Ministry of Science Research and Technology

DANESHPAJOOHAN PISHRO
Higher Education Institute

2018

Mechanical Engineering –B.S.

DANESHPAJOOHAN PISHRO HIGHER EDUCATION INSTITUTE

- **COURSE CHART**
- **SYLLABUS**
- **SEMESTER CHART**

Mechanical Engineering Undergraduate Course Chart

General Courses

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
61-11-004	Islamic Thoughts-I	2	2	0	-----	-----
61-11-011	Islamic Thoughts-II	2	2	0	Islamic Thoughts-I	-----
61-11-003	Rite of Life (Applied Ethics)	2	2	0	-----	-----
61-11-012	Islamic Revolution of Iran	2	2	0	-----	-----
61-11-014	Analytical History of Islam	2	2	0	-----	-----
61-15-001	Persian Language	3	3	0	-----	-----
61-15-002	English Language	3	3	0	-----	-----
61-15-005	Physical Education	1	0.5	0.5	-----	-----
61-15-011	Exercise-I	1	0	1	Physical Education	-----
61-15-007	Family and Population Knowledge	2	2	0	-----	-----
61-11-008	Introduction to Constitution	2	2	0	-----	-----
61-11-013	The Holy Quran Exegesis	2	2	0	-----	-----
Total Credits		22	Note1: Only one course between 'Islamic Revolution of Iran' and 'Introduction to Constitution' shall be taken.			

Science Courses

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-019	Mathematics-I	3	3	0	-----	-----
51-11-021	Mathematics-II	3	3	0	Mathematics-I	-----
51-11-022	Differential Equations	3	3	0	------	Mathematics-II
51-11-031	Computer Programming	3	3	0	Mathematics-I	-----
51-11-023	Numerical Analysis	2	2	0	Computer Programming	-----
51-22-030	Physics-I	3	3	0	-----	-----
51-22-031	Physics-II	3	3	0	Physics-I	-----
51-22-032	Physics-I Lab	1	0	1	Physics-I	-----
51-22-033	Physics-II Lab	1	0	1	Physics-II	-----
51-22-008	General Chemistry	3	3	0	-----	-----
Total Credits		25				

Mechanical Engineering Courses

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-009	Engineering Mathematics	3	3	0	Mathematics-II, Differential Equations	-----
12-71-020	Industrial Drawing-I	2	1	1	-----	-----
12-71-021	Statics	3	3	0	Mathematics-I, Physics-I	-----
12-71-022	Dynamics	4	4	0	Statics	-----
12-71-023	Strength of Materials-I	3	3	0	Statics	-----
12-71-024	Strength of Materials-II	2	2	0	Strength of Materials-I	-----
12-71-025	Strength of Materials Lab	1	0	1	Strength of Materials-II	-----
12-71-026	Materials Science	3	3	0	General Chemistry	-----
12-71-027	Thermodynamics-I	3	3	0	Physics-I, Differential Equations	-----
12-71-028	Thermodynamics-II	3	3	0	Thermodynamics-I, Fluid Mech-I	-----
12-71-029	Thermodynamics Lab	1	0	1	Thermodynamics-II	-----
12-71-030	Fluid Mechanics-I	3	3	0	Differential Equations	Dynamics
12-71-031	Fluid Mechanics-II	3	3	0	Fluid Mechanics-I	-----
12-71-032	Fluid Mechanics Lab	1	0	1	Fluid Mechanics-II	-----
12-71-033	Design of Machine Elements-I	3	3	0	Strength of Materials-I, Dynamics	-----
12-71-034	Design of Machine Elements-II	3	3	0	Design of Machine Elements-I	-----
12-71-035	Heat Transfer-I	3	3	0	Thermodynamics-I	Fluid Mechanics-II
12-71-036	Machinery Dynamics	3	3	0	Dynamics	-----
12-71-037	Mechanical Vibrations	3	3	0	Dynamics, Engineering Mathematics	-----
12-71-038	Vibrations and Dynamics of Machinery Lab	1	0	1	Machinery Dynamics, Mechanical Vibrations	-----
12-71-039	Automatic Control	3	3	0	Mechanical Vibrations	-----
12-71-040	Fundamentals of Electrical Engineering-I	3	3	0	Physics-II	
12-71-041	Fundamentals of Electrical Engineering-II	3	3	0	Fundamentals of Electrical Engineering-I	-----
12-71-042	Fundamentals of Electrical Engineering Lab	1	0	1	-----	Fundamentals of Elec Eng-II
12-71-050	English for Mechanical Eng.	2	2	0	English Language	-----
12-71-051	Project Management and Control	2	2	0	Internship	-----
12-71-052	Industrial Drawing-II	2	1	1	Industrial Drawing-I	-----
12-71-053	Production Methods & Workshop	3	2	1	Materials Science	-----
12-71-054	Introduction to Finite Element Analysis	3	3	0	Strength of Materials-II, Numerical Analysis	-----
12-71-055	Welding & Stamping Workshop	1	0	1	-----	-----
12-71-056	Automechanics Workshop	1	0	1	-----	-----
12-71-057	Universal Machine Tools Workshop	1	0	1	-----	-----
12-71-059	Internship	1	---	---	(after passing 65 credits)	-----
12-71-058	Final Project	3	---	---	(after passing 105 credits)	-----

	Total Credits	80	Note2: All the above courses are compulsory.

Elective Courses (not complete)

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-063	Composite Materials	3	3	0	Strength of Materials-II, Materials Science	-----
12-71-066	Welding Technology	2	2	0	Materials Science	-----
12-71-067	Industrial Metals	2	2	0	Materials Science	Mathematics-II
12-71-069	Computer-Aided Design and Manufacturing	3	3	0	Numerical Methods	-----
12-71-072	Die Design	3	3	0	Materials Science	-----
12-71-074	Hydraulics, Pneumatics & Lab	3	2	1	-----	Fluid Mech-I, Automatic Control
12-71-075	Casting Lab	1	0	1	Materials Science	-----
12-71-076	Metrology	2	2	0	(after passing 50 credits)	-----
12-71-078	Heat Transfer-II	3	3	0	Heat Transfer-I	-----
12-71-080	Air Conditioning System Design-I	3	3	0	Heat Transfer-I	-----
12-71-081	Air Conditioning System Design-II	3	3	0	Air Conditioning System Design-I	-----
12-71-082	Water Distribution Systems	3	3	0	Fluid Mechanics-II	-----
12-71-085	Freezing and Cooling Systems Design	3	3	0	Heat Transfer-I	
12-71-086	Turbomachinery	3	3	0	Thermodynamics-II, Fluid Mech-II	
	Total Credits	--				

	Total Credits (All Courses)	142

Note3: After 4 semesters students have to refer to the department of mechanical engineering and coordinate their choice of 'Elective Courses'.

Mathematics-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-019	Mathematics-I	3	3	0	-----	-----

Consisted principally of one-variable Calculus, Functions, Derivative, Integrals, Integration Methods, Complex Numbers and Infinite Series.

Mathematics-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-021	Mathematics-II	3	3	0	Mathematics-I	-----

The main scope of this course is to teach the students some topics in introductory linear algebra including matrix algebra and linear transformations and multivariable calculus including multivariable functions, directional and partial derivatives, velocity and acceleration, tangent plane and normal gradient line, cylindrical and spherical coordinates, vector field and line integrals, surface integral, Green's theorem, Divergence theorem and Stoke's theorem.

Differential Equations

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-022	Differential Equations	3	3	0	------	Mathematics-II

The main reason for solving many differential equations is to try to learn something about an underlying physical process that the equation is believed to model. Gaining an understanding of a complex natural process is usually accomplished by combining or building upon simpler and more basic models. Thus a thorough knowledge of these models, the equations that describe them and their solutions, is the first and indispensable step toward the solution of more complex and realistic problems. Topics covered in this course:

Introduction to Differential Equations; First Order Differential Equations; Second Order Linear Equations; Higher Order Linear Equations; Series Solutions of Second Order Linear Equations; The Laplace Transform; Systems of First Order Linear Equations;

Computer Programming

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-031	Computer Programming	3	3	0	Mathematics-I	-----

Explanation of main computer parts; The concept of software and hardware; Algorithms design and an introduction to a structured computer programming language.

Numerical Analysis

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-023	Numerical Analysis	2	2	0	Computer Programming	-----

This course is an introduction to numerical methods for solving mathematical problems that arise in Science and Engineering. The goal is to provide a basic understanding of the derivation, analysis and use of these numerical methods. Topics covered in this course:

Error Analysis; Numerical solution of Nonlinear Equations; Interpolation, Polynomial Approximation, Curve Fitting; Numerical Differentiation and Integration; Numerical Solution of Ordinary Differential Equations; Solutions of Systems of Equations.

Physics-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-22-030	Physics-I	3	3	0	-----	-----

To provide tools by which students can learn how to effectively read scientific material, identify fundamental concepts, reason through scientific questions, and solve quantitative problems. Physics-I is the first course of this set. This course covers the fundamental concepts in Classical Mechanics and Thermodynamics.

Physics-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-22-031	Physics-II	3	3	0	Physics-I	-----

The main goal of fundamental courses in physics is to provide tools by which students can learn how to effectively read scientific material, identify fundamental concepts, reason through scientific questions, and solve quantitative problems. Physics-II is the second course of this set. This course covers the fundamental concepts in Electromagnetism and includes:

Physics-I Lab

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-22-032	Physics-I Lab	1	0	1	Physics-I	-----

The main goal of this course is to introduce students to practical topics of Physics-I. Topics covered in this course:

Inclined planes experiments; Thermal conductivity of materials testing; Pendulum and spring tests; Calculating the friction of different surfaces; …

Physics-II Lab

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-22-033	Physics-II Lab	1	0	1	Physics-II	-----

Examination of various materials thermal resistance; Examination of Gauss's Law; Magnetic force testing; Electrical currents testing.

Electric Charge and Electric Field; Gauss's Law; Electric Potential; Capacitance and Dielectrics; Current, Resistance, and Electromotive Force; Direct-Current Circuits; Magnetic

Field and Magnetic Forces; Sources of Magnetic Field; Electromagnetic Induction; Inductance; Alternating Current; Electromagnetic Waves.

General Chemistry

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-22-008	General Chemistry	3	3	0	-----	-----

To teach students to think about the properties and behavior of the macroscopic world in terms of the structure and arrangement of the constituent molecules and atoms.

Engineering Mathematics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
51-11-009	Engineering Mathematics	3	3	0	Mathematics-II, Differential Equations	-----

Engineering mathematics is a branch of applied mathematics that concerns itself with mathematical methods and techniques that are typically used in engineering and industry. Engineering mathematics consisted principally of Fourier analysis, Partial differential equations, Complex analysis, Integral transforms and Calculus of variations. Contents covered in this course:

Fourier Series, Integrals and The Fourier Transform; Partial Differential Equations; Complex Analysis; Calculus of Variations.

Industrial Drawing-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-020	Industrial Drawing-I	2	1	1	-----	-----

Introduction to graphic language and design — means and techniques; The third and the first angle projections; Orthographic projection of points, lines, planes and solids; Principal and auxiliary views; Views in a given direction; Sectional views; Intersection of lines, planes and solids; Development of surfaces; Drafting practices; Dimensioning, fits and tolerancing.

Statics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-021	Statics	3	3	0	Mathematics-I, Physics-I	-----

This course presents analytical mechanics of particles, rigid bodies and mechanical structures when the system is in static equilibrium and includes:

Statics of Particles, Rigid Bodies: Equivalent Systems of Forces, Equilibrium of Rigid Bodies, Distributed Forces: Centroids and Centers of Gravity, Analysis of Structures, Forces in Beams and Cables, Friction, Distributed Forces: Moments of Inertia, Method of Virtual Work.

Dynamics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-022	Dynamics	4	4	0	Statics	-----

This course is the study of forces, applied on particles, rigid bodies and mechanical structures and furthermore it studies the resulting motion. Topics covered in this course:

Kinematics of Particles, Kinetics of Particles: Newton's Second Law, Kinetics of Particles: Energy and Momentum Methods, Systems of Particles, Kinematics of Rigid Bodies, Plane Motion of Rigid Bodies: Forces and Accelerations, Plane Motion of Rigid Bodies: Energy and Momentum Methods, Kinetics of Rigid Bodies in Three Dimensions, Mechanical Vibrations.

Strength of Materials-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-023	Strength of Materials-I	3	3	0	Statics	-----

Calculation of the deformation of various bodies under a variety of loads. Topics covered in this course: Stress; Torsion; Bending; Deflection; General stress-strain relations.

Strength of Materials-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-024	Strength of Materials-II	2	2	0	Strength of Materials-I	-----

Transformation of stress and strain and yield criteria; Deflection of beams; Stability of equilibrium; Design of columns; Energy and virtual work methods; Statically indeterminate problems; Plastic limit analysis.

Strength of Materials Lab

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-025	Strength of Materials Lab	1	0	1	Strength of Materials-II	-----

Selected experiments covering the main subjects of strength of materials, including:

Testing methods to calculate tensile, torsion and compressive stress; Examining parameters of hardness, toughness, abrasion and … in different experimental conditions.

Materials Science

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-026	Materials Science	3	3	0	General Chemistry	-----

Relationships between properties and internal structure; Atomic bonding; Molecular, crystalline and amorphous structures; Crystalline imperfections and mechanisms of structural change; Microstructures and their development from phase diagrams; Structures and mechanical properties of polymers and ceramics; Thermal, optical, and magnetic properties of materials.

Thermodynamics-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-027	Thermodynamics-I	3	3	0	Physics-I, Differential Equations	-----

Learning the fundamental laws of thermodynamics. Topics covered in this course: Definitions; Properties of Pure Substance; Work and Heat; First Law of Thermodynamics.

Thermodynamics-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-028	Thermodynamics-II	3	3	0	Thermodynamics-I, Fluid Mech-I	-----

Learning different cycles, the second law of thermodynamics. Topics covered in this course:

Second Law of Thermodynamics; Entropy; Cycles; Thermodynamic Relations; Mixtures; Chemical Reactions; Compressible Flow.

Thermodynamics Lab.

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-029	Thermodynamics Lab	1	0	1	Thermodynamics-II	-----

Selected experiments covering the main subjects of thermodynamics.

Practical introduction of First Law of Thermodynamics and Air Conditioning Systems.

Fluid Mechanics-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-030	Fluid Mechanics-I	3	3	0	Differential Equations	Dynamics

The goal of the course is to introduce the students to the science and practice of Fluid Mechanics. It is intended to develop an understanding of the basic equations governing the mechanics of fluid flows. Contents covered in this course:

Introduction to Fluid Properties; Fluid Statics; Fluid Dynamics; Dimensional Analysis; …

Fluid Mechanics-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-031	Fluid Mechanics-II	3	3	0	Fluid Mechanics-I	-----

Learning velocity and pressure distribution in different kinds of flows; Learning different phenomena in fluid flow including boundary layer, separation, learning internal and external flows. Topics covered in this course: Ideal Fluid; Real Fluid; Fluid Measurement; …

Fluid Mechanics Lab.

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-032	Fluid Mechanics Lab	1	0	1	Fluid Mechanics-II	-----

Selected experiments covering the main subjects of fluid mechanics.

Introduction to fluidic currents and forces applied to objects; Studying the Law of Viscosity; Understanding the amount of torsion stress applied to walls of the shells.

Design of Machine Elements-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-033	Design of Machine Elements-I	3	3	0	Strength of Materials-I, Dynamics	-----

Introduction to machine design: static failure theories, failure of ductile vs. brittle materials under static loading; Fatigue failure theories: fatigue loads, notches and stress concentrations, residual stresses, designing for high cycle fatigue; Design of shafts, keys and couplings; Design of spur gears; Spring design; Design of screws and fasteners; Design of bearings.

Design of Machine Elements-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-034	Design of Machine Elements-II	3	3	0	Design of Machine Elements-I	-----

Learning design for different bearings, gears, pulleys and etc. Topics covered in this course:

Ball-Bearings and Roller-Bearing; Belts; Gears; Materials.

Heat Transfer-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-035	Heat Transfer-I	3	3	0	Thermodynamics-I	Fluid Mechanics-II

Learning different mechanisms of heat transfer in solids and fluids. Topics covered in this course:
Introduction; Conduction Heat Transfer; Convection, Internal Flows; Convection, External Flows; Heat Exchangers.

Machinery Dynamics

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-036	Machinery Dynamics	3	3	0	Dynamics	-----

Studying the relative motion of machine parts, studying forces acting on the parts and the motion resulting from these forces. Topics covered in this course:

Fundamental concepts; Cams; Gears; Balancing of Rotating Systems; Balancing of Reciprocating Systems; Forces and Torques.

Mechanical Vibrations

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-037	Mechanical Vibrations	3	3	0	Dynamics, Engineering Mathematics	-----

Learning the dynamics of vibratory systems, degrees of freedom and damping vibrations. Contents covered in this course:

Vibrational Motion; Free Vibrations; Forced Vibrations; Two-Degree-of-Freedom Systems; Critical Speed for rotating shafts; Multi-Degree-of-Freedom Systems.

Vibrations and Machinery Dynamics Laboratory

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-038	Vibrations and Dynamics of Machinery Lab	1	0	1	Machinery Dynamics, Mechanical Vibrations	-----

Experiment on single- and two-degree-of-freedom systems, rotating bodies, cams, etc.
Vibrations: vibration of single- and two-degree-of-freedom systems, free and forced vibrations, natural frequency.
Machinery Dynamics: Experiment on Gear systems, dynamical stability of rotating bodies, cams, clutches.

Automatic Control

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-039	Automatic Control	3	3	0	Mechanical Vibrations	-----

Learning the analysis and design of control systems. Topics covered in this course:

Introduction; Mathematical modeling of physical systems; Linear systems; Characterization of systems; Design of Control Systems.

Fundamentals of Electrical Engineering-I

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-040	Fundamentals of Electrical Engineering-I	3	3	0	Physics-II	

Dependent sources; Voltage and current dividers; Voltage and current sources; Superposition; Linear and nonlinear circuit analysis.

Fundamentals of Electrical Engineering-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-041	Fundamentals of Electrical Engineering-II	3	3	0	Fundamentals of Electrical Engineering-I	-----

Introduction to Control and Precision Engineering, and components such as sensors and actuators. Introduction to PLC.

Fundamentals of Electrical Engineering Lab

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-042	Fundamentals of Electrical Engineering Lab	1	0	1	-----	Fundamentals of Elec Eng-II

The main purpose of this course is to train the relevant works in Electronics Laboratory.

Teaching Single-Phase and Three-Phase Transformers and Their Shunt Connection, Relays, Fuses, High-Voltage and Low-Voltage Cables.

English for Mechanical Engineering

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-050	English for Mechanical Eng.	2	2	0	English Language	-----

Introduction to technical words and expressions within the field of Mechanical Engineering. Introduction to some important processes through audiovisual means

Project Management and Control

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-051	Project Management and Control	2	2	0	Internship	-----

Introduction to related topics of Management and Industrial Engineering such as: storage quantity control, calculating the possible income and profit of products, …

Industrial Drawing-II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-052	Industrial Drawing-II	2	1	1	Industrial Drawing-I	-----

Descriptive geometry (orthogonal projection, point, line, plane); Determination of length, distance, angle, and area; Method of rotation and replacing planes of projection; Intersections of lines, planes ,and volumes; Perspectives; Various types of industrial drawings; Introduction to AUTOCAD software.

Production Methods & Workshop

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-053	Production Methods & Workshop	3	2	1	Materials Science	-----

Casting; Powder metallurgy; Hot and cold forming processes; General hand-workings of metals in cold state; …

Introduction to Finite Element Analysis

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-054	Introduction to Finite Element Analysis	3	3	0	Strength of Materials-II, Numerical Analysis	-----

Formulation and application of the finite element method to modeling of engineering problems; Examples illustrating the direct approach, as well as variational and weighted residual methods; Elements and interpolation functions; Meshing effect; Error analysis; One- and two-dimensional boundary value problems.

Welding and Stamping Workshop

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-055	Welding & Stamping Workshop	1	0	1	-----	-----

Introduction to Manual Arc Welding, TIG, MAG, MIG, and Technology of welding, Heat sources for welding and cutting, Heating effects before and after welding, Welding cracks, Effects of alloys on welded structures, and Mechanical properties of welded structures.

Automechanics Workshop

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-056	Automechanics Workshop	1	0	1	-----	-----

Practical introduction to various systems in an automobile; Dismantling and mantling engines, gearboxes, differential gear and …

Universal Machine Tools Workshop

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-057	Universal Machine Tools Workshop	1	0	1	-----	-----

The main goal of this course is to introduce students to various machinery processes, including: Lathing, Milling, Drilling and …

Internship

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-059	Internship	1	---	---	(after passing 65 credits)	-----

Practical introduction of studied courses through the university, in industrial environments.

Final Project

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-058	Final Project	3	---	---	(after passing 105 credits)	-----

Teaching students how to do researches, gather information, categorize data and present results based on data.

Composite Materials

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-063	Composite Materials	3	3	0	Strength of Materials-II, Materials Science	-----

Introduction, definition, and classifications of composite materials; Introduction to processing methods, physical properties, and mechanical behavior of composite materials.

Mechanical Engineering Syllabus

Industrial Metals

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-067	Industrial Metals	2	2	0	Materials Science	Mathematics-II

Introduction to modern methods of metals and various materials identification.

CAD/CAM

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-069	Computer-Aided Design and Manufacturing	3	3	0	Numerical Methods	-----

Computer-aided drafting (CATIA). Drawing, editing, and dimensioning. Finite element analysis.

Die Design

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-072	Die Design	3	3	0	Materials Science	-----

Theory of cutting; Types of cutting dies; Theory of bending; Types of bending dies; Theory of deep drawing; Types of deep drawing dies; Principles of die casting; Principles of Injection dies.

Air Conditioning System Design-I, II

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-080	Air Conditioning System Design-I	3	3	0	Heat Transfer-I	-----
12-71-081	Air Conditioning System Design-II	3	3	0	Air Conditioning System Design-I	-----

Load estimating; Apparatus and duct design for air distribution; Water and steam piping design; Auxiliary equipment (pumps, motors, boilers); Water and dam systems; Fan-coil unit systems.

Water Distribution Systems

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-082	Water Distribution Systems	3	3	0	Fluid Mechanics-II	-----

Water cycle; Urban and industrial water resources; Water distribution through pipes and channels and their design issues; Industrial water distribution systems; Design examples.

Turbomachinery

Course Code	Course Title	Credits	Theoretical	Practical	Pre-requisite	Simultaneous
12-71-086	Turbomachinery	3	3	0	Thermodynamics-II, Fluid Mech-II	

Definitions and classifications; Theory of Turbomachineries; Dimensional analysis; Design and applications of turbo- machineries.

Mechanical Engineering-B.S. Semester Chart

Guide: ME = Mechanical Engineering, S = Science, G = General Course, E = Elective Course
Course title columns: Credits / Course type

Semester 1 (Total 18)

Course title	Credits	Course type
Mathematics-I	3	S
Persian Language	3	G
English Language	3	G
Industrial Drawing-I	2	ME
General Chemistry	3	S
Physics-I	3	S
Physical Education	1	G

Semester 2 (Total 20)

Course title	Credits	Course type
Physics Lab-I	1	S
Islamic Thoughts-I	2	G
Mathematics-II	3	S
Industrial Drawing-II	2	ME
Statics	3	ME
Physics-II	3	S
Computer Programming	3	S
Differential Equations	3	S

Semester 3 (Total 19)

Course title	Credits	Course type
Physics Lab-II	1	S
Islamic Thoughts-II	2	G
Exercise-I	1	G
Strength of Materials-I	3	ME
Numerical Methods	2	S
Thermodynamics-I	3	ME
Dynamics	4	ME
Fluid Mechanics-I	3	ME

Semester 4 (Total 18)

Course title	Credits	Course type
Welding & Stamping Workshop	1	ME
Universal Machine Tools Workshop	1	ME
Strength of Materials-II	2	ME
Engineering Mathematics	3	S
Thermodynamics-II	3	ME
Materials Science	3	ME
Fluid Mechanics-II	3	ME
The Holy Quran Exegesis	2	G

Semester 5 (Total 18)

Course title	Credits	Course type
Islamic Revolution of Iran	2	G
Strength Of Materials Lab.	1	ME
Mechanical Vibrations	3	ME
Fundamentals of Electrical Engineering-I	3	ME
Heat Transfer-I	3	ME
Design of Machine Elements-I	3	ME
Production Methods & workshop	3	ME

Semester 6 (Total 18)

Course title	Credits	Course type
Rite of Life (Applied Ethics)	2	G
Automechanics Workshop	1	ME
Fundamentals of Electrical Engineering-II	3	ME
Fundamentals of Electrical Eng. Lab.	1	ME
Machinery Dynamics	3	ME
Automatic Control	3	ME
Design of Machine Elements-II	3	ME
English for Mechanical Engineers	2	ME

Semester 7 (Total 17)

Course title	Credits	Course type
Fluid Mechanics Lab.	1	ME
Family and Population Knowledge	2	G
Elective Courses	7	E
Internship	1	ME
Fluid Mechanics Lab.	1	ME
Introduction to Finite Element Analysis	3	ME
Project Management and Control	2	ME

Semester 8 (Total 14)

Course title	Credits	Course type
Analytical History of Early Islam	2	G
Final Project	3	ME
Elective Courses	8	E
Vibrations and Dynamics of Machinery Lab.	1	ME

Elective Courses (Credits)

Metrology (2)	Hydraulics, Pneumatics & Lab. (3)	Computer-Aided Design and Manufacturing (3)
Welding Technology (2)	Industrial Metals (2)	Introduction to Mechatronics (3)
Composite Materials (3)	Fuel & Combustion (2)	Turbomachinery (3)
Casting Lab. (1)	Air Conditioning System Design (3)	Freezing and Cooling Systems Design (3)
Heat Transfer-II (3)	Water Distribution Systems (3)	Die Design Fundamentals (3)