

COURSE DESCRIPTION - AUTOMOTIVE

65-120 Statics

Credits: 2

Hours: 3

Pre-requisite: 76-105

General principles: mechanics fundamental concepts units of measurement the international system of units numerical calculations; Introduction to statics including vectors and scalars forces moments of force; equilibrium of a particle and rigid bodies covering free-body diagrams; structural analysis and trusses; internal forces and shear; friction; center of gravity and centroids and Moments of inertia; Application of mechanics in automotive industry.

65-122 Thermodynamics

Credits: 3

Hours: 4

Pre-requisite: 56-113

Fundamentals of thermodynamics including work and heat; Thermodynamic properties of fluids including ideal gases. Thermodynamic processes. Classical approach to first and second laws of thermodynamics with applications; entropy reversibility irreversibility. Applications of thermodynamic principles to air standard cycles otto cycle diesel cycle and dual cycle.

65-124 Mechanics Skill Workshop

Credits: 1

Hours: 3

Pre-requisite: None

Automotive workshops safety precautions procedures and hazardous materials. The students will be trained on using different tools devices and equipment that are encountered in automotive workshops. This shall include hand/power/special tools lifting equipment measurement tools diagnostic tools welding equipment machining equipment electrical and electronic testing devices.

65-126 Fluid Mechanics

Credits: 2

Hours: 3

Pre-requisite: 56-113

Fluid mechanics fundamentals and applications. Topics include fluid properties fluid static manometer pressure gauges classification of fluid flow conservation of mass Bernoulli's equation flow measurements friction losses in pipes and pipe system connections. Fluid mechanics application in the automotive engineering.

65-128 Automotive Material Technology

Credits: 2

Hours: 3

Pre-requisite: None

General classification of materials including metals polymers ceramics and composites. Emphasis on processing structure properties performance and selection of these materials for automotive engineering applications. Understand the different heat treatment processes their applications. Problem-solving skills are developed in the areas of materials selection evaluation measurement and testing.

65-129 Automotive Engines Technology

Credits: 3

Hours: 5

Pre-requisite: None

Automotive engines (spark –SI – and compression ignition - CI) cycles construction parts functions and materials. Engine systems such as cooling lubrication intake exhaust forced induction ignition and fuel. Students are trained to diagnose repair disassemble and reassemble engine and related parts.

65-132 Vehicle and Traffic Safety

Credits: 3

Hours: 3

Pre-requisite: None

General road safety rules. Traffic related injuries effect on life and cost for society and means to reduce these injuries and cost. Major causes of car accidents. Human physical and mental factors. Restraint designs and their principal function; for adults children and vulnerable road users. Infrastructure design to reduce accident risk and impact severity. Vehicle control and traffic procedure. Future vehicle designs.

65-133 Introduction to Automotive Engineering Technology

Credits: 2

Hours: 2

Pre-requisite: None

Introduction to automotive engineering “terminology” and the different disciplines incorporated in automotive engineering technology field as well as the skill set needed to be successful in automotive engineering technology. Focus will be on individual and professional development including team work problem identification developing analytical skills time and resource management project planning design implementation and evaluation. Role of automotive engineering technology in society. Job opportunities for automotive engineering technology.

65-134 Occupational Safety*Credits: 2**Hours: 2**Pre-requisite: None*

This course offers students an introduction to standards and guidelines for safety in automotive field with special emphasis on automotive workshops and garages. Topics include the need and justification for safety in the work place legal aspects of safety related insurance policies common incidents and accidents first aid and emergency procedures and safety investigation procedures. Furthermore it covers protection against mechanical and non-mechanical (e.g. chemical and electrical) hazards.

65-153 Transportation Economics*Credits: 2**Hours: 3**Pre-requisite: 76-105*

Study of factors affecting automotive transportation and how they affect selection of transportation units. Fixed and variable transportation costs. Transportation cost optimization. Transportation Systems management and marketing.

65-154 Heavy Equipment Technology*Credits: 2**Hours: 2**Pre-requisite: 65-129*

Heavy equipment types construction theory of operation performance characteristics and productivity rates. General hydraulic and pneumatic control and power transmission systems.

65-155 Alternative Energy Sources*Credits: 2**Hours: 2**Pre-requisite: None*

Study of alternative fuel and energy systems fuel delivery systems alternative propulsion systems hybrid and alternative propulsion. Study of energy conversion battery design fuel cells renewable and fossil fuel. Also internal combustion engines burning hydrogen and reformulated fuels. Environmental concerns with current legislative actions will be discussed.

65-205 Automotive Mechanics*Credits: 3**Hours: 3**Pre-requisite: None*

Automotive workshop safety rules. Operating principles and working cycles for automotive engines. Function components and operation of engine parts. Function components operation and troubleshooting of different automotive systems. Automotive emissions and their control devices. Automotive maintenance schedule.

65-208 Automotive Accident Analyses*Credits: 2**Hours: 2**Pre-requisite: 65-120*

Automotive Accident Analysis guides the student through every step of analyzing vehicular accidents. This course explains the procedures involved in accident investigation and reconstruction and offers a constant source of reference on topics such as occupant kinematics the history of safety equipment.

65-221 Railway Transportation Technology*Credits: 2**Hours: 3**Pre-requisite: 65-129*

A Study of the railway transportation technology aspects of efficient management of railway operations including freight, passenger, and intermodal and multi-modal transportation. Diagnosis, maintenance and repair of train units.

65-235 Automotive HVAC Systems*Credits: 2**Hours: 3**Pre-requisite: 65-122*

Study of the main components and functions of automotive heating ventilation and air conditioning systems. The course includes theory of operation diagnosis and repair of HVAC systems. Environmental safety issues are stressed including law and regulations. Computerized automatic temperature-controlled systems are also covered.

65-250 Engineering Drawing*Credits: 2**Hours: 3**Pre-requisite: 65-133*

Fundamentals of technical drawings. Drawing standards descriptive geometry Orthographic and axonometric projection methods Sectioning and Dimensioning. The students will learn freehand sketching as well as sketching with CAD packages applied to automotive engineering technology.

65-256 Internal Combustion Engines**Credits: 3****Hours: 4****Pre-requisite: 65-122**

Fuel Structure and Properties SI engine fuels and Diesel Fuels. Alternative fuels: types uses advantages and disadvantages. Combustion in SI engines normal and abnormal combustion. Combustion in CI engines normal and abnormal combustion. Combustion Chambers design. Scavenging and charging Systems. Engine Performance and related curves/graphs. Brake Power Indicated Power and Friction power. Torque Brake and Indicated Mean Effective Pressure (i.m.e.p). Fuel Consumption mechanical thermal and volumetric efficiencies. Introduction to HCCI and CAI Engines.

65-257 Automotive Fuel Systems**Credits: 3****Hours: 4****Pre-requisite: 65-129**

Study the effect of air fuel mixture on gasoline engines performance (rich stoichiometric and Lean mixtures). Study gasoline fuel system components and functions with particular emphasis placed on microprocessor control systems. Injection systems types (construction operation testing). Different types of diesel fuel systems construction theory of operation advantages & disadvantages disassembling reassembling testing and service procedures of each type. Electronically controlled systems will be covered.

65-258 Automotive Powertrain Technology**Credits: 3****Hours: 5****Pre-requisite: None**

This course covers manual automatic transmissions/transaxles and driveline components. This includes the function construction operation inspection troubleshooting and servicing of front rear and four – wheel drive power transmission devices used in passenger cars and light trucks.

65-259 Automotive Chassis Technology**Credits: 3****Hours: 5****Pre-requisite: 65-258**

Understand the construction details of various types of automotive chassis and basic functions of subsystems in the chassis. Function of suspension system brake system steering system and wheels & tiers in the vehicles.

65-260 Automotive Electrical and Electronic Systems**Credits: 3****Hours: 4****Pre-requisite: 65-129**

Study of electric and electronic circuit fundamentals functions construction operation and testing for: storage battery charging cranking and ignition systems. Study, diagnose and repair for: lighting signaling hazard flashers windscreen washers and wipers horns electric power door locks power windows analog dash instruments computer-controlled instrument panel driver information center cruise control and heating ventilation and air conditioning fundamentals.

65-261 Automotive Emission and Control**Credits: 2****Hours: 3****Pre-requisite: 65-257**

This course introduces students to the fundamentals of engine exhaust emissions including their formation, mechanisms their sources and their effects. The students will be familiarized with the present emission control technologies and future challenges. The topics covered include: engine emissions and air pollution review of emission regulations emission control systems catalyst fundamentals and catalyst-based engine after treatment techniques for gasoline diesel and lean-burn engines discussion of cold-start emission control and breakthrough catalytic technologies.

65-264 Modern Automotive Systems**Credits: 2****Hours: 3****Pre-requisite: 65-257**

Principles, concepts and components of automotive control systems. Modern control systems of engine power transmission suspension steering brakes safety and stability.

65-265 Automotive Engine Tribology**Credits: 2****Hours: 2****Pre-requisite: 65-126**

Introduction to Tribology. Engine tribology basics. Friction and wear. Friction components: crankshaft friction reciprocating friction valve train auxiliary components pumping losses. Types of wear mechanism. Factors affecting wear. Bearing lubrication and automotive lubricants. Mode of Lubrication.

65-266 Automotive Dynamometer Testing*Credits: 2**Hours: 3**Pre-requisite: 65-258*

Dynamometer types operation calibration. Methods of designing and preparing laboratories and workshops for engine/vehicle performance testing. Testing engine/vehicle performance under steady and transient operating conditions. Observing the influence of different engine subsystems (fuel injection system ignition system intake system and exhaust system) on the performance.

65-267 Automotive Safety*Credits: 1**Hours: 1**Pre-requisite: 65-258*

Introduction to vehicle safety. Safety equipment. Safety and comfort systems: antilock braking system traction control system electronic stability program low tire pressure warning system collision avoidance systems steering and mirror adjustment central locking system tire pressure control system rain sensor system and environment information system.

65-268 Diesel Systems Technology*Credits: 2**Hours: 3**Pre-requisite: 65-257*

Different types of Diesel Fuel Systems (Mechanical and Electronical) construction theory of operation advantages & disadvantages testing and service procedures of each type. Emission control systems and engine management system will be covered.

65-269 Hybrid and Electric Vehicles*Credits: 2**Hours: 3**Pre-requisite: 65-260*

Comparison between conventional automotive and hybrid and electric cars. Types characteristics operation construction and performance of hybrid and electric cars and their components. Operating economics of hybrid and electric cars.

65-350 Projects*Credits: 2**Hours: 3**Pre-requisite: 65-257*

Teams of several students conceive and complete an automotive design project under the supervision of a faculty member most often in one of the fields they studied namely automotive engine automotive systems automotive maintenance automotive safety or automotive tools. Oral presentation and written report are required.

65-356 Vehicle Dynamic*Credits: 3**Hours: 4**Pre-requisite: 65-120*

The fundamentals of vehicle dynamics including vehicle performance braking performance vehicle loads (aerodynamics rolling resistance) ride steady-state cornering suspension rollover and tires.

65-357 Automotive Drivability Diagnosis*Credits: 3**Hours: 4**Pre-requisite: 65-260*

Automotive performance diagnostic methods and strategies by using traditional and advanced diagnostic equipment. Analyzing physical measurement (pressure temperature voltage) for different automotive mechanical and electrical systems to discover the root cause of automotive performance faults.

65-358 High Performance Engines*Credits: 2**Hours: 3**Pre-requisite: 65-256*

Mechanical design requirements of high performance engines and its subsystems. Fundamentals of turbocharger selection intercooler design fuel injection requirements intake and exhaust systems control and testing engine performance.

65-399 Field Training*Credits: 4**Hours: 16**Pre-requisite: 30-162 Passing 50 credit hours*

Students should spend 14 weeks in one of automotive dealer garages to get acquainted with real life to participate in real life practices and daily work routines. The student is enrolled in small groups under mutual supervision from college and industrial establishment to carry out some assignments. Students should submit a final report at the end of training period to a committee in the department where he will be examined.