DEPARTMENT OF MECHANICAL ENGINEERING TECHNOLOGY

Course Learning Outcomes

Course Code	Courses	Course Learning Outcomes (CLOs)	Domain	Taxonomy Level	Mapping of Course Learning Outcomes (CLOs) with Program Learning Outcomes (PLOs)
PHY-104	Applied Physics (Th)	An ability to identify physical principles of waves and electromagnetism relevant to a problem and to apply approximations necessary to obtain solutions	Cognitive	3	1
		Describe the fundamental physical laws and principles of optics and discuss the application of these principles	Cognitive	2	2
	Applied Physics(LAB)	Perform basic physics experiments using lab equipment and components.	Psychomotor	2	1
MTH-101	Applied Mathematics-I	Interpret the functions and their behavior in plane and in space	Cognitive	2	1
		Apply the concept of differential calculus in solving the optimization problems such as maxima, minima and concavity	Cognitive	3	1
		Solve definite integrals to find physical lengths, curves and volumes	Cognitive	3	1
		Comprehend the learning of vector calculus and analytical geometry in multiple dimensions	Cognitive	2	1
CST-101	Computer Fundamentals and Applications(Th)	Identify the components of a computer system, demonstrate basic proficiency in computer and commonly used computer applications	Cognitive	2	1
		Explain the fundamentals of operating systems, databases, computer networks and internet.	Cognitive	2	1

	(LAB)	Prepare documents using Microsoft Office tools	Psychomotor	3	1
		Ability to develop, debug and execute programs in C language	Psychomotor	3	3
MET-101	Engineering drawing (Th)	Recognition of concepts of basic engineering drawing	Cognitive	1	1
		Explanation of fundamental knowledge of parts drawing and assembly drawing of machines	Cognitive	2	1
	LAB	Performing tasks related to engineering drawing	Psychomotor	2	9
		Application of concepts related to engineering drawing	Affective	3	10
PST-104	Pakistan Studies	To explore colonial and post-colonial history of Pakistan	Cognitive	2	6
		The revival of Islamic society in the changing world environment in context of political and constitutional history of Pakistan.	Cognitive	2	6
ENG-101	Communication Skills	Students will be able to describe the scope and application of effective communication	Cognitive	2	10
		Students will apply their writing skills in composing Emails, faxes and business letters	Cognitive	3	10
		Students will be able to show effective verbal and non-verbal skills in communication & presentations	Affective	3	9
MTH-102	Applied Mathematics-II	ACQUIRE the basic knowledge of Different Order of Equations.	Cognitive	1	1
		To Explain Different Methods for the Solutions of Equations.	Cognitive	2	2
		ACQUIRE the basic knowledge about Applications of Different Order Equations	Cognitive	1	1
EET-101	Basic Electrical and Electronics	•			
CHY-104	Applied Chemistry	Apply fundamentals of Gas laws to theory of distillation process and Use principles of electrochemistry to evaluate energy-generating systems (galvanic	Cognitive	3	2

		cell, fuel cell and potentiometry)			
		Analyze various instrumentation techniques related to chemical industrial processes: a: Separation (chromatography), b. Quantitative analysis (spectroscopy)	Cognitive	4	5
MET-102	Workshop Practice				
MET-103	Statics(Th)	To be able to define or describe different theoretical concepts related to statics	cognitive	1	1
		To be able to solve different engineering problems based on statics	cognitive	3	2
		To be able to calculate the centroid, moment of areas and inertia for bodies under equilibrium	cognitive	3	2
	LAB	**Demonstrate the skills to use scalar and vector analytical techniques for analysing forces in statically determinate structures**	cognitive	2	1
		Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple practical problems	psychomotor	3	2
		Apply basic knowledge of maths and physics to solve real-world problems	psychomotor	3	2
IST-104/HUM-104	Islamic Studies	Discuss the fundamental concepts of Quran, Ahadees and Sunnah and compare modern day living with them	Cognitive	2	8
		To apply ethical values and understanding of Islamic parameters to their professional and personal views	Cognitive	4	6
MET-231	Materials Technology	•			
MET-232	CAD-I (LAB)	Interpret the basic concepts of CAD tools for designing in manufacturing industries.	cognitive	2	1
		Apply the basic CAD concepts to develop and construct multi views of machine elements.	Psychomotor	3	3
MET-233	Mechanics of Materials	Understand the basics of mechanics of materials and their mechanical properties, thermal stresses, virtual work, strain energy and Pressure vessels.	cognitive	1	1
		Calculate the stresses (tensile, compressive and shear), strains and differentiate between plain & principal stresses and strain in mechanical structures.	cognitive	2	2

		Solve problems related to moment of inertia, shear force and bending moments , torsion and theories of failure in mechanical structures	cognitive	2	2
MET-234	Thermodynamics for Technologists	**Understand** the nature and role of the thermodynamics properties of matter and processes on appropriate diagrams.	cognitive	2	1
		Apply energy and entropy balances to the closed and open systems.	cognitive	3	1
		Analyze implications and limitations of the Second Law of Thermodynamics.	cognitive	3	2
		Analyze thermodynamics cycles of power, refrigeration, and air-conditioning using energy and exergy principles.	cognitive	3	2
MET-235	Dynamics	Develop a basic understanding of concepts of kinematics, types of motion, kinetics, laws of Newton, work, energy, momentum, types of velocities and acceleration.	Cognitive	2	1
		Compute the fundamental problems of kinematics, types of motion, kinetics, laws of Newton, work, energy, momentum, types of velocities and acceleration to understand these numerically.	Cognitive	3	2
HUM-204	Technical writing and communication	Students will be able to define and explain the characteristics of technical writing	cognitive	2	10
		They will be able to compose and present information logically and to design documents concisely and clearly	cognitive	3	10
		Students will be able to communicate effectively and present their thoughts and ideas M	Affective	2	10
MET-241	Fluid Flow processes	**APPLY** the basic concepts to hydrostatic fluid problems.	Cognitive	3	1
		Interpret the fluid kinematics and dynamics parameters using basic laws of mechanics.	Cognitive	2	2

		Solve the pipe flow problems using Bernoulli and energy equation	Cognitive	3	2
		APPLY governing equations to incompressible and compressible fluid flows	Cognitive	3	2
MET-242	Basic mechanics of machines	Interpretation and understanding of working principles of different machine mechanisms, velocities and profiles.	Cognitive	2	1
		Compute the fundamental problems of basic machine mechanisms to develop understanding of relations between inputs and outputs.	Cognitive	3	2
MET-243	Machine Design and CAD-II(Th)	Explain the fundamental concepts of machine design for different machine elements	Cognitive	2	1
		Calculate the basic design parameters of machine elements by identifying different stresses and other design considerations.	Cognitive	3	2
	LAB	Demonstrate the basic concepts of CAD tools.	Cognitive	2	1
		BUILD solid models of parts and assemblies using CAD software as individual and as a team.	Psychomotor	3	5
		Present the design aspects effectively through oral presentation to assist team reporting.	Affective	2	10
MET-244	Manufacturing Technology	•			
MTH-204	Statistics and probability	•			
MET-245	Hydraulics and pneumatics	Understand the basics of Pneumatic and hydraulic principles, Production and distribution of fluid power.	cognitive	1	1
		Visualize the concepts of Sensors and Cylinder control.	cognitive	2	2
		Put into practice the theory of Control valves and Actuators.	cognitive	3	2
MET-351	Hydraulics machinery	Interpretation of Hydraulic Machines to explain basic working of the hydraulic equipment.	cognitive	1	2
		Compute parameters related to different types of hydraulic equipment to measure capacities, efficiencies and other parameters.	cognitive	2	3
MET-352	HVAC Technology(Th)	Understand the fundamentals of refrigeration system and HVAC	cognitive	2	1
		Applications of thermodynamic principles in the subject of refrigeration and air conditioning	cognitive	3	3

		Understanding the differences, types and classifications, choose a right refrigerant and explain its effects on ozone depletion	cognitive	2	7
	LAB	**Demonstrate the skills to use Psychometric chart**	cognitive	2	1
		Operate HVAC testing units to observe different properties of air and refrigerants after heating and cooling processes. Manipulate different settings and parameters of HVAC units to investigate the effect of changing different parameters on refrigeration, cooling and heating	psychomotor	3	4
		Present oral presentations/Viva voce that summaries functions and operations of HVAC	affective	2	9
MET-353	Instrumentation technology (Th)	To develop an awareness of principles of measurement and ıcipal design features of a variety of ruments. To become familiar with the ration and use of a variety of typical ns of process instrumentation and trol	cognitive	3	1
		To appreciate the key issues in selecting instrument types and specifying their requirements and recognise the importance of good measurement as a basis for effective control.	cognitive	4	5
	LAB	Ability to apply the knowledge of Instrumentation and Control to the Process Industry	cognitive	3	1
		Use Modern tools/equipment to assess the effects of changes in operating conditions on the performance of Measurement Systems	Psychomotor	3	5
		Ability to work effectively, as an individual or in a team on multifaceted settings.	affective	3	9
MET-354		**Explain** various machining processes to demonstrate their significance in the manufacturing industries.	cognitive	2	1

	Machining Technology (Th)	**Examine** different machining techniques/operations and their parameters for performing right type of machining process	cognitive	4	1
		Apply effectively knowledge of various machining techniques to solve machining related problems in industrial sector.	cognitive	3	2
	LAB	Demonstrate various machining operations and their parameters in different experiments to extent the knowledge of machining process.	cognitive	2	1
		Perform experiments on given work part using various machine tools to interpret the theoretical knowledge of machining methods.	psychomotor	2	1
		To effectively present as individually and team, the subject knowledge based on each lab and project assigned.	affective	2	9
MET-355	Metrology and quality control	Understand the basics of Metrology and Quality, Errors and Uncertainty in Measurement along with measurement techniques, Statistical Process Control (SPC), Screw Threads, Gears, Limits and Limit Gauges and ISO 900	cognitive	1	1
		Calculate the Inspection techniques, fundamentals of statistics-frequency distribution, measures of central tendency and dispersion.	cognitive	2	2
		Solve problems related to Statistical quality control, basics of control charts, specifications, process capabilities and, normal curve.	cognitive	3	2
MET-356	Automotive technology and engines	**Explain** the basic knowledge, construction and working of various types of IC engines and its components	cognitive	2	1
		Solve numerical problems related to the design and operation of IC engines.	cognitive	3	3
		Analyze the design and operation of various IC Engine systems including preparation of air/fuel mixture, combustion control and emission reduction.	cognitive	3	7

		Analyze the effect of engine operating parameters (air/fuel ratio, ignition timing, fuel properties etc.) on engine performance and emissions.	cognitive	3	4
MET-361	Heat and mass transfer	**Apply** governing equations of heat transfer to various thermal systems.	cognitive	3	1
		Analyze the performance and thermal design of heat exchangers under various conditions	cognitive	3	3
		SOLVE the real life complex engineering problems related to heat transfer.	cognitive	3	2
MET-362	Condition monitoring and maintenance(Th)	Explain basic principle, requirements and approaches of maintenance to keeping mechanical equipment and plant in working condition.	cognitive	2	1
		Compute plant utilization, economic order quantities by applying planning and scheduling techniques to implement the maintenance concepts.	cognitive	3	1
		Demonstrate condition based monitoring techniques to discuss the possibilities and causes of failures in mechanical equipment and systems	cognitive	2	6
	LAB	Demonstrate different maintenance practices through experiments and case studies of power sector, manufacturing and process industries to extend the knowledge of condition monitoring and maintenance.	cognitive	2	1
		To effectively present (individually and as team) the subject knowledge based on each lab and project assigned.	Affective	2	9
MET-363	Energy resources and management	•			

MET-364	Power plant and thermal utilities (Th)	Comparison of different energy resources, their description and environmental impacts	cognitive	2	7
		Brief introduction of nuclear power plant, its working and components	cognitive	1	1
		Calculation of the performance of different types of .power plant and their thermodynamic properties	cognitive	4	2
	LAB	**Introduction of different energy resources, their description and environmental impacts.**	cognitive	1	7
		Viva and presentation of comparison different power plants, their efficiency calculation.	Affective	2	2
MET-365	Health safety and environment	Recognize Health hazards, Sources of risk, Dangerous substances Safety Machining & Guarding Equipment & Machine handling , Chemical Safety, Fire	cognitive	1	4
		Visualize Personal protection, Safety Management, Safety Training, Safety Inspection and Work Permit and Emergency plan.	cognitive	2	6
		Put into practice the Waste Management, Occupational illness, Accident Reporting and Investigation and the basic Safety Standards such as (ISO-14001, OHSAS 18001)	cognitive	3	7
HUM-304	Management and entrepreneurship	Recall Organizational Structure, Production Processes and overall idea of Productivity and Plant Layout from management point of view	cognitive	1	1
		Visualize concepts of Project Management, Inventory Management and Human Resource Management.	cognitive	2	11
MET-482 MET-367	Supervised industrial training. Technical projec t (part-II)	Describe the objectives and scope of the project using knowledge of fundamental concepts related to Mechanical Technology.	Cognitive	C2	1
		Analyze different availabletechniques and data to identify feasible working approach while using literature review and market survey.	cognitive	C4	2
		Design and develop physical model based on calculations to complete the project.	cognitive	C6	3

		Propose appropriate methodology for reaching valid conclusions (methodology includes literature survey, design of experiment, data collection and analysis tools etc.)	Cognitive	C4	4
		Demonstrate the ability to use modern tools and software to carry out solution to complex technological problems.	Psychomotor	P4	5
		Demonstrate the significance of societal and safety related issues while proposing solution to concerned technical problems.	Affective	A3	6
		Demonstrate impact of the project in societal and environment contexts.	Cognitive	C2	7
		Show commitment to professional ethics and moral responsibilities in all aspects while completing the project.	Affective	A3	8
		Ability to function effectively as individual and group members to achieve the project objectives.	Affective	A3	9
		Enable students to communicate effectively through oral presentation, written report and physical demonstration of working model.	Cognitive	C2	10
		Organize, discuss, record and compile project progress throughout the duration of the project.	Affective	A4	11
		Recognize importance of, and pursuing life-long learning in the broader context of innovation and technological developments.	Cognitive	C2	12

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