEERING THERMODYNAMICS		3		/		The goal of this course is cover the basic principles of thermodynamics. To present a wealth of real-world engineering applications to give students	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								a feel for engineering practice. To develop an intuitive understanding of the subject matter by emphasizing the physics and physical arguments. To apply the principles of conservation of mass and energy, production of entropy, work potential of energy, reversible work and irreversibility, second-law efficiency, and exergy change of a system.	
6	KIG1006	ENGINEERING DESIGN AND MODELLING		3		/		In this course, students are taught techniques for graphics communication and to develop a standard engineering drawing by sketching and by using a CAD software. This course covers sketching techniques, engineering geometry and 3D modelling, multi-views and visualizations such as multiviews drawing of an object, auxiliary views, pictorial projections and section view, the practices of geometric dimensioning and tolerancing (GDT) in engineering drawings. Finally, students will learn the techniques for assembly drawings of a complete product.	-
7	KIG1007	MECHANICS OF MATERIALS I		3		/		This course exposing the student to the concept of stress and strain,	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								deformations due to axial loading, torsion loading, pure bending, analysis of beams for bending, transformations of stress and strain and the deflections of beams.	
8	KIG1008	MECHANICAL ENGINEERING LAB II AND COMMUNICATION		1		/		This course is aimed at helping engineering students to apply laws and theories learned, which are related to Mechanics of Materials I (KIG 1007) and Engineering Thermodynamics (KIG 1005). Emphasis is given to the ability of students to conduct experiments, preparation of written reports and oral presentations.	-
9	KIG2001	FUNDAMENTAL OF ELECTRICAL ENGINEERING		3	/			This course introduces the students with the fundamentals of electrical circuit elements and circuit analysis principles.	-
10	KIG2002	DYNAMICS	KIG1001	3	/			This course exposing the student to applied mechanics by using vector analysis approach which is introduced early lecture and used throughout the presentation of statics and dynamics. This approach leads to more concise derivations of the fundamental principles of mechanics. It also results in simpler solutions of three-dimensional problems in statics, and makes it possible to analyze many advanced problem in	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								kinematics and kinetics, which could not be solved by scalar methods. The emphasis in this syllabus, however, remains on the correct deriving and applying of the principles of mechanics and on their application to the solution of engineering problems, and vector analysis is presented chiefly as a convenient tool.	
11	KIG2003	FLUID MECHANICS II	KIG1002	3	/			The aim of this course is to further the knowledge and understanding acquired in the basic fluid mechanics course given in the first year. This course includes mainly the application of the understanding acquired to the analysis of various phenomena encountered in the very broad field of fluid mechanics. Such phenomena include the flow of fluids in closed and open channels, the study of the lift and drag forces acting on bodies immersed in a fluid, the study and analysis of flow through turbo-machines, such as pumps and turbines and the applications of the laws of similarity and dimensional analysis.	-
12	KIG2004	MECHANICS OF MATERIALS II	KIG1007	3	/			Unsymmetric Bending, Composite Beams, Reinforced Concrete Beams,	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								Bending in Curved Beams, Stress Concentrations, Inelastic Bending, Shear in Straight Members, The Shear Formula, Shear Flow in Built-Up Members, Shear Flow in Thin-Walled Members, Shear Centre for Open Thin-Walled Members, Thin-Walled Pressure Vessels, State of Stress Caused by Combined Loadings, Slope and Displacement by the Methods of Superposition and Discontinuity Functions, Statically Indeterminate Beams and Shafts—Methods of Integration and Superposition, Critical Load, Ideal Column with Pin Supports, Columns Having Various Types of Supports, The Secant Formula, Inelastic Buckling, Design of Columns for Concentric Loading, Design of Columns for Eccentric Loading, External Work and Strain Energy, Elastic Strain Energy for Various Types of Loading, Method of Virtual Forces Applied to Trusses and Beams, Conservation of Energy, Impact Loading, Castigliano's Theorem Applied to Trusses and Beams.	
13	KIG2005	ENGINEERING MATERIALS	KIG1004	3	/			This course focuses on the structures-rightful of engineering materials. It's includes the crystal structures, phase	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								diagram, precipitation, deformation and others related mechanical properties. Then, introduction on the mechanisms in engineering materials such as mechanisms of dislocation, diffusion, deformation etc. Macroscopic and microscopic structures and the rightful of materials in engineering application are discussed. Interpretation and relation between materials, mechanism, and application in real life are explained and analyzed.	
15	KIG2007	COMPUTER PROGRAMMING		3		/		This course introduces students to computer systems and makes them familiar with the computer programming. The course helps students to develop their skill and feel confident to write computer programs and map scientific problems into computational frameworks.	-
16	KIG2008	MANUFACTURING TECHNOLOGY		3		/		This course introduces students to computer systems and makes them familiar with the computer programming. The course helps students to develop their skill and feel confident to write computer programs and map scientific problems into computational frameworks.	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
17	KIG2009	DESIGN OF MACHINE ELEMENTS	KIG1007	3		/		Designs of Mechanical Elements have been prepared specifically to introduce the mechanical elements which often used in mechanical machines. This course also introduces the concept of design in the engineering environment and provides hands-on experience of the design process for the mechanical engineering students. The topic covered the review of failure mechanisms in the context of machine design and considers the analysis and safe design of various common elements of engineering systems such as shafts, bearings, gears and etc. Throughout the course, the application and integration of these components in assemblies are demonstrated through examples, case studies and projects involving the detail design of a number of mechanical assemblies and machines	-
18	KIG2010	HEAT TRANSFER	KIG1005	3		/		This course consists of the fundamental concepts of heat transfer, conduction, convection and radiation. Transient heat conduction, internal & external forced convections will be introduced. Besides, the applications and concepts of energy calculations in the heat transfer system	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								will be introduced.	
19	KMEM2218	PRODUCT DESIGN AND DEVELOPMENT	KMEM2110	3	/			Product Design and Development is a unique course developed to prepare the students to design products and develop technologies for current and future needs. This course is a project-based course that covers modern tools and methods for product design and development. The cornerstone is a project in which teams of management, engineering, and industrial design students conceive, design and prototype a physical product. Class sessions are conducted in workshop mode and employ cases and hands-on exercises to reinforce the key ideas. Topics include identifying customer needs, concept generation, product architecture, industrial design, and design-for manufacturing.	-
20	KMEM3116	INSTRUMENTATION AND MEASUREMENT TECHNIQUES		3	/			The course is aimed at exposing the students the classical and current instrumentations and measurement techniques applied in industries. The course discusses the application and principles of transducers and data acquisition, post-processing and documentation. The advantages and	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								disadvantages between measurement techniques and computational method are highlighted.	
21	KMEM3211	MECHANICAL VIBRATION	KMEM2208	3	/			It is aimed at introducing the fundamentals of vibrations for one degree of freedom (DOF) systems, 2 DOF systems, and multi DOF systems in engineering field. This includes undamped and damped with free and forced vibrations.	-
22	KMEM3119	HEAT TRANSFER	KXEX1144 KMEM1109	3	/			This course consists of the fundamental concepts of Heat Transfer. The modes of heat transfer, conduction, convection and radiation. Transient heat conduction, internal, external force convection and applications the concepts energy calculations in the heat transfer system.	-
23	KMEM2217	APPLIED MECHANICS OF MATERIALS	KMEM1107	3	/			Introduction to mechanics of materials, Theories of stress and strain, Linear stress-strain-temperature relations, Inelastic material behaviour, Torsion of circular and non circular bars, Thin-walled cylinder, the Prandtl ElasticMembrane (Soap-Film) analogy, Bending and bending stresses in beams (Nonsymmetrical bending), Deflections of straight beams (subjected to	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								nonsymmetrical bending), Applications of Energy Methods, Stress concentration and the stress concentration factors (theory of elasticity, combined loads).	
24	KMEM3122	CONTROL ENGINEERING		3		/		To introduce the student the basic theory and practice of control engineering. The main goal is to enable the student to analyse and design control systems in frequency domain representation. Students will become familiar with analytical and will be exposed extensively to the use of computers for analysis and design of control systems.	-
25	KMEM4110	ELECTRONICS AND MICROPROCESSORS		3		/		The aim of this course is to acquaint the students with the basic electric and electronic components, quantity and unit, introduction to electronics and digital, introduction to microprocessors and microcomputers.	-
26	KMEM2115	CULCULATION AND NUMERICAL MEHODS	KMEM2117	2	/			This course consists of modelling, error analysis, and root of equations, linear algebraic equations, optimizations and curve fitting. Numerical differential and integration. Numerical methods of ordinary and partial differential equation.	-
27	KMEM4214	APPLIED VIBRATION	KMEM3211	3	/			System dynamic response is related to its	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								dynamic characteristics, namely, natural frequencies, mode shapes and damping. The course deals with the theory of multiple degree of freedom systems (damped and undamped) and solution techniques encompassing analytical, numerical and measurements methods. These include Frequency Response Function (FRF) Modal analysis, FRF Operating Deflection Shape analysis and Finite Element Modal analysis. Combined measurement and computational techniques to study vibration problems in industries is discussed in the case studies.	
28	KMEM4124	PRODUCTION AND OPERATION MANAGEMENT		3		/		The objective of this course is to help engineering students to learn about industrial administration and to introduce the subject of operation management. The concepts, procedures, and technologies in the operations are explained so students are able to grasp management basics and to able to understand the function of operation managers in a typical business organizations.The important objective of this subject is to obtain basic knowledge and issues on the production operation	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								system	
BIOMEDICAL									
1	KIB1002	HUMAN ANATOMY AND PHYSIOLOGY I		3	/			This course covers basics of human anatomy and physiology. The topics covered are gross anatomy, cells & tissues, cardiovascular system, respiratory system, nervous system, integumentary system, muscular system, skeletal system.	-
2	KIB1003	STATICS		3	/			This course covers force systems, free body diagrams, structural analysis, geometrical properties, distributed load, friction and virtual work.	-
3	KIB1005	HUMAN ANATOMY AND PHYSIOLOGY II		2		/		This course covers basics of human anatomy and physiology. The topics covered are renal system, digestive system, endocrine system, reproductive system, motor system, special senses.	-
4	KIB1006	DYNAMICS		3		/		This course covers kinematics and kinetics of accelerating particles as well as accelerating rigid bodies in 2D, vibration of particles and kinematics of simple mechanisms.	-
5	KIB1007	ELECTRICAL CIRCUIT ANALYSIS		3		/		This course covers the introduction to the Kirchoff's law, Nodal analysis and Thevenin's law, mesh analysis and superposition's law. Calculate current, voltage and power in ac circuits using	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								phasor approach. Study the mutual Inductance and transient response in RC, RL and RLC circuits.	
6	KIB1008	BASIC PROSTHETICS AND ORTHOTICS		3		/		This course covers the basics of prosthetics and orthotics. The topic includes upper and lower limb prosthetics and orthotics, spinal orthotics, wheelchair and functional electrical stimulation. The user assessment and device prescription are also covered.	-
7	KIB2002	ELECRONICS	KIB1007	3	/			This course introduces electronic devices and their applications. The p and n type materials, including its doping process and application of p-n junction as circuit element. Clipper and clamper and power supply. Diode equivalent circuits and applications. DC and AC equivalent analysis of BJT and FET including their bias configurations	-
8	KIB2003	MECHANICS OF MATERIALS	KIB1003	3	/			This course covers stress and strain of non rigid body. The topics include torsion, beam and column stress and displacement and plane stress and strain.	-
9	KIB2005	SAFETY, STANDARD AND ETHICS IN BIOMEDICAL ENGINEERING		2		/		The course covers the international and national medical devices regulation, safety and standards including the Global Harmonization	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								Task Force Regulatory Framework. The electrical safety and tests in Medical devices are also explained. The course also covers ethical and bioethical issues related to biomedical engineering.	
10	KIB2007	MEDICAL ELECTRONICS	KIB1007	3		/		This subject introduces to students the basic theory of sensors, transducers and electrodes. It covers the related electronic circuits and components for biomedical applications. The students are also exposed to filters, oscillators and ADC & DAC circuits. The specific circuit for ECG, EMG and EEG systems are also explained in this course.	-
11	KIB2006	COMPUTER AND PROGRAMMING		2		/		This course introduces the basic structural computer programming and object-oriented programming. The course covers the arithmetic and logical operations, control structures, functions, arrays, pointers and object-oriented programming. The student will learn to write useful computer programs in order to solve mathematical and engineering problems.	-
12	KIB2008	BIOMECHANICS OF HUMAN MOTION		3		/		The principles of mechanics are applied to the study of human motion	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								to provide students with an understanding of the internal and external forces acting on the body during human movement. Topics cover basics biomechanic, biomechanic of human growth, biomechanics of upper limb, lower limb, spine, joints and muscle, kinetics and analysis of human motion as well as rehabilitation biomechanics.	
13	KUEU2137	BIOMECHANICS		3	/			Biomechanics, statics, dynamics, kinetics, kinematics and identify instrumentation used for measuring kinetics and kinematics quantities. Concepts and theories of human skeletal, human upper and lower extremities and human spine from a biomechanical perspective. Types of mechanical loading on the human body and the relationship to bone injuries. Problems related to kinematics (linear and angular) and kinetics (linear and angular)	-
14	KUEU3147	BIOMATERIALS		3	/			Materials that are used in medical application. Materials (metals, polymers, ceramics, composites) that are used in biomaterials. Mechanism of host response and materials response. Different criteria needed for implants.	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								Types of biomaterials that can be used.	
15	KUEU2143	MIROCOMPUTER AND DIGITAL SYSTEMS		3	/			This subject introduces Microprocessor and its Architecture, number systems, digital logic circuits, addressing mode, data movement instructions, arithmetic and logic instructions, program control, memory interface, Input/ Output interface, interrupts, subroutines, design of microprocessor system.	-
16	KUEU3150	BIOMEDICAL ENGINEERING PRACTICES		1	/			Identify clinical departments of UMMC. Important equipment used for the treatment of the patients. Safe working practice and current safety legislation in clinical department	-
17	KUEU3233	SIGNALS AND SYSTEMS	KXEX1144 KXEX1145	3		/		This course introduces the basics of signal and systems to the students. The students will be exposed to signal transformation and signal properties.	-
18	KUEU3148	ELECTROMAGNETISM AND ELECTRICAL MACHINES	KUEU2142 KUEU2141	3		/		This subject introduces the magnetic field concept, Amperes and Faradays law for magnetic system with time varying fields. Basic components for electric drive system and their functions, different parts of ac and dc motors a real so included with extension of applications in biomedical engineering.	-
19	KUEU3149	CONTROL SYSTEMS		3		/		This subject introduces the concept of control system, transfer functions of	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								cascaded systems and their parameters. Control approaches such as PID, system stability, sketching techniques and plotting are also included to equip students with necessary tools in solving biomedical engineering problems.	
20	KUEU3245	MECHANICS OF MACHINES		2		/		Kinematics and kinetics of slider mechanism and four bar mechanism. Gears and gear trains	-
21	KUEU3146	BIOMEDICAL STATISTIC		2		/		Basic concepts, theory and techniques of statistics used in biomedical engineering. Introduction of statistical package to analyse biomedical engineering problems. Application of statistical analysis in the case study.	-
22	KUEU4140	SAFETY, STANDARDS AND ETHICS IN BIOMEDICAL ENGINEERING		2		/		The course covers the medical safety standard or safety codes to guide equipment manufacturers in the production of safe equipment, electrical hazards of medical instruments e.g. macro shock and micro shock hazards, physiological effects of electricity on human body, leakage current, devices to protect against electrical hazards, and an equipment safety program.	-
TELECOMMUNICATION									
1	KIJ2003	DIGITAL COMMUNICATIONS		3		/		Spectral analysis and transmission over a channel. Fourier transform of pulses;	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								characteristics of distortionless signal transmission. Nyquist sampling theorem. Digital signals, baseband transmission and digital modulation. Time division multiplexing. Digitization of speech signals. Pulse code modulation (PCM), quantization noise, companding, differential PCM, Delta modulation, overload noise, adaptive delta modulation. Baseband data transmission and digital modulation techniques. Line coding, Intersymbol interference, Nyquist waveshaping, eye pattern. Adaptive equalization. Error performance in digital communication systems. Spread spectrum communications. Direct sequence spread spectrum, frequency hopping spread spectrum, CDMA. Telephony, subscriber loop interface, basic function. Public switched telephone network, hybrids, echo suppression and switching.	
2	KEET3206	ELECTRONICS COMMUNICATIONS	KEEE2225 KEET2202	3		/		This course starts with description of an ideal operational amplifier. Practical operational amplifier designs which are undertaken by various companies are introduced and the reasons	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (✓) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								for deviation from ideal performance are discussed. Student will design, test, and write a formal report on the performance of their op amp. Theory of Oscillators and various classes of oscillators are discussed at length. Stability, amplitude limitation and non-sinusoidal oscillators are given adequate treatment Tuned amplifiers, ideal and practical waveforms, selectivity, single stage, multistage, stability, alignability and their frequency response. Phase locked loop, basic concept, loop gain, transfer function, first and second order systems, lock and capture range. Power supply design using zener diode and transistor. Line and load regulations. series and shunt regulators, feedback and fold-back regulator. Use of op amp in regulated power supplies. Voltage regulated IC d	
3	KEET3107	INFORMATION THEORY AND CODING		3	/			Information sources and coding. Channel capacity and coding. Linear block and	-

No	Course Code	Topic	Pre Requisite	Credit	Courses Offered Please tick (v) where applicable			Course Description	Other Description
					Sem 1	Sem II	Special Sem		
								cyclic error coding, convolution codes. Applications of coding.	
4	KEET4204	DATA COMMUNICATION AND COMPUTER	KEET2202	3		/		This course attempts to provide a unified overview of the broad field of data and computer communications. It encompasses the TCP/IP protocol architecture, and the concepts used at every layer, including encoding techniques, error handling, data link control, multiplexing and spread spectrum, switching and routing, and congestion control. Besides, the current standards for communication networks are also studied	-
5	KEET4205	OPTICAL COMMUNICATION AND OPTOELECTRONICS	KEET2202	3		/		Optical fiber structures, propagation characteristics, fabrication, cabling, optical measurements, loss, dispersion, nonlinear effects, optical emission, optical detection, optical amplification and fiber-optic devices	-
6	KEET4203	SATELLITE AND MOBILE COMMUNICATIONS	KEET2202	2	/			This course provides an in-depth understanding on the design various mobile and satellite communication systems. It encompasses the cellular concept, modulation and multiple access techniques, and the propagation models used in mobile systems,	-

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					Sem 1	Sem II	Special Sem		
								and the launching methods used in satellite systems. Besides, the current standards for both mobile and satellite systems are	
7	KEET4208	ANTENNA AND PROPAGATION	KEEE4213	3	/			Introduce the basic essentials of antenna. Starting with the plane electromagnetic waves and the laws that governs the propagation between the transmitting and receiving antennas, the important antennas parameters such as patterns, directivity and gain is explained. The course covers the antenna family that describes various antenna types, the electric dipoles, the loop antennas, uniform linear arrays and the basic concept of antenna measurements	-
CADCAM									
1	KCEC4105	MOLD AND DIE DESIGN		3	/			Classification of plastic and composites processing, injection molding machine, injection mold, injection molding phase/cycle, metal working processes, press machine die design	-
2	KCEC4111	DESIGN FOR MANUFACTURING		3	/			This course is to provide student with the necessary skills to recognize the	-

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					Sem 1	Sem II	Special Sem		
								<p>effect of design to the manufacturing processes and make necessary design changes that could improve the efficiency of the manufacturing process. The manufacturing efficiency is often measured in terms of cost and time of the manufacturing process. There are many options for manufacturing a component, proper selection and design of component to meet the required design requirements while being cost and time efficient is critical. Among the manufacturing processes covered sufficient to cater for most industries. Among the processes to be included are assembly, PCB assembly, common polymer processes and common metal processes.</p>	
3	KCEC4114	REVERSE ENGINEERING		3		/		<p>The aim of this course is to introduce students to the concept of reverse engineering as it is one of the most common techniques used in the industry today. The main concepts of reverse engineering that are introduced include generation and manipulation of 3D model from scanned data, generation</p>	-

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					Sem 1	Sem II	Special Sem		
								of physical object through the use of RP techniques and developing tools using rapid tooling techniques.	
4	KCEC3109	TECHNOLOGY CNC/CAM		3	/			The course emphasize the Classification of NC/CNC machines, Manual part programming, Computer Aided Part Programming, Process Planning, Tool Requirements, Different controller type for milling and lathe part programming.	-
5	KCEC3213	COMPUTATIONAL FLUID DYNAMICS	KCEC1108 KCEP1111 KCEP2105	3	/			This course gives you an introduction to computational fluid dynamics (CFD) modeling technology for fluid mechanic related applications. It will also give you a proper background for the intelligent and appropriate use of commercial CFD packages. At the end of the course you will understand the process of developing a geometrical model of the flow, applying appropriate boundary conditions, specifying solution parameters, and visualizing and analysing the results. Through the course study, you will also become conscious of the limitations of CFD and develop an appreciation for the factors limiting the accuracy of CFD solutions.	-

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					Sem 1	Sem II	Special Sem		
6	KCEC3101	COMPUTER AIDED ERGONOMICS		3		/		This course provides a broad based introduction to ergonomic principles and their application in the design of work or product, equipment and the workplace. Consideration is given to anthropometry, musculoskeletal disorders, manual handling, biomechanics, and ergonomic aspects of the special population as well as to the social and legal aspects.	-
7	KCEC3107	FINITE ELEMENT ANALYSIS		3		/		This course covers the review of matrix algebra, basic theory of FEA, the use of type of finite elements (spring, bar, beam, two-dimensional solid, plate/shell, and three-dimensional solid), stress-strain relations, boundary conditions, finite element modelling and solution techniques, equation solving; direct and iterative methods.	-
8	KCEC3108	COMPUTER INTEGRATED MANUFACTURING		3		/		This course focuses on the integration of manufacturing activities including its automation protocols for the implementation of Computer Integrated Manufacturing (CIM). The concepts of flexible manufacturing systems (FMS) and the interfaces between the Computer Aided Design (CAD) and	-

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					Sem 1	Sem II	Special Sem		
								the Computer Aided Manufacturing (CAM) systems are addressed.	
MANUFACTURING									
1	KCEP3106	PRINCIPLES OF METAL FORMING		3	/			Plasticity and Yield Criteria, Work Hardening and Plastic Instability, Strain Rate and Temperature, Ideal Work and Slab Analysis of Bulk Deformation Processes, Sheet Metal Forming Processes, Forming Tools and Dies ,internal and external process parameters, Forming loads, Defects, Plastic Anisotropy, Forming Limit Diagrams	-
2	KCEP3112	MEASUREMENT AND INSTRUMENTATION		3	/			This course will provide the students with knowledge on the background of engineering measurement and instrumentations. Topics covered include: Basics of measurement methods, Signals and their analysis, Mathematical modeling and measurement system response, Statistics in measurement, Accuracy and Uncertainty analysis, Measurement of temperature, velocity, and pressure, Stress and strain sensors.	-
3	KCEP3107	INDUSTRIAL ERGONOMICS		3		/		This course contains eight essential parts mainly: industrial safety and health, ergonomics industries,	-

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					Sem 1	Sem II	Special Sem		
								ergonomics principal in design, effect of environment on workers, human physiology, anthropometry, works design and analysis of tasks.	
4	KCEP3111	INTRODUCTION TO INDUSTRIAL ENGINEERING		3		/		This course is aimed to deliver the contemporary relevant contents so that the students understand the basics of Industrial engineering and apply the fundamental knowledge in their professional life. The main contents of the course are: Industrial Engineering as a profession, Industrial systems and cybernetics, Decision making process, Decision theories, Cost concepts and Break-even analysis, introduction to quantitative decision making techniques and their applications – linear programming, transportation programming, assignment programming, Demand management and Forecasting in manufacturing, Plant location and Layout, Material handling, and Scheduling.	-
MATERIAL									
1	KMEB3104	FERROUS ALLOYS AND		3	/			The iron-iron carbide diagram. Major	-

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					Sem 1	Sem II	Special Sem		
		HEAT TREATMENT						types of iron base alloys: steels and cast irons. Microstructural constituents in steels and cast irons. Alloying elements and their effects on structure and properties of steels based on TTT and CCT diagrams. The process of surface treatment, hot and cold working for ferrous alloys. Industrially important grades of steels and cast irons, their selection for specific applications.	
2	KMEB3115	ELECTRONIC MATERIALS AND DEVICES		3	/			The course includes the quantum mechanics and crystal structure of semiconductor, semiconductor materials and their properties, energy bands, carrier transport phenomena, pn junction, diodes pn junction, optoelectronics devices, transistors, the magnetic properties of the semiconductor materials and its advanced fabrication technology. All these components are vital to the understanding of both the operation of present day devices and any future development in the field. The course also comprises of many mathematic calculations which are needed in designing the electronic component with low cost and energy conservation.	-

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					Sem 1	Sem II	Special Sem		
3	KMEB3119	NONFERROUS ALLOYS AND MATERIALS SELECTION		3	/			This course introduces students to various non-ferrous alloys. The properties, processing and applications of the non-ferrous alloy will be discussed.	-
4	KMEB1105	MATERIALS PRODUCTION		3		/		The objective of this course is to equip students with knowledge about the fundamentals of engineering materials and fuels in order to analyze the industrial production processes, and ultimately to extract the materials (mostly ferrous & non-ferrous metals with little coverage of processing of polymers).	-
5	KMEB3220	MECHANICAL BEHAVIOUR AND FAILURE OF MATERIALS	KMEB2112	3		/		The course starts with relevant examples of failure encountered in real engineering components. The importance of failure analysis is highlighted. Since mechanical failure can be related to stress and strain history exhibited by the materials, the concept of stress and strain will be briefly reviewed. Four types of failures will be addressed: yielding, fracture, fatigue and creep. The discussion on yielding will start on the basic concept of slip, motion of dislocations and resolved shear stress responsible for slip in single crystal. The	-

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					Sem 1	Sem II	Special Sem		
								extension to polycrystalline metals is discussed. For engineering applications, the prediction of the onset of yielding is conducted by the use of yield criteria. The discussion on fracture will start on the physical mechanism of brittle and ductile fracture. The treatment of component containing crack will be discussed in the framework of Linear Elastic Fracture Mechanics. The discussion on fatigue failure will start on the physical mechanism in metals under fatigue loading. Two different approaches of fatigue analysis will be highlighted: fatigue crack nucleation approach and fatigue crack propagation approach. In creep failure, the discussion starts on the physical mechanism of creep in metals. A simple method to estimate creep rupture lifetime using Larson-Miller parameter will be discussed.	
6	KMEB2204	POLYMER ENGINEERING	KMEB2108	3		/		Introduction to polymer engineering materials and its various properties, classification, applications and processing of polymers.	-
7	KMEB3116	COMPOSITE MATERIALS		3		/		This course introduces the students to composite materials. Various types of	-

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					Sem 1	Sem II	Special Sem		
								matrix and reinforcements and its properties. Mechanical properties of single and multi layered composite materials. Fatigue and environmental effects of composite materials and its applications.	
8	KMEB4206	CERAMICS PROCESSING	KMEB2110	3	/			The aim of this course is to give students on overview of the existing processing technologies in manufacturing ceramics, as well as an understanding of the physics and chemistry behind those processing methods. In 28 contact hours, the following topics will be discussed: raw materials, preparation of raw materials, comminution and beneficiation, slurry systems involving additives, rheology, one forming technique and sintering.	-
9	KMEB3219	COMPITATIONAL MATERIALS ENGINEERING	KMEB1102	3		/		Introduction to Fortran, Error analysis, Interpolation, Numerical differential equation, Numerical partial differential equation, Monte Carlo simulation	-
PROSTHETIC & ORTHOTICS									
1	KII1001	HEALTHCARE AND ETHICS		2	/			Basic knowledge about health service system and social welfare in Malaysia, including the role of P&O personnel in Malaysia and professional ethics.	-
2	KII2001	PROSTHETICS AND		3	/			This course teaches the students	-

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					Sem 1	Sem II	Special Sem		
		ORTHOTICS ENGINEERING DESIGN I						engineering design skills. This is incorporated through three important skills such as engineering drawing, workshop technology and hands-on practical.	
3	KII2003	CLINICAL PATHOPHYSIOLOGY	KIB2008	3		/		The course is about learning the basic pathological processes and common diseases that related to prosthetic and orthotics including pathogenesis, manifestations and symptoms of clinical conditions.	-
4	KII2004	BIOMECHANICS OF ORTHOTICS		3		/		Apply biomechanics principles in orthotics field. Mechanical properties of human tissues and the effects of force to the tissues. The effects of the same forces to the replacing orthotic device, and its process design.	-
5	KII2002	PROSTHETICS AND ORTHOTICS ENGINEERING DESIGN II		3		/		This course teaches the students engineering design skills. This is incorporated through three important skills such as engineering drawing, workshop technology and hand-on practical.	-
6	KII2005	PROSTHETICS AND ORTHOTICS CLINICAL BASED DESIGN		5			/	Basic knowledge in orthotics development, mainly in the device design and manufacturing aspect and prescription of orthotics to patients, practiced under supervision to obtain	-

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					Sem 1	Sem II	Special Sem		
								the optimal outcome.	
7	KUEP3130	BIOMECHANICS OF ORTHOTICS		3	/			Apply biomechanics principles in orthotics field. Mechanical properties of human tissues and the effects of force to the tissues. The effects of the same forces to the replacing orthotic device, and its process design.	-
8	KUEP3131	BIOMECHANICS OF PROSTHETICS		3	/			Apply biomechanics principles in prosthetics field. Mechanical properties of human tissues and the effects of force to the tissues. The effects of the same forces to the replacing prosthesis device, and its process design.	-
9	KUEP3140	SAFETY, STANDARDS AND ETHICS IN BIOMEDICAL ENGINEERING		2		/		The course covers the medical safety standard or safety codes to guide equipment manufacturers in the production of safe equipment, electrical hazards of medical instruments e.g macroshock and microshock hazards, physiological effects of electricity on human body, leakage current, devices to protect against electrical hazards. Design for electrical safety measurement for medical device. Safety Criteria in designing mechanical devices in biomedical engineering.	-
10	KUEP4281	CLINICAL PROSTHETICS AND ORTHOTICS II		5			/	Basic knowledge in orthotics development, mainly in the device	-

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					Sem 1	Sem II	Special Sem		
								design and manufacturing aspect and prescription of orthotics to patients, practiced under supervision to obtain	
FACULTY SUBJECTS									
1	KIX1001	ENGINEERING MATHEMATICS 1		3	/			To enhance the mathematical skills for engineering students, differentiation and integration, matrix and vector algebra, and ordinary differential equations will be taught in this course.	-
2	KIX1003	THINGKING AND COMMUNICATION SKILLS		2	/			Introducing to students the objective, procedure, evaluation, and explanation regarding critical thinking and communication skills. Critical thinking skills include explaining and analyzing ideas; analyzing and evaluating arguments; determining source credibility; recognizing persuasive language; and recognizing fallacy. Communication skills cover oral communication; listening skills; non-verbal communication; interpersonal communication; group interaction skills; and problem solving and decision making. Students will also be brief on barriers in critical thinking and communication. Interactive sessions will impose the students to apply or practice critical thinking and communication skills	-

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					Sem 1	Sem II	Special Sem		
								to engineering discipline effectively.	
3	KIX1002	ENGINEERING MATHEMATICS 1		3		/		To enhance the mathematical skills for engineering students, vector analysis, Fourier Series, Laplace Transform and partial differential equations will be taught in this course.	-
4	KIX2002	ENGINEERING ECONOMIC ANALYSIS		3	/			This course will provide students with a systematic framework for evaluating the economic aspects of competing design solutions. Students should appreciate the concepts of physically realizable and economically affordable engineering project. The course will start with an introduction to the basic concepts and tools in engineering economics follow by approaches in analysing a project. Then, the course will offer the fundamental on comparing alternatives and projects. Finally, student will be exposed to the enhancements for the real world including issues on financial risk.	-
5	KIX2003	LAW AND ETHICS IN ENGINEERING		2		/		This course covers an introduction to law and functions, basic principles of law and the code of ethics related to the field of engineering. Responsibilities and rights of engineers, public welfare implications, and the role of engineers to sustainable development and globalization has also	-

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					Sem 1	Sem II	Special Sem		
								been emphasized in this course.	