

AUTOMOTIVE & MARINE ENGINEERING DEPARTMENT

PLO-CLO Course wise and Taxonomy Mapping of “FALL” Semester Courses

FIRST YEAR – AUTOMOTIVE				
INTRODUCTION TO AUTOMOTIVE SYSTEMS (AU-113)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	IDENTIFY different automotive systems and their main parts and assemblies.	Cognitive	1	1
CLO-2	EXPLORE innovation and technological development in automotive systems.	Cognitive	1	12
CLO-3	INTERPRET specifications of a vehicle and its main components as given by the manufacturer.	Cognitive	2	1
CLO-4	CALCULATE engine displacement, engine power, number of g's, gear ratio and width of tire using given formula.	Cognitive	3	1
WORKSHOP PRACTICE (ME-104)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	DEMONSTRATE workshop practices related to metal and wood work.	Psycho-motor	3	1
CLO-2	RECOGNIZE relevant safety measures related to metal and woodwork tools.	Psycho-motor	3	1
CLO-3	PARTICIPATE in workshop activities individually as well as in group	Affective	2	9
APPLIED PHYSICS (PH-122)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	SOLVE problems using principles of mechanics, electricity, magnetism and optics.	Cognitive	3	1
CLO-2	EXPLAIN the concepts of modern physics	Cognitive	2	1
CLO-3	MEASURE physical parameters considering experimental errors.	Psycho-motor	4	4
CALCULUS (MT-114)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				

CLO-1	APPLY concept of calculus for solving engineering problems.	Cognitive	3	1
CLO-2	TEST convergence and divergence of sequence and series.	Cognitive	3	1
CLO-3	PLOT complex numbers with standard function.	Cognitive	2	1
CLO-4	SOLVE problems of single variable Calculus using software.	Cognitive	3	5
FUNCTIONAL ENGLISH (HS-104)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	IDENTIFY listening types and note-taking techniques.	Cognitive	2	10
CLO-2	DEMONSTRATE writing and reading skills in English.	Cognitive	3	10
CLO-3	DELIVER effective formal presentations on a variety of topics.	Affective	2	10
PAKISTAN STUDIES (HS-105)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	DESCRIBE the history of Pakistan considering societal legal and cultural aspects.	Cognitive	2	6
CLO-2	RECOGNIZE the importance of ethics, codes and value system in becoming a good citizen.	Affective	3	8
CLO-3	WRITE a report on current issues, resources and problems faced by Pakistan.	Cognitive	2	9
SECOND YEAR – AUTOMOTIVE				
AUTOMOTIVE POWER PLANT (AU-201)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE thermodynamic efficiencies of Otto, Diesel, Dual and Stirling Cycle using first principle.	Cognitive	3	1
CLO-2	CALCULATE engine performance parameters including brake power and specific fuel consumption.	Cognitive	3	1
CLO-4	MEASURE the break power and fuel consumption of an engine using dynamometer.	Psychomotor	3	4
STATISTICS AND QUALITY CONTROL (AU-203)				

CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE descriptive statistics.	Cognitive	3	1
CLO-2	CALCULATE probability and probability distributions.	Cognitive	3	1
CLO-3	PERFORM statistical process control.	Cognitive	3	1
CLO-4	USE software tools for statistics and quality control.	Cognitive	3	5
COMPUTER PROGRAMMING AND APPLICATIONS (AU-212)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	DESCRIBE the fundamental concepts of computing and computer systems.	Cognitive	2	1
CLO-2	PREPARE pseudo code and/or a flow chart related to a given problem.	Cognitive	3	1
CLO-3	PRODUCE a high-level computer language program and/or output.	Cognitive	3	1
CLO-4	USE application software to perform engineering calculations.	Cognitive	3	5
FUNDAMENTALS OF ANALOGUE AND DIGITAL ELECTRONICS (AU-225)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	EXPLAIN the operation and circuit analysis of BJT, FET and Thyristor devices.	Cognitive	2	1
CLO-2	CALCULATE the operational parameters of different types of BJT and FET based amplifier circuits.	Cognitive	3	1
CLO-3	SOLVE the digital circuits using Boolean algebra for different combinational Logics.	Cognitive	3	1
CLO-4	DEMONSTRATE the operation of different amplifiers and combinational logic circuits.	Psychomotor	3	4
MATERIALS AND METALLURGY (ME-209)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	Explain different material types in terms of bonding and crystal structure.	Cognitive	2	1
CLO-2	DESCRIBE the property differences between metals, polymers & composites and their	Cognitive	2	1

	implications in terms of environment and sustainability.			
CLO-3	APPLY tie line and lever rule to phase diagram in order to determine the phase composition and phase fraction in a mixture.	Cognitive	3	1
CLO-4	DETERMINE the effect of micro-structure and solidification process on end use properties/mechanical properties of materials.	Cognitive	3	1
CLO-5	Demonstrate the mechanical properties of advanced engineering materials using laboratory equipment.	Psychomotor	3	1
ORDINARY DIFFERENTIAL EQUATIONS AND FOURIER SERIES (MT-223)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	FORMULATE differential equation for an engineering problem.	Cognitive	3	1
CLO-2	SOLVE differential equations using Laplace and integral transformations.	Cognitive	3	1
CLO-3	EXPRESS periodic functions into Fourier series	Cognitive	2	1
CLO-4	SOLVE differential equations using software.	Cognitive	3	5
THIRD YEAR – AUTOMOTIVE				
MANUFACTURING ENGINEERING – II (AU-311)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	EXPLAIN the metal forming processes.	Cognitive	2	1
CLO-2	ANALYSE appropriate use of metrology in manufacturing processes.	Cognitive	4	1
CLO-3	CALCULATE parameters related to machine tools.	Cognitive	3	1
CLO-4	DEMONSTRATE the use of CAM equipment available in the lab with given precision.	Psychomotor	3	5
COMBUSTION, EMISSION AND POLLUTION (AU-313)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	EXPLAIN concept of combustion and combustion process in engines.	Cognitive	2	1
CLO-2	CALCULATE composition of combustion reaction.	Cognitive	3	1

CLO-3	ANALYZE process of combustion in engines to determine sources of gaseous and noise pollutions from internal combustion engines keeping in view the effects of pollutants on environment and sustainability.	Cognitive	4	7
VEHICLE DYNAMICS (AU-314)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	FORMULATE mathematical models related to vehicle longitudinal, lateral and vertical dynamics using Newton's 2 nd law of motion.	Cognitive	3	1
CLO-2	SOLVE problems related to tire, driveline and steering dynamics.	Cognitive	3	1
CLO-3	CALCULATE roll center for a vehicle suspension systems.	Cognitive	3	1
CLO-4	DEVELOP a model for the determination of center of mass of a vehicle.	Cognitive	5	2
SOLID MECHANICS – II (ME-313)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE principal stress and strain in engineering problems.	Cognitive	3	1
CLO-2	SOLVE engineering problems using Failure Theories.	Cognitive	3	1
CLO-3	SOLVE problems related to cylinders and bending stress.	Cognitive	3	1
CLO-4	DISTINGUISH between statically determinate and indeterminate structure.	Cognitive	4	2
ADVANCED CALCULUS AND LINEAR ALGEBRA (MT-332)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	SOLVE engineering problems using multivariable calculus.	Cognitive	3	1
CLO-2	APPLY linear algebra to solve engineering problems.	Cognitive	3	1
CLO-3	APPLY concepts of vector calculus in solving engineering problems.	Cognitive	3	1
CLO-4	SOLVE calculus and linear algebra problems using software.	Cognitive	3	5

BUSINESS COMMUNICATION AND ETHICS (HS-304)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	IDENTIFY different types of communication skills.	Cognitive	1	10
CLO-2	DELIVER good oral communication skills in academic and professional environment.	Affective	2	10
CLO-3	DEMONSTRATE writing skills in different genres of business communication.	Cognitive	3	10
CLO-4	DEVELOP sharp understanding towards professional ethics and code of ethics.	Cognitive	3	8
FINAL YEAR – AUTOMOTIVE				
VEHICLE DESIGN (AU-415)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	APPLY the concept of vehicle design process and strategies.	Cognitive	3	1
CLO-2	APPLY principles of mechanics to automotive structures.	Cognitive	3	1
CLO-3	APPLY vehicle design assessment techniques vehicle design and development process.	Cognitive	3	1
CLO-4	ANALYZE the use of innovation and technology in a modern vehicle.	Cognitive	4	12
MECHATRONICS (AU-416)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	DESCRIBE the control system models using analogies.	Cognitive	2	1
CLO-2	CALCULATE circuit parameters of solid state switching circuits.	Cognitive	3	2
CLO-3	DEVELOP application programs of microcontroller using assembly language.	Cognitive	5	3
CLO-4	CONDUCT different application based experiments using microcontroller chip.	Psychomotor	4	4
FEM AND FVM: APPLICATIONS IN AUTOMOTIVE ENGINEERING (AU-442)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE displacements and stresses in	Cognitive	3	1

	physical structural problems using local and global stiffness matrices.			
CLO-2	CONVERT problems for truss, beam, frame, and pipe flow into their corresponding stiffness matrix.	Cognitive	3	1
CLO-3	SOLVE 1-D and 2-D problems of structural and thermal components by selecting different finite element types and their formulations.	Cognitive	3	1
CLO-4	SOLVE structural and thermal problems using commercial FE software.	Cognitive	3	5
CLO-5	DESIGN a truss structure for bridge under given constraints.	Cognitive	5	2
HEAT AND MASS TRANSFER (ME-315)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	CALCULATE heat transfer rate for steady and unsteady conduction, convection and radiation problems.	Cognitive	3	1
CLO-2	ANALYSE size and performance of a heat exchanger.	Cognitive	4	2
CLO-3	CALCULATE mass transfer rate using heat transfer analogy.	Cognitive	3	1
CLO-4	DEMONSTRATE thermal conductivity measurement for solids.	Psychomotor	3	4

PLO-CLO Course wise and Taxonomy Mapping of “SPRING” Semester Courses

FIRST YEAR – AUTOMOTIVE				
	ENGINEERING DRAWINGS AND COMPUTER GRAPHICS (AU-112)			
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	DRAW geometric curves including plane curves, cycloids, and involutes.	Psychomotor	4	1
CLO-2	DRAW simple machine parts, sections and assembly in orthographic projections.	Psychomotor	4	10
CLO-3	INTERPRET geometric dimensioning and tolerancing in working drawings.	Cognitive	2	1
CLO-4	USE software for simple 2D and 3D drawings.	Psychomotor	4	5
	STATICS (ME-106)			
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	DESCRIBE various concepts related to statics.	Cognitive	2	1
CLO-2	SOLVE different engineering problems based on statics.	Cognitive	3	1
CLO-3	CALCULATE the centroid, moment of areas for bodies under equilibrium	Cognitive	3	1
CLO-4	DEMONSTRATE the use of various apparatus related to engineering statics.	Psychomotor	3	1
	THERMODYNAMICS (ME-112)			
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	SOLVE problems based on fundamental concepts of equilibrium, system, properties, processes, and cycles.	Cognitive	3	1
CLO-2	SOLVE problems based on first and second law of thermodynamics for open and closed systems.	Cognitive	3	1
CLO-3	CALCULATE thermodynamic properties and performance parameters for gas and vapor power cycles.	Cognitive	3	1
	APPLIED CHEMISTRY (CY-109)			
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			

CLO-1	EXPLAIN the concepts of physical and analytical chemistry for engineering applications.	Cognitive	2	1
CLO-2	EXPLAIN water treatment methods.	Cognitive	2	1
CLO-3	SOLVE problems of thermochemistry, electrochemistry, gases, liquids and fuels.	Cognitive	3	1
CLO-4	EXPLAIN methods of extraction of metals and its purification.	Cognitive	2	1
CLO-5	DEMONSTRATE measurement of physical and chemical parameters.	Psychomotor	3	4
BASIC ELECTRICITY & ELECTRONICS (EE-118)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	SOLVE DC circuits.	Cognitive	3	1
CLO-2	SOLVE AC circuits.	Cognitive	3	1
CLO-3	SOLVE PN Junction device problems. .	Cognitive	3	1
CLO-4	DEMONSTRATE DC and AC electric circuit applications	Psychomotor	4	4
SECOND YEAR – AUTOMOTIVE				
AUTOMOBILE INSTRUMENTATION (AU-222)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE parameters of measurement system and its errors.	Cognitive	3	1
CLO-2	DESCRIBE electronic sensors and actuator in automobile system.	Cognitive	2	1
CLO-3	EXPLAIN electronic engine control system.	Cognitive	2	1
CLO-4	DEMONSTRATE the use of electronic instrumentation in automobile system.	Psychomotor	3	4
MANUFACTURING ENGINEERING-I (AU-231)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	EXPLAIN various manufacturing processes including plastic fabrication, machining, and metal forming.	Cognitive	2	1
CLO-2	DISTINGUISH between different types of casting and their output product's characteristics.	Cognitive	4	1
CLO-3	IDENTIFY the right type of process & its parameters for performing certain manufacturing.	Cognitive	1	1
SOLID MECHANICS-I (ME-202)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO

	On completion of the course, the student will be able to:			
CLO-1	CALCULATE forces, deflections, moments, stresses, and strains in simple structural members.	Cognitive	3	1
CLO-2	SOLVE problems relating to pure and non-uniform bending of beams.	Cognitive	3	1
CLO-3	SOLVE problems relating to torsional deformation of bars.	Cognitive	3	1
CLO-4	SOLVE the problems of buckling of columns.	Cognitive	3	1
CLO-5	DEMONSTRATE the measurement of mechanical properties of materials using universal testing machine.	Psychomotor	3	1
FLUID MECHANICS – I (ME-204)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	SOLVE different fluid statics problems.	Cognitive	3	1
CLO-2	CALCULATE Hydrostatic Forces on submerged surfaces	Cognitive	3	1
CLO-3	CALCULATE pressure drop in pipe flow for laminar and turbulent flow in a pipe.	Cognitive	3	1
CLO-4	SOLVE fluid flow problems using Bernoulli and momentum principle.	Cognitive	3	1
CLO-5	DEMONSTRATE the use of fluid flow measuring devices.	Psychomotor	3	4
DYNAMICS (ME-213)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	CALCULATE kinematics and kinetics parameters for a particle or system of particles.	Cognitive	3	1
CLO-2	CALCULATE kinematics and kinetics parameters using energy principle.	Cognitive	3	1
CLO-3	CALCULATE kinematics and kinetics parameters using impulse and momentum principle.	Cognitive	3	1
CLO-4	DEMONSTRATE kinetics and kinematics parameters using laboratory equipment.	Psychomotor	3	4
ISLAMIC STUDIES (HS-205)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	EXPLAIN Islamic perspective in the matters related to society and day to day dealings.	Cognitive	2	8
CLO-2	EXPLAIN meanings of selected quranic verses and hadiths	Cognitive	2	8

CLO-3	EXPLAIN seerah of prophet Muhammad (PBUH)	Cognitive	2	8
CLO-4	COMPARE Islamic and western values.	Cognitive	4	8
THIRD YEAR - AUTOMOTIVE				
DESIGN OF MACHINE ELEMENT (AU-315)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	IDENTIFY design strategies, brain storming, standards and codes with applications.	Cognitive	2	1
CLO-2	CACLULATE parameters for machine elements including couplings, shafts, brakes, clutches, springs, gears, bearings and clutch.	Cognitive	3	1
CLO-3	CALCULATE stresses and deflection for machine elements including fasteners.	Cognitive	3	1
MECHANICAL VIBRATION (ME-306)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	IDENTIFY the type of vibration and its characteristics for different applications.	Cognitive	2	1
CLO-2	SOLVE different vibration models including spring mass and damper for free and forced systems.	Cognitive	3	1
CLO-3	CALCULATE mechanical vibration system responses under arbitrary forces.	Cognitive	3	1
CLO-4	SOLVE multi-degree of freedom systems using numerical methods.	Cognitive	3	1
CLO-5	DEMONSTRATE measurement of vibration parameters using laboratory equipment.	Psychomotor	3	4
FLUID MECHANICS II (ME-314)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE velocity and pressure distribution for inviscid and viscous fluid flow.	Cognitive	3	1
CLO-2	SOLVE turbo-machine problems using velocity triangles at inlet and outlet.	Cognitive	3	1
CLO-3	APPLY conservation principles of mass, linear momentum, and angular momentum using Reynold's Transport Theorem to fluid flow problems.	Cognitive	3	1
CLO-4	CALCULATE the drag coefficient for external flow problems.	Cognitive	3	1

APPLIED ECONOMICS FOR ENGINEERS (MF-303)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	DEFINE the terminology and principles of engineering economics and production practices.	Cognitive	1	1
CLO-2	SOLVE time value of money problems using cash flows.	Cognitive	3	1
CLO-3	EVALUATE engineering economics scenarios among several alternatives through optimization.	Cognitive	6	1
CLO-4	EXPLAIN work practices of industry and business operations.	Cognitive	2	1
NUMERICAL METHODS (MT-442)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	SOLVE problems of numerical methods.	Cognitive	3	1
CLO-2	SOLVE mathematical expressions using appropriate techniques up to the desired decimal accuracy.	Cognitive	3	1
FINAL YEAR – AUTOMOTIVE				
AUTOMOTIVE TRANSMISSION & DRIVES (AU-422)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	APPLY the techniques used in design of automotive clutch and gears	Cognitive	3	1
CLO-2	CALCULATE performance parameters of drive line components in transmission operation	Cognitive	3	1
VEHICLE THERMAL MANAGEMENT (AU-431)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
On completion of the course, the student will be able to:				
CLO-1	CALCULATE performance parameters for a refrigeration system	Cognitive	3	1
CLO-2	PERFORM cooling & heating load calculation for a given space.	Cognitive	3	1
CLO-3	ANALYZE the energy conservation and energy efficient strategies used in thermal management of vehicle	Cognitive	4	2
PRODUCT DEVELOPMENT AND OPERATIONS MANAGEMENT (AU-441)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO

	On completion of the course, the student will be able to:			
CLO-1	DESCRIBE concept of product and process development drivers such as inventory, facilities, transportation, sourcing and pricing.	Cognitive	2	1
CLO-2	SOLVE multidisciplinary operation management problems pertinent to cost, quality and sustainability.	Cognitive	3	1
CLO-3	APPLY project management tools such as Gantt chart and CPM using available software.	Cognitive	3	11
ENTREPRENEURSHIP (MG-481)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	DEMONSTRATE entrepreneurial mindset and its challenges through group activity	Affective	2	9
CLO-2	APPLY financial and marketing strategies for a new venture keeping professional ethics	Cognitive	3	8
CLO-3	WRITE a business plan for a new product or service	Cognitive	3	10
AUTOMOTIVE ENGINEERING PROJECT (AU-499)				
CLO #	CLO	DOMAIN	TAXONOMY LEVEL	PLO
	On completion of the course, the student will be able to:			
CLO-1	Design/Develop work related to FYP	Cognitive	C-3	3
CLO-2	UTILIZE modern tools	Cognitive	C-3	5
CLO-3	DEMONSTRATE team work in the assigned project task	Affective	A-2	9
CLO-4	DEMONSTRATE communication skills	Cognitive	C-3	10
CLO-5	DEMONSTRATE project management techniques	Cognitive	C-3	11
CLO-6	APPRECIATE technological development related to the project	Cognitive	C-2	12