Al-Balqa' Applied University

Curriculum for the Bachelor Degree in Production Engineering and Machines

The curriculum for the B.S.c. degree in ***Production Engineering and Machines*** (160) credit hours are distributed as follows:-

No.	Requirements	Credit Hours
1	University Requirements • Compulsory • Elective	 21 6
2	Faculty Requirements	27
3	Specialization Requirements • Compulsory • Elective	 89 6
4	Supportive Specialization Requirements	11
Total		**160**

Curriculum for the Bachelor Degree in Production Engineering and Machines

First : University Requirement (27 Cr .H.)

A: Compulsory Requirements (21 Cr.H.):

Course No.	Course Title	Cr.H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
35003101	Arabic (1)	3	3	--	--
35003102	Arabic (2)	3	3	--	35003101
35004101	English (1)	3	3	--	--
35004102	English (2)	3	3	--	35004101
35005101	Computer Skills (1)	3	--	6	--
35001101	Military Sciences	3	3	--	--
35002100	National Education	3	3	--	

B: Elective University Requirements : (6 Cr.H.)

The student is allowed to select (6 Cr.H.) from the university elective courses offered by faculties other than the faculty of college.

Course No.	Course Title	Cr.H
36001101	Communication skills	3
36002102	Introduction to Psychology	3
36003103	Jordanian Society	3
36004104	Sport for All	3
36005105	Islamic Culture	3
36006106	Administration and Economic Concepts	3
36007107	Agriculture in Jordan	3
36008108	Environment and Society	3
36012109	The Orthodox Caliphs History	3

Curriculum for the Bachelor Degree in Production Engineering and Machines

Second: Faculty Requirements: (27 Cr .H.)

Course No.	Course Title	Cr.H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
30202101	Calculus 1	3	3	-	-
30202102	Calculus 2	3	3	-	30202101
30201101	Physics 1	3	3	-	-
30201111	Physics Lab. 1	1	-	3	30201101*
30201102	Physics 2	3	3	-	30201101
30201112	Physics Lab. 2	1	-	3	30201102*
30206101	General Chemistry 1	3	3		
30129101	Engineering Workshops	1	-	3	-
30129203	Engineering Drawing	2		6	35005101
30206111	General Chemistry lab	1	-	3	30206101*
30129201	Static	3	3	-	30202102, 30201101
30801101	Computer Skills 2	3	2	3	35005101

Third: Specialization Requirements: (95 Cr. H.)

A- Compulsory Requirements (89 Cr. H.)

Course No.	Course Title	Cr.H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
30131221	Mechanical Drawing	2	-	6	30130102
30130325	Thermodynamics	3	3	-	30201101
30130328	Heat Transfer	3	3	-	30130325
30130421	Heat Transfer Lab.	1	-	3	30130328
30131321	Strength of Materials	3	3	-	30130102
30131322	Strength of Materials Lab.	1	-	3	30131321
30131324	Dynamics	3	3	-	30130201
30131325	Mechanical Vibration	3	3	-	30131324
30131326	Mechanical Design	3	3	-	30131321
30131327	Dynamics and Vibration Lab.	1	-	3	30131325
30131331	Material Science	3	3	-	30131321
30131332	Material Science Lab.	1	-	3	30131331
30131341	Metrology Science	3	3	-	30131321
30131342	Metrology Science Lab.	1	-	3	30131341
30131351	Fluid Mechanics & Hydraulic Machines	3	3	-	30130325
30131362	Theory of Machines	3	3	-	30131324
30131371	Numerical Analysis	3	3	-	30130336
30131431	Metallurgical Science	3	3	-	30131331

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course No.	Course Title	Cr.H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
30131432	Metallurgical Science Lab.	1	-	3	30131431
30131441	Automatic control	3	3	-	30130336
30130442	Automatic Control Using Matlab	1	-	3	30131441
30131451	Fluid Mechanics & Hydraulic Machines Lab.	1	-	3	30131351
30131452	Casting Technology	3	3	-	30131331
30131453	Casting Technology Workshop	1	-	3	30131452
30131454	Welding Technology	3	3	-	30131431
30131455	Production Engineering (1)	3	3	-	30131452
30131456	Production Engineering(1) Workshop	1	-	3	30131455
30131461	Theory of Machines Lab.	1	-	3	30131362
30131551	Welding Technology Workshop	1	-	3	30131454
30131552	Production Engineering (2)	3	3		30131455
30131553	Industrial Management & Engineering Economy	3	3	-	30131371
30131554	Production Engineering(2) Workshop	1	-	3	30131552
30131561	Cutting Tool Technology	3	3	-	30131362
30131562	Cutting Tool Technology Workshop	1	-	3	30131561
30131563	CAD/CAM	3	3	-	30131561
30131564	CAD/CAM Lab.	1	-	3	30131563
30131542	Practical Training	6	-	-	100 Cr. H.**
30131591	Project 1	3	-	-	120 Cr. H.
30131592	Project 2	3	-	-	30131591

*** Synchronous**

**** Each (3) credit hours is equivalent to (140) training Hours.**

B: Elective Specialization requirements: (6) Cr. H. to be selected from the following list:

Course No.	Course Title	Cr. H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
30131543	Quality Control	3	3	-	30131441
30131544	Robotics	3	3	-	30131324
30131555	Composite Materials	3	3	-	30131331
30131557	Tribology	3	3	-	30131341
30131556	Design of experiments	3	3	-	30130336
30131578	Industrial Automation	3	3	-	30104243

Fourth: Supportive Specialization Requirements: (11 Cr .H.)

Course No.	Course Title	Cr. H.	Weekly Hours		Prerequisite
			Lecture	Lab.	
30104213	Electric Circuit	3	3	-	30201102
30104243	Electronics	3	3	-	30104213
30104214	Electric circuit Lab.	1	-	3	30104213*
30104344	Electronics Lab.	1	-	3	30104243*
30130336	Applied math.	3	3	-	30202102

*** Synchronous**

Curriculum for the Bachelor Degree in Production Engineering and Machines

First Year					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Cr. H.**	**Course No.**	**Course Title**	**Cr. H.**
35003101	Arabic Language (1)	3	35005101	Computer Skills	3
35004101	English Language (1)	3	35003102	Arabic Language (2)	3
30201101	Physics (1)	3	35004102	English Language (2)	3
30201111	Physics Lab. (1)	1	30201102	Physics (2)	3
30206101	Chemistry (1)	3	30201112	Physics Lab. (2)	1
30202101	Mathematics(1)	3	30202102	Mathematics (2)	3
			30206111	Chemistry Lab.(1)	1
Total		**16**	**Total**		**17**

Second Year					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Cr. H.**	**Course No.**	**Course Title**	**Cr. H.**
35001101	Military Sciences	3	30131322	Strength of Materials Lab	1
30801101	Computer skills (2)	3	35002100	National Education	3
30130102	Engineering Drawing	2	30104243	Electronics	3
30130201	Statics	3	30104214	Electric Circuits Lab	1
30104213	Electric Circuits	3	30131221	Mechanical Drawing	2
30130101	Engineering Workshops	1	30130336	Applied Mathematics	3
			30131321	Strength of Materials	3
Total		**15**	**Total**		**16**

Curriculum for the Bachelor Degree in Production Engineering and Machines

Third Year					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Cr. H.**	**Course No.**	**Course Title**	**Cr. H.**
30131331	Material Science	3		University Elective	3
30130325	Thermodynamics	3	30131362	Theory of Machines	3
30131341	Metrology Science	3	30131324	Mechanical Design	3
30131342	Metrology Science Lab	1	30131351	Fluid Mechanics & Hydraulic Machines	3
30131371	Numerical Analysis	3	30131325	Dynamics and Vibration Lab	1
30131324	Dynamics	3	30131332	Material Science Lab.	1
30104344	Electronics Lab	1	30131325	Mechanical Vibration	3
Total		**17**	**Total**		**17**

Fourth Year					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Cr. H.**	**Course No.**	**Course Title**	**Cr. H.**
30131461	Theory of Machines Lab	1	30131456	Production Engineering workshop (1)	1
30131441	Automatic control	3	30131452	Casting Technology	3
30131451	Fluid Mechanics & Hydraulic Machines Lab.	1	30131454	Welding Technology	3
30131431	Metallurgical Science	3	30131455	Production Engineering (1)	3
30131432	Metallurgical Science Lab	1	30131453	Casting Technology Workshop	1
30130328	Heat Transfer	3	30131442	Automatic control using MATLAB	1
30130421	Heat Transfer Lab	1		University Elective	3
Total		**13**	**Total**		**15**

Curriculum for the Bachelor Degree in Production Engineering and Machines

Fifth Year					
First Semester			**Second Semester**		
Course No.	**Course Title**	**Cr. H.**	**Course No.**	**Course Title**	**Cr. H.**
	Specialization Elective	3		Specialization Elective	3
30131551	Welding Technology Workshop	1	30131552	Production Engineering (2)	3
30131562	Cutting Tool Technology Workshop	1	30131554	Production Engineering Workshop (2)	1
30131561	Cutting Tool Technology	3	30131563	CAD/CAM	3
30131553	Industrial Management & Engineering Economy	3	30131592	Project (2)	3
30131591	Project (1)	3	30131564	CAD/CAM Lab	1
Total		**14**	**Total**		**14**

Course No.	Course Title	Cr. H.
30131542	**Practical Training***	**6**

*** After 120 Cr. Hrs.**

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

35003101 Arabic Language 1 3(3-0)

This course contains a set of linguistic skills in different levels such as the sounds of the Arabic language, its morphology, syntax, rhetoric, lexicography and writing. It includes as well as on applications on the use of Arabic dictionaries and applications on some writing skills indispensable for scholars in their working lives. It also contains a refined set of Quranic, poetry and short stories of Arabic texts to give the learners the opportunity to be in contact with and to appreciate these texts.

Pre-req. Arabic 99 or passing Arabic Level Exam

35003102 Arabic Language 2 3(3-0)

This course aims to develop student's skills in writing and expression and to provide him with the necessary and basic ones in order to employ them in his daily use, and enable him to stand on the origins of various Arabic scripts, and access to various forms of technical and functional old and new writing.

Pre-req. 35003101

35004101 English 1 3(3-0)

Is a complete graded course for foreign learners of English; it covers the skills of listening, speaking, reading, and writing; as well as improving pronunciation and building vocabulary; particular emphasis is placed on listening and speaking; the language of the course is British English.

Pre-req. English 99 or passing English Level Exam

35004102 English 2 3(3-0)

Is a continuation of English I Course in terms of approach and methodology However, it covers a new range of interesting topics, and provides a more advanced grammar syllabus in a communicative context as well, therefore, this topic tends to be a continuation of ENGL 101 goals.

Pre-req. 35004101

35005101 Computer Skills 1 3(0-6)

An introduction to computing and the broad field of information technology. Topics covered include the basic structure of digital computer systems; operating systems; application software; data communication and networks; and the Internet hands-on learning emphasizes windows (latest operating systems); MS-Office; and the Internet.

35001101 Military Science 3(3-0)

This course aims at providing university students with general military culture and illustrating the overall military capabilities of the armed forces to defend the homeland and its role in development and service of the Jordanian society through lectures and field visits.

35002100 National Education 3(3-0)

The course of National Education is one of the compulsory requirements of all students in Jordanian universities, national and private. The general intent is to provide students with the theoretical and practical knowledge of the homeland (Jordan), land and people, and to consolidate the love of the homeland and national brotherhood in them, to motivate them to serve the nation and the people consciously and sincerely, to be innovative and competitive by exhortations to achieve the desired progress in various fields of life.

30202101 Calculus 1 3(3-0)

Review: functions, limits and continuity, the derivative integration, definite integral, indefinite integral, fundamental theorem of calculus, mean value theorem for integral area, volume of solid revolution, arc length, and surface area.

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30202102 Calculus 2 3(3-0)

Exponential, logarithmic, and inverse trigonometric functions hyperbolic functions, differentiations, integration, and limits of these function, principles of integral evaluation integration by parts, trigonometric substitution, partial fraction radical expression, infinite series, theorems in convergence and divergence, analytic geometry in calculus.(polar coordinate functions).

Pre-req. 30202101

30201101 Physics 1 3(3-0)

Physics and measurements; vectors; motions in one dimension; motion in a plane; laws of motion; circular motion; Newton's laws and applications; work and energy; law of gravity; linear momentum and collisions; rotation of a rigid object about a fixed axis; rolling motion; angular momentum and torque.

30201102 Physics 2 3(3-0)

Electric charge and Coulomb's law; Electric fields and Gauss law; electric potential; potential energy, capacitors and dielectrics; DC and resistance; direct current circuits; magnetic fields; sources of magnetic field; Faraday's law; inductance; alternating current circuits; electromagnetic waves.

Pre- req. 30201101

30201111 Physics Lab 1 1(0-3)

Measurement and errors; vectors; rectilinear motion; projectile motion; Newton's second law; friction; collisions; circular motion; rotational motion; simple harmonic motion.

Co-req. 30201101

30201112 Physics Lab 2 1(0-3)

Electric field mapping; Ohm's construction law; Wheatstone bridge; electric power; potentiometer; Kerchief's laws; charging and discharging circuits (R-C circuits); magnetic torque on a loop; Faraday's laws of magnetic induction; resonance in R-L-C circuits.

Co-req. 30201102

30146210 Statics 3(3-0)

Basic definitions and concepts Statics of particles; rigid bodies; equivalent systems of forces; centurions and centers of gravity; analysis of structures: frames, machines, and trusses; friction; moments of inertia; computer-aided statics.

Pre-req. 30202102, 30201101

30801101 Computer Skills 2 3 (2-3)

Computer programming languages and their implementation; including; writing flow charts, the basic C++ programming variable definitions, templates, branches, loops, functions, arrays, strings, pointers, files, introduction to object-oriented programming, applications.

Pre req. 35005101

30206101 Chemistry 1 3 (3-0)

Periodic table; atomic stricture and chemical bonds; electron configuration; chemical stoichiometry; Redo-system; chemical equilibrium; thermodynamic; chemical kinetics; electro-chemistry

30206111 Chemistry Lab 1 1 (0-3)

Basic concepts, atomic theory and periodic table. Chemical bonding and molecular structure. Chemical reactions in solutions, oxidation-reduction reactions, ideal gases, states of matter and intermolecular forces. Physical properties of solutions and colloids. Chemical equilibrium, solubility, molecular structure, types of chemical reactions. Thermodynamics principles and kinetics. Organic chemistry.

Co-req. 30206101

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30129131 Engineering Workshops 1(0-3)

Mechanical works including: hand filing, turning, welding, metal cutting, casting and molding, electrical circuits; elements of electrical circuits; open and closed circuits; AC/DC circuits; instruments and measurements. Carpentry works including: types of timber, timber works, equipment and tools.

30129231 Engineering Drawing 2(0-6)

Use of instruments; lettering; graphic geometry; orthographic; isometric drawing and sketching; environmental applications; Introduction to AutoCAD, application of AutoCAD, commands, geometric entities. Geometric construction. Dimensioning, free –hand sketching, object representation, orthographic drawing and projections.

Pre-req. 35005101

30131221 Mechanical Drawing 2(0-6)

Sectional views; sectioning in machine parts drawing; threads; bolted joints: studded; screw fastening, cotter; keyed; splined joints, gears and bearing. drawing Detailing; assembly drawing; reading and drawing tolerances; fittings and surface roughness; AutoCAD Applications.

Pre. Request: 30130102

30131321 Strength of Materials 3(3-0)

Principles of statics, including equilibrium and static equivalents. Determination of moments and force resultants in slender members. Introduction to mechanics of deformable bodies, concepts of stress and strain, classification of materials behavior, stress-strain relations and generalized Hooke's Law. Application of engineering problems involving members under axial load, torsion of circular rods and tubes, bending and shear stresses in beams, combined stresses in beams, deflection of beams, buckling of columns.

Pre. Request: 30130102

30131322 Strength of Materials Lab 1(0-3)

Applying theory gained within the strength of materials theoretical through practical experimentation. Tensile; compression; bending; torsion; buckling of columns; impact; hardness, springs under axial loading; rubber shearing.

Co. Request: 30131321

30131331 Material Science 3(3-0)

Engineering materials and their properties. Material classification. Crystal structure of metals. Deformation mechanisms. Relation of properties to microstructure. Mechanical properties including fatigue and creep. Fracture mechanisms. Elastic-plastic behavior. Stress concentration. Phase diagrams, Iron-iron carbon diagram. Heat treatment of steels. Surface treatment. Composite materials. Modern metallographic techniques.

Pre. Request: 30131321

30131332 Material Science Lab. 1(0-3)

Metallographic. Heat treatment. Mechanical testing of metals and plastics. Hardness tests. Specimen preparation and surface treatment. Microscopic examination of metal hardness. Metal heat coefficients. A study of the stages and properties of molten metals

Co. Request: 30131331

30130325 Thermodynamics 3(3-0)

Thermodynamics concepts and definitions, states, properties, systems, control volume, processes, cycles, units, tables of properties, work and heat, first law, internal energy and enthalpy, conservation of mass, steady–state and uniform state processes, second law, heat engines and refrigerators, reversible processes, Carnot cycle, entropy, Claudius inequality, principle of the increase of entropy, efficiencies.

Pre requisite 30201102

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30130328 Heat Transfer 3(3-0)

Heat transfer methods, Conduction heat transfer in the dimensional steady flow, Heat capacitance, Convection Heat transfer, Empirical and practical equation of convective heat transfer, free convection, condensation and Vaporization, Fundamentals of radioactive heat transfer.

Pre. Request: 30130325

30130421 Heat Transfer Lab. 1(0-3)

Conduction, radial and axial along different shapes and bars, radiation, Stefan-Boltzmann law, Kirchhoff law, Lambert cosine law, convective, heat exchangers, radiations heat transfer, boiling heat transfer.

Co. Request: 30130328

30131341 Metrology 3(3-0)

Introduction to Metrology. Errors in measurements. Application of least squares principles. Magnification methods. Limits and fits. Gauges. Basic measuring and gauging instruments. Standards of length, angular measurement and circular division. Measurement of straightness, roundness, clindricity, squareness and flatness. Surface textures. Screw threads. Gear metrology. Metrology and quality control.

Pre. Request :30131321

30131342 Metrology Lab. 1(0-3)

Linear measurements. Angle measurements. Block gauges. Sine bar. Screw threads measurements. Surface texture. Straightness. Flatness. Alignment. Roundness. Gear metrology

Co. Request:30131341

30131362 Theory of Machines 3(3-0)

Kinematics and kinetics of mechanisms. Determination of velocity and acceleration in various mechanisms such as linkages, cams, gears, and other mechanisms. Theory of clutches, brakes, couplings, flywheels, belts, chains, governors and gyroscopes. Gear trains. Balancing of rotating parts.

Pre. Request :30131324

30131461 Theory of Machines Lab. 1(0-3)

Experiments on linkages, cams, gears and other mechanisms. Experiments on gyroscopes, governors, balancing of rotors. Gear trains. Experimental determination of moments of inertia for various components.

Co. Request: 30131362

30131563 CAD/CAM 3(3-0)

Engineering production specifications, geometric tolerance, CAD, Geometric modeling, Fundamental of Industrial control, sensors and actuators. Numerical control, NC part programming, DNC, CNC and adaptive control, PLC, analog to digital converter and digital to analog converter. Computer process control, rapid prototyping

Pre. Request: 30131561

30131564 CAD/CAM Lab. 1(0-3)

Experiments on programming Lathe and Milling CNC machines using G & M codes. Experiments on geometric modeling using different computer packages, Experiments on PLC programming. Experiments on different sensors and actuators.

Co. Request: 30131563

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30131351 Fluid Mechanics & Hydraulic Machines 3(3-0)

Fluids Properties. Fluids in steady state. Pressure measurements. Equation of continuity, Energy equation, Bernoulli's equation, Momentum equation and Moment of momentum equation and their applications. Major and minor head losses in the pipes, Classification of hydraulic machines. Dynamic action of fluid. Application of linear-momentum equation: Fluid jets on pipe bend. Different kinds of pumps, Head, Power and efficiency of a pump. Cavitations, Some more pumps and water lifting devices. Hydraulic systems, Hydraulic press. Hydraulic Jack. Hydraulic crane. Hydraulic lift.

Pre. Request: 30130325

30131451 Fluid Mechanics & Hydraulic Machines Lab 1(0-3)

Characteristics and components of pressure gauges and their calibrations, demonstrating Bernoulli theorem. Flow measurements through venture meter, orifice and notches and investigation of their hydraulic coefficients, demonstrating the performance curves of centrifugal and reciprocating pumps and their efficiencies.

Co. Request: 30131351

30131371 Numerical Analysis 3(3-0)

Calculate measuring errors and their reasons. Solve non-linear equations in one variable. Sequences, series and power series, Students will learn approximation of functions by interpolation, numerical differentiation and integration, direct methods for solving non-linear equations and some numerical solutions of ordinary differential equations.

Pre. Request: 30130336

30131441 Automatic Control 3(2-3)

Concepts of control systems and mathematical background, transfer function, block diagram and signal flow graph, mathematical modeling of control systems and elements, time-domain analysis, root locus techniques and frequency-domain of control systems, measuring the character of control systems, design of control systems .

Pre. Request: 30130336

30131442 Automatic Control Using MATLAB 1(0-3)

Application of control problems using MATLAB

Pre. Request: 30130441

30131324 Dynamics 3(3-0)

Kinematics and kinetics of particles and systems of particles with applications to force motion, impact and relative motion, single-degree of freedom, free and forced vibration, dynamics of rigid bodies, relative motion, and gyroscopic motion;, computer applications.

Pre. Request: 30130201

30131325 Mechanical Vibration 3(3-0)

Elements of vibratory systems. Systems with single degree of freedom and applications; deriving the governing equations of motion, damped free vibration, harmonic excited motion, unbalance rotating motion, vibration isolation and transmissibility, systems with multiple degrees of freedom and applications. Continuous systems.

Pre. Request: 30130324

Curriculum for the Bachelor Degree in Production Engineering and Machines
Course Description

30131325 Dynamics and Vibrations Lab. 1(0-3)

Experimental work related to free and forced vibrations of spring-mass systems with and without viscous damping. Damped and un-damped torsional vibrations. Free and forced vibrations of beams with and without damping. Whirling of shafts. Vibration techniques for determining mass moments of inertia of machine components. Vibration and sound measurements.

Pre. Request :30131325

30131326 Mechanical Design 3(3-0)

Introduction to design process. Design considerations. Tolerances, fits and surface finish. Stress analysis and deflection of mechanical elements. Statistical considerations in machine design. Failure of machine elements. Fatigue. Design of fasteners and connections; riveted joints, bolts and screws, Welded joints. Mechanical springs mechanical elements.

Pre. Request: 30131321

30131431 Metallurgy 3(3-0)

Physical and mechanical properties of metals; ferrous alloys; carbon steel; cast iron; non-ferrous and their alloys; heat treatment of steel.

Pre.Request:30131331

30131432 Metallurgy Lab. 1(0-3)

Heat treatment of steel, joining test, hardening, tempering, annealing. Chemical surface hardening of steel, intruding, carbonizing, surface hardening (flame hardening, Edit Currents) Heat treatment of cast Iron. Heat treatment of non-ferrous metals (AL,CU)

Co. Request: 30131431

30131452 Casting Technology 3(3-0)

Production of Ferrous Metals; Introduction to Casting; Patterns; Cores; Moulds and Molding Processes; Melting of metals; Pouring and Feeding Castings; solidification of casting. Defects of Casting; different Casting Processes like Die casting, centrifugal casting, continuous casting, pressed casting, vacuum casting and others, Investment casting. Sand properties measurement. Quality of casting.

Pre. Request: 30131331

30131453 Casting Technology Workshop 1(0-3)

Sand testing: water content; clay content permeability; grain distribution sand mixture strength test: compression, tension shear. Hand molding, project: Design of sand castings. Experiments on different types of casting. Permanent mould. Test of casting quality.

Co. Request: 30131452

30131454 Welding Technology 3(3-0)

Introduction, types of welding. Arc welding. Arc welding power sources, Arc welding process, Gas tungsten Arc welding, Gas metal Arc welding, resistance welding process, Friction welding, plasma welding process, solid phase welding process, metallurgy of welding, inspection of welding, thermal cutting processes. Soldering and brazing.

Pre. Request: 30131431

30131551 Welding Technology Workshop 1(0-3)

Experiment on Arc welding; gas welding, MIG & TIG welding, experiment on spot welding, and experiment on GAS thermal cutting. Experiments on resistance welding and friction welding. Test of welding quality.

Co. Request: 30131454

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30131561 Cutting Tools Technology 3(3-0)

Types of cutting tools, design of cutting tools, cutting tools materials, complex cutting tools, machinability, wear in cutting tools, unconventional cutting tools. Cutting fluids, cemented carbide tools. Jigs and fixtures.

Pre. Request: 30131362

30131562 Cutting Tools Technology Workshop 1(0-3)

Classification of cutting tools shaping of cutting tools for internal and external cutting, comparison among cutting tools made of ceramic, carbide and conventional materials using different cooling liquids, measurements of forces on cutting tools, measurements of tool temperatures during cutting. Experiments on measurements of wear in cutting tools.

Pre. Request: 30131561

30131455 Production Engineering (1) 3(3-0)

Fundamentals of machine tools, Machine tools like lathe, milling, planer, shaper and slotter, broaching and sawing, drilling and boring machines. Sheet metal forming, press working and tooling, forming and shaping of plastics and composite materials. Joining of materials.

Pre. Request: 30131452

30131552 Production Engineering (2) 3(3-0)

production and Manufacturing Processes; Machining Accuracy and Surface Finish; Machining of Typical Machine Parts; Finishing and Super finishing (micro-finishing) processes; Plastic Working of Metals; Hot Working of Metals; Cold Working of Metals; Press Working and Operations. Powder metallurgy.

Pre. Request: 30131455

30131456 Production Engineering(1) Workshop 1(0-3)

Turning process of cylinder bar including straight cutting, step cutting, inclined cutting, curve cutting, thread cutting. Milling operating likes slots, pockets, gears and cams. Process using grinding, shaping, drilling machines

Pre. Request: 30131455

30131554 Production Engineering(2) Workshop 1(0-3)

Sheet metal forming, Blanking and punching process of sheet metal, Drawing process of sheet steel metal. Press of metals, powder metallurgy

Pre. Request: 30131552

30131553 Industrial Management and Engineering Economy 3(3-0)

Industrial system and plant location, plant layout, humanity on the move, industrial ecology, culture, psychology, engineering Economy, production control, loading and scheduling, inventory control. Cost concepts and Analysis , Time Value of money and inflation , Method of selection among economic alternatives, Risk and Uncertainty , Benefit Cost ratio

Pre. Request: 30131371

30131555 Composite Materials 3(3-0)

Types of composite materials, Adhesives, cohesive and interfacial bonds dispersion and particulate strengthened composites, fiber-reinforced composites, continuous and discontinues fibers, fiber-Reinforced plastic composites, fiber glass reinforced composites, metal-matrix and ceramic –matrix composites, sandwich structure, honeycomb and factor attesting in composite materials.

Pre. Request: 30131331

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30131578 **Industrial Automation** **3(3-0)**

Detroit type automation, Analysis of automation flow lines, assembly systems and line balancing, Automated material handling, automated storage system, FMS, Computer manufacturing planning system, shop floor control, future automated factory.

Pre. Request: 30104243

30131556 **Design of Experiments** **3(3-0)**

Introduction to industrial experimentation, fundamentals of design of experiments, understanding key interactions in processes, systematic methodology for design of, screening designs, full factorial designs, fractional factorial designs, case studies, analysis using Minitab software.

Pre. Request: 30130336

30131543 **Quality Control** **3(3-0)**

Concepts and statistical methods employed in the assurance of product conformance to specifications. Control charts for attributes and variables. Process capability analysis. Acceptance sampling plans and military standards

Pre. Request: 30131441

30104243 **Electronics 1** **3(3-0)**

Properties of semiconductor materials; doping technique; p-n junction; diode: forward and reverse biasing; VI static characteristics; small and large-signal models; junction capacitance and switching times; types and applications; bipolar junction transistors: construction; connections and biasing; applications; small signal models; ratings; and applications; field-effect transistors: construction types; VI characteristics; ratings; and applications**.**

Pre. Request: 30104213

30104344 **Electronics Lab 1** **3(3-0)**

Diode characteristics; rectification; regulation; clipping and clamping; BJT characteristic and applications; FET characteristics and applications; frequency response of amplifiers; DC regulated power supplies; troubleshooting projects.

Pre. Request: 30104243

30131557 **Tribolo** **3(3-0)**

Nature of solid surfaces. Interaction of solid surfaces. Friction of metals and non-metals (mechanisms, theories, applications). Wear of metals and non-metals (types, mechanisms, theories, applications). Lubrication (methods, types, theories, applications). Lubricants (types, utilization) Selection of materials for tribological applications. Surface Engineering.

Pre. Request: 30131341

30131544 **Robotics** **3(3-0)**

Introduction to robotic technology; industrial robot applications; robot anatomy and components; robot motion analysis: robot kinematics, statics and dynamics in 2D/3D dimensions; robot drive systems; sensors in robotics; mobile robot ; robot control; robot modeling and simulation using MATLAB robot toolbox; artificial intelligence in robotics; robot programming languages and techniques.

Pre. Request: 30131324

30130336 **Applied Mathematics** **3(3-0)**

Ordinary differential equations, first order equation, second order equation, method of solutions, Fourier series, Laplace transformation, Bessel Functions, partial differential equations.

Pre. Request: 30202102

Curriculum for the Bachelor Degree in Production Engineering and Machines

Course Description

30104214 Electrical Circuits Lab 1 1(0-3)

DC circuits: Ohm's law; KVL and KCL; network theorems; transient analysis of RL; RC; and RLC circuits; impedance concept and techniques; power and P.F; series and parallel resonance; three phase circuits; parameters of two-port networks; magnetically coupled circuits; filters; troubleshooting.

Pre. Request: 30104213

30104213 Electrical Circuits 1 3(3-0)

Introduction. Current, Voltage, Resistance, Ohm's low, Power and energy, Series, parallel and Series-Parallel resistive circuits, Current and Voltage Sources, Superposition, Thevenin's, Norton's theorems, Kerchov mesh current and node voltage methods. Capacitance and inductance, R-C and R-L-C circuits, frequency response, Complex numbers in reactive circuits, resonance and filters.

Single-phase & three-phase circuits connections and analysis; two-port networks; troubleshooting in DC and AC circuits.

Pre. Request: 30201102