1.	School	**Engineering**
2.	Department	**Industrial engineering**
3.	Program title (Arabic)	**البكالوريوس في الهندسة الصناعية**
4.	Program title (English)	**B.Sc. in Industrial Engineering**

5. Components of Curriculum:

The curriculum for the bachelor's degree in Industrial Engineering consists of (165) credit hours distributed as follows

Number	**Type of requirement**	**credit hours**
First	University requirements	**27**
Second	Faculty requirements	**26**
Third	Department requirements	**112**
Total		**165**

6. Numbering System:

A- Department number

Number	**Department**
01	Civil Engineering
02	Architecture Engineering
03	Electrical Engineering
04	Mechanical Engineering
05	Chemical Engineering
06	Industrial Engineering
07	Computer Engineering
08	Mechatronics Engineering

B- Course number

Domain code	Domain title	Domain Code	Domain title
0	General Industrial Engineering	5	Operations Research and Statistics
1	Manufacturing Engineering	6	Maintenance Engineering
2	Management Science and Economy	7	Materials Science
3	Engineering Design	8	Human factors Engineering
4	Control, Automation, and Metrology	9	Projects

C- Course number consists of 7 digits

School		Generation	Department	Level	Domain code	Serial number
0	**9**	**0**	**6**	**1, 2, 3, 4, or 5**	Between 0 - 9	Sequential rank of the course within its domain

First: University Requirements:

Compulsory Requirements (18 Credit Hours)					
No.	**Course Title**	**Course No.**	**Credit Hours**	**Prerequisites**	**Notes**
1	Military Science	2220100	3		
2	National Culture	3400100	3		
3	Learning & Research Skills	3400101	3	3202099 3201099 1932099	
4	Communication Skills	3400102	3	3400101	
5	Introduction to Philosophy and Critical Thinking	3400103	3	3400101	
6	Human Civilization	3400104	3		

Preparation Program Requirements

All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program

(0 - 15 Credit Hours)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Basics of Arabic	3201099	3		Pass/Fail
2	Arabic Languages Skills	3201100	3	3201099	Pass/Fail
3	Basics of English	3202099	3		Pass/Fail
4	English Language Skills	3202100	3	3202099	Pass/Fail
5	Basics of Computing	1932099	3		Pass/Fail

Electives

(9 Credit Hours)

Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.

(First Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Great Books	3400107	3		
2	Islam and Current Issues	0400101	3		
3	Arab-Islamic Civilization	2300101	3		
4	Jordan: History and Civilization	2300102	3		
5	Jerusalem	3400108	3		

Electives

(Second Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Legal Culture	1000102	3		
2	Environmental Culture	0300102	3		
3	Physical Fitness Culture	1100100	3		
4	Islamic Culture	0400102	3		
5	Health Culture	0720100	3		

Electives

(Third Group)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Entrepreneurship & Creativity	3400109	3		
2	Foreign Language	2200103	3		
3	Electronic Commerce	1600100	3		
4	Social Media	1900101	3		
5	Appreciation of Arts	2000100	3		
6	Special Subject	3400106	3		
7	Administrative skills	1601105	3		

Second: School courses: distributed as follows:

A. Obligatory school courses: (26) credit hours

B. Elective school courses: (0) credit hours

A. Obligatory school courses: (26) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus (1)	3	-	3	-
0302101	General Physics (1)	3	-	3	-
0302111	Practical Physics (1)	-	3	1	0302101 **or co-requisite**
0904131	Engineering Drawing and Descriptive Geometry	2	2 Drawing 2Computer	3	-
0301102	Calculus (2)	3	-	3	0301101
0302102	General Physics (2)	3		3	0302101
0302112	Practical Physics (2)	-	3	1	0302102 **or co-requisite**
0966111	Engineering Workshops	-	3	1	-
0907101	Computer Skills for Engineers	3	-	3	1932099
0301201	Calculus (3)	3		3	0301102
0921420	Engineering Economy	2	-	2	90 Cr. Hours Successfully

B. Elective school courses: (0) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		

Third: Specialty courses: (112) credit hours distributed as follows:

A. Obligatory specialty courses: (94) credit hours
B. Elective specialty courses: (18) credit hours

A. Obligatory specialty courses: (94) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0303101	General Chemistry (1)	3	-	3	-
0333109	General Chemistry Laboratory for non-chemistry students for non-chemistry students	-	3	1	0303101 or co-requisite
0906273	Properties of Engineering Materials	3	-	3	(0303101)+ {0966111 or co-requisite}
0903203	Electrical Engineering	3	-	3	0302102
0906231	Engineering Mechanics	3	-	3	0301102
0904248	Thermal and Fluid Sciences	3	-	3	0302102
0936251	Engineering Statistics (1)	3	-	3	0301102
0906274	Properties of Engineering Materials Laboratory	-	3	1	0906273
0301202	Engineering Mathematics (1)	3	-	3	0301201
0903204	Electrical Engineering Laboratory	-	3	1	0903203
0904249	Thermal and Fluid Sciences Laboratory	-	3	1	0904248
0906333	Engineering Design	2	3	3	0906231 + 0904131
0906356	Engineering Statistics (2)	3	-	3	0936251
0906384	Methods Engineering and Work Measurement	3	-	3	0936251
0906305	Principles of Linear Algebra	3	-	3	0301202 + 0907101
0906315	Metal Forming Processes	3	-	3	0906274 + 0906333
0906347	Industrial Control Systems	3	-	3	0903204
0906358	Statistical Quality Control	3	-	3	0906356
0906481	Human Factors Engineering	3	-	3	0906384
0936302	Research Methods for Engineering	1	-	1	0906356
0906357	Deterministic Operations Research	3	-	3	0906305
0906415	Metal Cutting Processes	3	-	3	0906315
0906421	Production Planning and Control	3	-	3	0906305
0936441	Metrology and Engineering Measurements	3	-	3	0906315
0936482	Human Factors and Work Measurement Laboratory	-	3	1	0906481
0916542	Industrial Automation	2	-	2	{0906415 or co-requisite}+

					0906347
0906544	Automation and automatic control Laboratory	-	3	1	0916542
0906425	Facilities Planning and Material Handling	3	-	3	0906421
0936442	Metrology and Engineering Measurements Laboratory	-	3	1	0936441
0946513	Metallurgical Processes	3	-	3	0906415
0906505	Information Systems for Industrial Engineering	3	-	3	0906421
0916515	Manufacturing Engineering Laboratory	-	3	1	0946513
0916525	Logistics Engineering and Supply Chain Management	3	-	3	0906425
0916555	Probabilistic Operations Research	3	-	3	0906357 + 0906356
0936553	Simulation	2	3	3	0916555
0956500	Employability Readiness and Field Training	Training Regulations		5	120 Cr. Hours Successfully
0976598	Graduation Project (1)	-	3	1	(120 Cr. Hours Successfully + 0916302)
0976599	Graduation Project (2)	-	6	2	(0976598 Successfully) or (Incomplete with the department approval)
Total				**94**	

*****Graduation project (1) and graduation project (2) are one integrated units, and none of them may be registered except for two regular semesters (first semester and second semester, only). The result (incomplete) of the graduation project (1) is monitored at the end of the semester in which it was registered, and determines its result and approves when completing and succeeding in the graduation project (2).

B. Elective specialty courses: (18) credit hours:

Course Number	**Course Title**	**Contact Hours**		**Credit Hours**	**Pre-requisite**
		Theoretical	**Practical**		
0936417	Non-ferrous Metals and Non-ferrous Alloys	3	-	3	0906315
0936445	Microprocessors in Industrial Engineering	3	-	3	0906347
0946572	Biomedical Materials Engineering	3	-	3	0906315
0936573	Polymers and Plastics Engineering	3	-	3	0906315
0936401	Organization Design and Control	3	-	3	0906421
0906404	Production Engineering	3	-	3	0936441
0906428	Entrepreneurship and Management of Creativity and Change	3	-	3	0906421
0936483	Industrial Safety Engineering	3	-	3	0916525
0916516	Steel and Iron	3	-	3	0946513 or Co-requisite
0916517	Non-traditional Manufacturing Processes	3	-	3	0906415

0916518	Design for Manufacturing and for Assembly	3	-	3	0946513+ 0906333
0906522	Project Management	3	-	3	0906358
0916523	Setting up and Managing Small Businesses	3	-	3	0906421
0906526	Strategic Planning	3	-	3	0906421
0946531	Computer Aided Design and Computer Aided Manufacturing	3	-	3	0906415
0916533	Product Design and Marketing	3	-	3	0906421
0946534	Design and Manufacturing of Tools and Dies	3	-	3	0906415
0946551	Quality Management	3	-	3	0906358
0936561	Reliability and Maintainability	3	-	3	0906358
0906576	Materials Testing	3	-	3	0936441+ 0936442
0906579	Rapid Prototyping and E-Manufacturing	3	-	3	0906415
0916580	Manufacturing Systems	3	-	3	0916542
0906423	Cost Accounting	3	-	3	0901420
0906506	Lean and Agile production systems	3	-	3	0906425
0936574	Nano-materials Engineering	3	-	3	0946513
0916577	Composite Materials Ceramic and Powder Technology	3	-	3	0946513
0906454	Algorithms Design and Programming	2	3	3	0916555
0916566	Management of Maintenance and Operating systems	3	-	3	0916500
0946501	Selected Topics in Manufacturing engineering	3	-	3	0906415
0936500	Selected Topics in Engineering Management	3	-	3	0906425

Fourth: Courses offered by other schools and departments to the program (B.Sc. in Industrial Engineering)

a-Courses offers by other Schools

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus (1)	3	-	3	-
0301102	Calculus (2)	3	-	3	0301101
0301201	Calculus (3)	3		3	0301102
0302101	General Physics (1)	3	-	3	-
0302111	Practical Physics (1)	-	3	1	0302101 or co-requisite

0302102	General Physics (2)	3		3	0302101
0302112	Practical Physics (2)	-	3	1	0302102 or co-requisite
0303101	General Chemistry (1)	3	-	3	-
0333109	General Chemistry Laboratory for non-chemistry students	-	3	1	0303101 or co-requisite
0301202	Engineering Mathematics (1)	3	-	3	0301201

b-Courses offers by other Engineering Department

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0921420	Engineering Economy	2	-	2	90 Cr. Hours Successfully
0904131	Engineering Drawing and Descriptive Geometry	2	2 Drawing 2 Computer	3	-
0907101	Computer Skills for Engineers	3	-	3	1932099
0903203	Electrical Engineering	3	-	3	0302102
0903204	Electrical Engineering Laboratory	-	3	1	0903203
0904248	Thermal and Fluid Sciences	3	-	3	0302102
0904249	Thermal and Fluid Sciences Laboratory	-	3	1	0904248

Fifth: Advisory Study Plan

(First academic) Year

(first) Semester			**(second) Semester**		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0301101	Calculus (1)	3	0301102	Calculus (2)	3
0302101	General Physics (1)	3	0302102	General Physics (2)	3
0302111	Practical Physics (1)	1	0302112	Practical Physics (2)	1
0303101	General Chemistry (1)	3	0966111	Engineering Workshops	1
0333109	General Chemistry Laboratory for non-chemistry students	1	0907101	Computer Skills for Engineers	3
0904131	Engineering Drawing and Descriptive Geometry	3	0906273	Properties of Engineering Materials	3
-	University requirement	3	-	University requirement	3
	Total	**17**		**Total**	**17**

(Second academic) Year

(first) Semester			**(second) Semester**		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0936251	Engineering Statistics (1)	3	0301202	Engineering Mathematics (1)	3
0301201	Calculus (3)	3	0906333	Engineering Design	3
0906231	Engineering Mechanics	3	0903204	Electrical Engineering Laboratory	1
0903203	Electrical Engineering	3	0906356	Engineering Statistics (2)	3
0904248	Thermal and Fluid Sciences	3	0906384	Methods Engineering and Work Measurement	3
			0904249	Thermal and Fluid Sciences Laboratory	1
			0906274	Properties of Engineering Materials Laboratory	1
-	University requirement	3	-	University requirement	3
Total		**18**	**Total**		**18**

(Third academic) Year

(first) Semester			(second) Semester		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0906358	Statistical Quality Control	3	0936441	Metrology and Engineering Measurements	3
0906347	Industrial Control Systems	3	0906421	Production Planning and Control	3
0906305	Principles of Linear Algebra	3	0906357	Deterministic Operations Research	3
0906315	Metal Forming Processes	3	0936482	Human Factors and Work Measurement Laboratory	1
0906481	Human Factors Engineering	3	0906415	Metal Cutting Processes	3
-	University requirement	3	0936302	Research Methods for Engineering	1
			-	University requirement	3
	Total	**18**		**Total**	**17**

(Fourth academic) Year

(first) Semester			(second) Semester		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0946513	Metallurgical Processes	3	0916525	Logistics Engineering and Supply Chain Management	3
0936442	Metrology and Engineering Measurements Laboratory	1	0906505	Information Systems for Industrial Engineering	3
0921420	Engineering Economy	2	0906544	Automation and automatic control Laboratory	1
0916542	Industrial Automation	2	0916515	Manufacturing Engineering Laboratory	1
0906425	Facilities Planning and Material Handling	3	0916555	Probabilistic Operations Research	3
-	University requirement	3	-	University requirement	3
-	Elective specialty courses	3	-	Elective specialty courses	3
Total		**17**	**Total**		**17**

(Fifth academic) Year

(first) Semester			**(second) Semester**		
Course Number	**Course Title**	**Credit Hours**	**Course Number**	**Course Title**	**Credit Hours**
0976598	Graduation Project (1)	3	0976599	Graduation Project (2)	2
0916553	Simulation	3	-	Elective specialty courses	3
-	Elective specialty courses	3	-	Elective specialty courses	3
-	Elective specialty courses	3			
-	University requirement	3			
Total		**13**	**Total**		**8**

Courses offers to other B.Sc. programs

Course Number	Course Title	Contact Hours		Credit Hours	Program
		Theoretical	Practical		
0966111	Engineering Workshops	-	3	1	All Engineering B.Sc. Programs
0906275	Materials Science	2	-	2	B.Sc. in Mechanical Engineering
0906310	Manufacturing Processes	-	3	3	B.Sc. in Mechanical Engineering
Total				**6**	

Course Description

Course Number	Course Title	Credit Hours
0301101	Calculus (1)	
Prerequisite: (-)		**3**

Course Description:

Functions: domain, operations on functions, graphs of functions, trigonometric functions, limits: meaning of a limit, computational techniques, limits at infinity, infinite limits, continuity, limits and continuity of trigonometric functions. The derivative: techniques of differentiation, derivatives of trigonometric functions, the chain rule, implicit differentiation, differentials, Roll's Theorem, the mean value theorem, the extended mean value theorem, L'Hopital's rule, increasing and decreasing functions, concavity, maximum and minimum values of a function, graphs of functions including rational functions (asymptotes) and functions with vertical tangents (cusps), antiderivatives, the indefinite integral, the definite integral, the fundamental theorem of calculus, the area under a curve, the area between two curves. Transcendental functions: inverse functions, logarithmic and exponential functions, derivatives and integrals, limits (the indeterminate forms), hyperbolic functions and their inverses, inverse trigonometric functions.

Course Number	Course Title	Credit Hours
0302101	General Physics (1)	
Prerequisite: (-)		**3**

Course Description:

Motion in one dimension, vectors, motion in two dimensions, the laws of motion, circular motion, conservation of energy, linear momentum and collisions, rotation of a rigid object about a fixed axis, angular momentum, static equilibrium, universal gravitation, fluid mechanics, oscillatory motion.

Course Number	Course Title	Credit Hours
0302111	Practical Physics (1)	
Prerequisite: (0302101 or co-requisite)		**1**

Course Description:

11 experiments each of 3 hrs/week duration: collection and analysis of data, measurements and uncertainties, vectors: force table, kinematics of rectilinear motion, force and motion, collision in two dimensions, rotational motion, simple harmonic motion: simple pendulum, gas's Laws, ballistic pendulum, specific heat capacity of metals.

Course Number	Course Title	Credit Hours
0904131	Engineering Drawing and Descriptive Geometry	
Prerequisite: (-)		**3**

Course Description:

Drawing equipment and use of instruments. Lettering, geometric construction, sketching and shape description. Basic descriptive geometry, developments and intersections. Axonometric, oblique and perspective drawings, Multiview projection, principal views, conventional practice, and sectional views.

Auxiliary views. Dimensioning techniques. Parallel: introduction to computer drawing, drawing aids, geometrical construction, and the appropriate commands of text, editing, plotting, sections, layers, pictorial views, and dimensioning. Auxiliary views.

Course Number 0301102	**Course Title** Calculus (2)	**Credit Hours**
Prerequisite: (0301101)		**3**
Course Description: Techniques of integration: integration by substitution, integration by parts, integrating powers of trigonometric functions, trigonometric substitutions, integrating rational functions, partial fractions, rationalization, miscellaneous substitution. Improper integrals, application of definite integral: volumes, length of a plane curve, area of a surface of revolution polar coordinates and parametric equations: polar coordinates, graphs in polar coordinates, area in polar coordinates, infinite series: sequences, infinite series, convergence tests, absolute convergence, conditional convergence, alternating series, power series: Taylor and Maclurine series, differentiation and integration of power series.		

Course Number 0302102	**Course Title** General Physics (2)	**Credit Hours**
Prerequisite: (0302101)		**3**
Course Description: Electric field, Gauss's law, electric potential, capacitance and dielectrics, current and resistance, direct current circuits, magnetic field, sources of the magnetic field, Faraday's law, inductance, alternating current circuits, the nature of light and the principles of ray optics, image formation		

Course Number 0302112	**Course Title** Practical Physics (2)	**Credit Hours**
Prerequisite: (0302102 or co-requisite)		**1**
Course Description: 12 experiments each of 3 hrs /week duration: electric field mapping, specific charge of copper ions, power transfer, potentiometer, capacitors: RC time constant, Kirchhoff's laws, magnetic field of a current, lenses, Young's double slit experiment, electromagnetic induction, Ohm's law, Wheatstone bridge.		

Course Number 0966111	**Course Title** Engineering Workshops	**Credit Hours**
Prerequisite: (-)		**1**
Course Description: General introduction to engineering workshops, tools, and common measurement instruments, general safety, introduction to machining operations, forming operations, casting operations, and welding operations, describing common machine tools, furnaces, tools and dies, practical exercises including fitting, forging, carpentry, casting, welding, mechanical saws, shearers, drills, lathes, milling machines, shapers and grinders.		

Course Number	Course Title	Credit Hours
0907101	Computer Skills for Engineers	
Prerequisite: (1932099)		**3**

Course Description:

This course presents the fundamental concepts of programming using one high level programming language like C++, Java, or Python. It covers the basic structures of the programming language such as variables; data type; control structures; arrays; function; and introduction to records (struct) and object oriented programming (classes and objects). The course will focus on providing the students with practical programming skills through home works and exams which require writing whole program. Also, the course prepares the students to the global programming competitions.

Course Number	Course Title	Credit Hours
0301201	Calculus (3)	
Prerequisite: (0301102)		**3**

Course Description:

Three dimensional space and vectors rectangular coordinates in 3D, spheres, cylindrical surfaces, quadric surfaces, vectors: dot product, projections, cross product, parametric equations of lines planes in 3-spaces, vector -valued functions: calculus of vector valued functions, change of parameters, arc length, unit tangent and normal vectors, curvature, functions of two or more variables: domain, limits, and continuity, partial derivatives, differentiability, total differentials, the chain rule, the gradient, directional derivatives, tangent planes, normal lines; maxima and minima of functions of two variables, Lagrange multipliers, multiple integrals: double integral, double integrals in polar coordinates, triple integrals, triple integrals in cylindrical and spherical coordinates, change of variables in multiple integrals, Jacobian .

Course Number	Course Title	Credit Hours
0921420	Engineering Economy	
Prerequisite: (Passing 90 Credit Hours)		**2**

Course Description:

Major elements of feasibility studies. Principles of engineering economy. Equivalence and compound interest formulas. Single payment model. Uniform payment model. Gradient payment model. Exponential payment model. Decision criteria for single and multiple alternatives: present worth, annual worth, future worth, internal rate of return, benefit cost ratio and payback methods. Income-tax effect on decision making.

Course Number	Course Title	Credit Hours
0303101	General Chemistry (1)	
Prerequisite: (-)		**3**

Course Description:

Measurements and significant figures, chemical reactions, stoichiometry, the gaseous state, thermochemistry, electronic structure and periodicity, chemical bonding, molecular shapes, states of matter and intermolecular forces.

Course Number	Course Title	Credit Hours
0333109	General Chemistry Laboratory for non-chemistry students	
Prerequisite: (0303101 or co-requisite)		**1**

Course Description:

The course includes experiments dealing with the following topics: safety and laboratory rules, chemical observations, stoichiometry, volumetric analysis, oxidation and reduction, colligative properties, thermochemistry and equilibrium.

Course Number	Course Title	Credit Hours
0906273	Properties of Engineering Materials	
Prerequisite: ((0303101)+ {0966111 or co-requisite})		**3**

Course Description:

Atomic structure and bonding, structure of crystalline solids, Imperfections in solids. Dislocations and strengthening mechanisms. Mechanical, thermal and electrical properties of engineering materials. Phase diagrams and alloy formation. Alloying elements, Ferrous and nonferrous metals and alloys. Blast furnace and Iron making.

Course Number	Course Title	Credit Hours
0903203	Electrical Engineering	
Prerequisite: (0302102)		**3**

Course Description:

Ohm's and Kirchhoff's Laws. Series and parallel connections. Voltage and current division. Nodal and mesh analysis. Superposition. Thevenin and Norton theorems. Inductance and capacitance. Source free RL and RC circuits. Response of RL and RC and RLC circuits to unit step function. Characteristics of a sinusoid. The phasor concept. Phasor relationships for R, L, and C elements. Impedance and admittance. Effective values of current and voltage. Instantaneous, average and apparent power and power factor. Three-phase wye and delta connections. Introduction to semiconductors. The PN junction. Applications of PN junctions (rectifiers). Transistors: operation, model, V-I characteristics. Operational amplifiers and gates. Safety considerations. Protective earthing.

Course Number	Course Title	Credit Hours
0906231	Engineering Mechanics	
Prerequisite: (0301102)		**3**

Course Description:

In terms of teaching hours, the course is divided into two equal parts.

Part one covers: General principles. Force systems; resultant, moment of a force, equivalent force-couple system. Particle and rigid body equilibrium in one plane. Trusses and Frames. Beams; shear force and bending moment diagrams. Center of gravity and centroid. Area moment of inertia.

Part two covers: Planar kinematics and kinetics (Newton's second Law and work-energy method) of particles and rigid bodies in rectilinear and curvilinear motion (normal and tangential coordinates).

Course Number	Course Title	Credit Hours
0904248	Thermal and Fluid Sciences	
Prerequisite: (0302102)		**3**

Course Description:

Introduction. Basic principles of thermodynamics, fluid mechanics and heat transfer. Thermodynamics concepts and definitions. Properties of pure substances, First law of thermodynamics. System and control volume analyses. Second law of thermodynamics. Basic principles of fluid mechanics. Fluid statics. Conservation laws. Energy equations. Flow in pipes. Heat transfer modes. Conduction, convection and radiation.

Course Number	Course Title	Credit Hours
0936251	Engineering Statistics (1)	
Prerequisite: (0301102**)**		**3**

Course Description:

Quantitative and graphical descriptive statistics, probability concepts, discrete and continuous random variables and distributions, joint probability distributions, covariance and correlation of random variables, point and interval estimation, sampling distributions, hypothesis testing, introduction to simple linear regression. Practical exercises on the application of statistical methods in engineering.

Course Number	Course Title	Credit Hours
0906274	Properties of Engineering Materials Laboratory	
Prerequisite: (0906273**)**		**1**

Course Description:

Macroscopic Preparation of specimen, Microscopic Preparation of specimen, Examination of the microstructure of Metallic Materials using the light microscope, Construction of Phase Diagram (1), Construction of Phase Diagram (2), Construction of Phase Diagram (3), Carburizing and Heat Treatment, Hardness test, and Non Destructive Testing.

Course Number	Course Title	Credit Hours
0301202	Engineering Mathematics (1)	
Prerequisite: (0301201**)**		**3**

Course Description:

Ordinary differential equations, linear differential equations of second and higher order, systems of differential equations, phase plane, stability, series solutions of differential equations, orthogonal function, Laplace transforms, and linear systems of equations, matrices and determinants.

Course Number	Course Title	Credit Hours
0903204	Electrical Engineering Laboratory	
Prerequisite: (0903203**)**		**1**
Course Description: Electric measuring equipment. DC circuits. Basic Laws and network theorems. Impedance concept and phase shift in RL and RC circuits. Three-phase wye and delta connected loads. Measurement of power and power factor. Transistor amplifiers. Operational amplifiers (Op-Amps).		

Course Number	Course Title	Credit Hours
0904249	Thermal and Fluid Sciences Laboratory	
Prerequisite: (0904248**)**		**1**
Course Description: Liquid-vapor saturation curve. Flow through a nozzle. Heat pump and air-cooler. Friction and secondary losses in pipes. Hydrostatic pressure on a plane surface. Impact of water jet. Pump characteristics. Flow visualization. Thermal conductivity measurement		

Course Number	Course Title	Credit Hours
0906333	Engineering Design	
Prerequisite: (0906231 + 0904131**)**		**3**
Course Description: Types of stress and type of strain, stress strain analysis, Principle stresses, Mohr circle, yield criteria Transmission mechanisms and kinematics. Joints, pulleys, and belts. Gears, gear trains, cams, clutches brakes and flywheels. Hydraulic components and circuits, bolts, shafts, keys, and springs. System integration. Design project is part of the course.		

Course Number	Course Title	Credit Hours
0906356	Engineering Statistics (2)	
Prerequisite: (0936251**)**		**3**
Course Description: Analysis of Variance, linear regression, full and fractional factorial design of experiments		

Course Number	Course Title	Credit Hours
0906384	Methods Engineering and Work Measurement	
Prerequisite: (0936251**)**		**3**
Course Description: Assessing and improving performance of individuals and groups in organizations. Techniques include various basic industrial engineering tools, work analysis, data acquisition and application, performance evaluation and appraisal, and work measurement procedures, improving processes, study of time and movement, standardization of methods and time measurements, project.		

Course Number	Course Title	Credit Hours
0906305	Principles of Linear Algebra	
Prerequisite: (0301202 + 0907101**)**		**3**
Course Description: What linear Algebra is, Systems of linear equations and matrices, elementary row operations, inverse, matrix equations, determinants, LU factorization. Vectors in Euclidean n-space (R^n), linear combination and linear independence. Vector spaces, subspaces, bases and dimensions. Linear transformations, null space and range, isomorphism, matrix representation of linear transformation, and similarity. Eigenvalues and eigenvectors, diagonalization, Markov chains. Inner product spaces, The dot product on R^n, orthogonal bases, orthogonal complements. Applications.		

Course Number	Course Title	Credit Hours
9060315	Metal Forming Processes	
Prerequisite: (0906274 + 0906333**)**		**3**
Course Description: Mechanical behavior and forming of metals, different types of mechanical behavior and main factors affecting it. Yield criteria, representative stress and representative strain, work due to plastic deformation, classification of forming processes with respect to strain rate and temperature. Temperature rise in dynamic forming. Bulk deformation processes: forging, extrusion, rolling, rod and wire drawing. Sheet forming processes: blanking, deep drawing and bending.		

Course Number	Course Title	Credit Hours
0906347	Industrial Control Systems	
Prerequisite: (0903204**)**		**3**
Course Description: Systems dynamics and modeling. Time response of systems. System stability. Design and analysis of closed-loop control systems using root locus techniques. Control by microprocessors. System characteristics. ID controllers, open loop and closed control of systems.		

Course Number	Course Title	Credit Hours
0906358	Statistical Quality Control	
Prerequisite: (0906356**)**		**3**
Course Description: General introduction to quality management, application of statistical methods and probability models to monitor and control product quality. Variables and attributes Shewhart control charts, acceptance sampling. Process capability and measurement systems analysis, process improvement. Specifications and international standards.		

Course Number	Course Title	Credit Hours
0906481	Human Factors Engineering	
Prerequisite: (0906384**)**		**3**

Course Description:

Muscular work and identification of physical and physiological abilities, raising the efficiency of muscle work, measurements of the human body, mental work and identification of mental abilities and abilities, means of receiving information and methods of processing and decision-making in humans, designing devices and means of displaying information Machine controls, design of displays, and control the study of social and physical environmental effects on worker performance

Course Number	Course Title	Credit Hours
0936302	Research Methods for Engineering	
Prerequisite: 0906356		**1**

Course Description:

The nature and types of research and their characteristics. Survey research, the definition of the research problem and its statement, its theoretical framework and develop hypotheses related to the research, design elements, in addition to the classification of different variables. Methods of sampling, analysis, quantitative and qualitative research data, achieving results, writing research reports, in addition to the submission and the presentation of the research.

Course Number	Course Title	Credit Hours
0906357	Deterministic Operations Research	
Prerequisite: (0906305**)**		**3**

Course Description:

Deterministic operations research and modeling concepts, linear programming modeling, formulation examples of linear models, Graphical solution method, Simplex solution method, M-method, Two phase methods, graphical sensitivity analysis with economic interpretation; duality and dual primal relationship, transportation model, assignment models, transshipment model.

Course Number	Course Title	Credit Hours
0906415	Metal Cutting Processes	
Prerequisite: (0906315**)**		**3**

Course Description:

Fundamentals of material removal processes, cutting tools, cutting fluids, mechanics of chip formation and types of chips: Merchant's theory for determining different forces involved in the orthogonal cutting, power Consumption, different material removal processes, turning, drilling, shaping, milling, grinding, broaching, planning, reaming, vibration and chatter in material removal processes.

Course Number	Course Title	Credit Hours
0906421	Production Planning and Control	
Prerequisite: (0906305**)**		**3**
Course Description: Theory and concepts involved for the analysis and control of production systems. Productivity and productivity measures. Demand forecasting models, capacity planning, inventory management, aggregate planning, Master Production Scheduling (MPS), Material Requirements Planning (MRP), and introduction to Enterprise Resource Planning (ERP).		

Course Number	Course Title	Credit Hours
0936441	Metrology and Engineering Measurements	
Prerequisite: (0906315**)**		**3**
Course Description: Errors, linear, angular contour measurements, sine bar, rotating table. Fits and tolerances: interchangeability, ISO shaft and hole systems of fits and tolerances. Thread metrology. Gear metrology; surface texture, out of roundness and flatness measurements. Flow and temperature measurements. Basic electrical measurements and sensing devices DC, AC bridge, and measuring systems, transducers, smart sensors and transmitters. Force, torque and strain measurements, design of load cells.		

Course Number	Course Title	Credit Hours
0936482	Human Factors and Work Measurement Laboratory	
Prerequisite: (0906481**)**		**1**
Course Description: Applying concepts and knowledge of human factors, such as measuring muscle capacity, weightlifting methods, and material handling, studying methods of measuring muscle voltage, and measuring tools and standards, studying several means of presentation of information, and control tools and analysis of its impact on work efficiency and the health and safety of the worker, study of the number and tools manual design analysis and its impact on work efficiency, worker health and safety, use of computer software in the analysis and improvement of workstations and methods of work.		

Course Number	Course Title	Credit Hours
0916542	Industrial Automation	
Prerequisite: ({0906415 or co-requisite}+ 0906347**)**		**2**
Course Description: Basic production concepts, analysis of serial production lines, assembly line balancing, computer numerical control, industrial robots, automated material handling systems, automated storage and retrieval systems. Lab experiments concentrate on familiarizing the student with the concepts studied in class and on PLC programming and applications.		

Course Number	Course Title	Credit Hours
0906544	Automation and automatic control Laboratory	
Prerequisite: (0916542**)**		**1**
Course Description: Experiments and applications on automatic control and automation using contemporary control packages.		

Course Number	Course Title	Credit Hours
0906425	Facilities Planning and Material Handling	
Prerequisite: (0906421**)**		**3**
Course Description: Theory and concepts involved in model formulation for design and analysis of facility plans. Includes facility layout, facility location and material handling system design. Application of quantitative tools and techniques for flow analysis, layout planning, and automated material handling system design. Warehouses planning.		

Course Number	Course Title	Credit Hours
0936442	Metrology and Engineering Measurements Laboratory	
Prerequisite: (0936441**)**		**1**
Course Description: Experiments on alignment, angular measurements, diameters, surface roughness, out of roundness, screws, gears, thermocouples and oscilloscope.		

Course Number	Course Title	Credit Hours
0946513	Metallurgical Processes	
Prerequisite: (0906415**)**		**3**
Course Description: Metallurgy and alloying theory, phase diagrams, FE-C phase diagram, heat treatment of materials, casting processes, welding processes and methods.		

Course Number	Course Title	Credit Hours
0906505	Information Systems for Industrial Engineering	
Prerequisite: (0906421**)**		**3**
Course Description: Information systems in industrial enterprises, methods of analysis, information security, maintaining its confidentiality, computer network, and securing communication channels between users. Computers and accessories, operating systems, user empowerment, email, website. Master Data Management, Data Processing and Information Extraction, How to Deal with Industrial Machines Associated with Computerized Systems, The Role of Information in Reengineering Administrative or Process, Web Content Management. Knowledge management and transfer. Database Management System. Data-Warehouse. Decision support systems and data exploration.		

Course Number	Course Title	Credit Hours
0916515	Manufacturing Engineering Laboratory	
Prerequisite: (0946513**)**		**1**

Course Description:

Laboratory experiments in the practice and analysis of some formation, machining, casting, and welding operations. Linking the variables involved in the operations with the characteristics and quality of the products. Monitor the effects of machines and tools on quality of the final products, and the behavior of products during operations.

Course Number	Course Title	Credit Hours
0916525	Logistics Engineering and Supply Chain Management	
Prerequisite: (0906425**)**		**3**

Course Description:

Supply chain design and operation strategies. Modeling and analysis of logistics network. Globalization and international trade. Transport and communications management. Planning, control and performance evaluation of logistics network and supply chains. Outsourcing and offshoring decisions. Responsive and efficient supply chains. Supply chain for service and manufacturing organizations. Supply chain integration and collaboration. Sustainability and sustainable development. Supply chain dynamics and logistics information management. Informatics and computerized applications. Designing the logistics network and location decisions. Humanitarian, ethical, and environmental issues.

Course Number	Course Title	Credit Hours
0916555	Probabilistic Operations Research	
Prerequisite: (0906357 + 0906356**)**		**3**

Course Description:

This course introduces Probabilistic and stochastic models used to investigate the behavior of industrial systems; queuing theory, queuing models, queuing networks and its applications, discrete and continuous Markov processes, and related mathematical analysis.

Course Number	Course Title	Credit Hours
0916553	Simulation	
Prerequisite: (0916555**)**		**3**

Course Description:

The course presents two theoretical contact hours per week covering: introducing the role and importance of simulation in engineering, probability models, manual simulations, input models, modelling analysis of various systems and study situations, accuracy and validity of simulation models, reading, interpreting, analysis and evaluation of outputs, Reduce contrast in outputs. In addition, student required to practice simulation during a 3 contact hours per week on a project using one of the most common simulation software.

Course Number	Course Title	Credit Hours
0956500	Employability Readiness and Field Training	
Prerequisite: (120 Cr. Hours Successfully**)**		**5**
Course Description: The course offers a comprehensive blend of theoretical and practical instruction, spanning university classrooms and external settings such as companies, factories, and government institutions. Intensive coursework, totaling 105-120 contact hours over four weeks, covers essential topics like: Technical Skills Development, Teamwork, Written and Oral Communications, Career Services, Networking and Professional Associations, Work Ethics, Professionalism, Industry Projects and Case Studies, Certification and Continuing Education. Emphasis is placed on practical application through assignments, assessments, and field training, both domestically and internationally. The program aligns with University of Jordan regulations and aims to equip students with the skills necessary for successful careers.		

Course Number	Course Title	Credit Hours
0976598	Graduation Project (1)	
Prerequisite: (120 Cr. Hours Successfully + 0916302)		**1**
Course Description: Graduation project in industrial engineering. A comprehensive project in which the student applies the knowledge and skills accumulated from different courses in some area of industrial engineering.		

Course Number	Course Title	Credit Hours
0976599	Graduation Project (2)	
Prerequisite: (0976598 Successfully) or (incomplete with the department approval)		**2**
Course Description: Accomplishment of graduation project (1), by applying the knowledge and skills it has acquired in the fields of industrial engineering. Documentation and presenting the conducted work.		

Electives

Course Number	Course Title	Credit Hours
0936417	Non-ferrous Metals and Non-ferrous Alloys	
Prerequisite: (0976598 Successfully) or (incomplete with the department approval)		**3**
Course Description: Aluminum and Magnesium, copper, Nickel, Titanium, Beryllium, Zirconium and their alloys, their uses, in addition to precious metals, memory-shape alloys and low melting point alloys.		

Course Number	Course Title	Credit Hours
0936445	Microprocessors in Industrial Engineering	
Prerequisite: (0906347**)**		**3**

Course Description:
Digital logic design, combinatorial logic, and sequential logic. Elements of microprocessor design. Microprocessors software and hardware. Real-time applications of microprocessors.

Course Number	Course Title	Credit Hours
0946572	Biomedical Materials Engineering	
Prerequisite: (0906315**)**		**3**
Course Description:		
Introduction to Biomedical Engineering and biomaterials, Properties of biomaterials, Structure and Assembly, Classes of biomaterials, Applications.		

Course Number	Course Title	Credit Hours
0936573	Polymers and Plastics Engineering	
Prerequisite: (0906315**)**		**3**
Course Description:		
Polymeric materials. Polymer microstructures, mechanical, chemical and physical properties, thermoplastic, thermo-set, and elastomeric materials, polymer processing and molds, designing with plastics.		

Course Number	Course Title	Credit Hours
0936401	Organization Design and Control	
Prerequisite: (0906421**)**		**3**
Course Description:		
Strategic planning in organizations. Organization structures. Philosophies and models for organizing. Dynamics of organization. Change & self-organization. Organizational behavior & culture.		

Course Number	Course Title	Credit Hours
0906404	Production Engineering	
Prerequisite: (0936441**)**		**3**
Course Description:		
The study includes many technical, technological, design and administrative aspects, related to different industries. Among them: process planning, industrial organization, CNC and digital control machines, identification and control of tolerances, precision and accuracy of dimensions and product engineering, surface engineering and tribology, precision and accuracy, specifications, tools technology, costing and feasibility studies and how to prepare them economically and technically.		

Course Number	Course Title	Credit Hours
0906428	Entrepreneurship and Management of Creativity and Change	
Prerequisite: (0906421**)**		**3**
Course Description:		

The course provides a general introductory on creativity, entrepreneurship and change, its importance, its specificity and different terms used in this context, highlights the role of the individual and the institution in the management and leadership of this successfully. The course also considers sources for creativity, how to look for opportunities, and how to draw successful policies and strategies. The course also addresses the difficulties and challenges of managing creativity and change and the impact of knowledge in overcoming them. The course aims to help students understand and understand the opportunities for creativity and change and how to manage creativity and change, and to know the knowledge and skills needed to achieve this and the drivers and effects of change, strategies and approaches to managing change and elements of change management successfully.

Course Number 0936483	**Course Title** Industrial Safety Engineering	**Credit Hours**
Prerequisite: (0916525**)**		**3**
Course Description: Study of hazards in the workplace, analytical tools of hazards and accidents, probabilistic concepts, safety and health, national regulations and requirements, hazard control, safety and health management. Industrial safety and precautions.		

Course Number 0916516	**Course Title** Steel and Iron	**Credit Hours**
Prerequisite: (0946513 or Co-requisite**)**		**3**
Course Description: Iron ore and their chemical forms and methods of treatment, blast furnace processes, the theory of alloys, steel types and their classifications, production of different types of steels, the study of the properties steel , compare and distinguish between steels, cast iron alloys and its production and properties,. Uses of iron and steel.		

Course Number 0916517	**Course Title** Non-traditional Manufacturing Processes	**Credit Hours**
Prerequisite: (0906415**)**		**3**
Course Description: Chemical, electromechanical and EDM Operating, laser cutting, arc plasma, and assembly of Nano scale parts, silicon and semiconductor, flexible printing, rapid copying, and others.		

Course Number 0916518	**Course Title** Design for Manufacturing and for Assembly	**Credit Hours**
Prerequisite: (0946513+ 0906333**)**		**3**
Course Description: Materials and processes selection, design for manufacturing by forming, cutting, casting, welding, and other traditional and nontraditional manufacturing processes, design for assembly.		

Course Number	Course Title	Credit Hours
0906522	Project Management	
Prerequisite: (0906358**)**		**3**

Course Description:

Basics of project management and its importance in project success and the achievements of objectives within constraints of time, Budget, and standards. Comprehensive integrated planning for all the activities required for project success using the project life cycle. Gantt chart, activity on arrow, activity on node for scheduling time, expenditure, and resources. Time/Cost analysis and resource allocation.

Course Number	Course Title	Credit Hours
0916523	Setting up and managing small businesses	
Prerequisite: (0906421**)**		**3**

Course Description:

The course introduces small businesses and works, classification, importance, specificity and various terms used in this context. The course also shows the reasons for the failure and the reasons for the success of these projects and the difference between them and medium and large-scale projects and businesses. The course also deals with the main activities that should be taken care of when setting up a new business or when managing an existing one, forms of ownership, how to establish small businesses, sources of funding, the importance of choosing the location of the business and the factors influencing it. The course also provides an overview of the concept and importance of financial accounting for small businesses and how to measure, analyse and evaluate their performance.

Course Number	Course Title	Credit Hours
0906526	Strategic Planning	
Prerequisite: (0906421**)**		**3**

Course Description:

Nature of strategic planning, development of a strategic plan. Setting vision, mission, and objectives. External evaluation, internal evaluation, analysis and selection of alternatives. Strategy implementation. Strategy review and evaluation.

Course Number	Course Title	Credit Hours
0946531	Computer Aided Design and Computer Aided Manufacturing	
Prerequisite: (0906415**)**		**3**

Course Description:

Basics of computer aided in engineering and design, computer design applications, engineering modeling, engineering analysis, end-of-part style, one-dimensional, two-dimensional and three-dimensional analysis, design analysis, computer aided drawing, computer aided design, computer aided process planning, computer integrated manufacturing, examples.

Course Number	Course Title	Credit Hours
0916533	Product Design and Marketing	
Prerequisite: (0906421**)**		**3**

Course Description:

Students are required to conduct comprehensive projects that are accomplished in accordance with the innovative principles of developing and marketing new products. That include; analyzing the product cycle and the process of creating value, conducting feasibility studies and analyzing competition and its dimensions, development of engineering specifications, product design, design for manufacturing, design for maintenance and ease of service. After-sales services, marketing decisions, pricing strategies, e marketing, QFD analysis, and customer behavior are also considered. The course also aims to integrate the various student's skills and knowledge gained in the field of industrial engineering, such as materials selection, engineering drawing, design and manufacturing, quality evolution, flexible and agile management systems, safety engineering, human factors, and economics. Engineering, costing, computer applications, etc. Students apply these skills on the selected projects within teams under the supervision and guidance of their instructor.

Course Number	Course Title	Credit Hours
0946534	Design and Manufacturing of Tools and Dies	
Prerequisite: (0906415**)**		**3**

Course Description:

Tools, jigs, and fixtures design. Principles of jig and fixture design. Tool design. Classification of dies, main parameters to be considered in die design, sheet metal forming dies, forming dies. Materials used in dies, manufacturing of dies and its heat treatment.

Course Number	Course Title	Credit Hours
0946551	Quality Management	
Prerequisite: (0906358**)**		**3**

Course Description:

Leadership, customer focus, employee involvement, supplier's partnership, performance measures, tools of TQM, quality assurance systems.

Course Number	Course Title	Credit Hours
0936561	Reliability and Maintainability	
Prerequisite: (0906358**)**		**3**

Course Description:

Statistical and analytical concepts of failures, failure and reliability models, life cycle of machines and its relation with reliability and maintainability, reliability and quality, project.

Course Number	Course Title	Credit Hours
0906576	Materials Testing	
Prerequisite: (0936441 + 0936442**)**		**3**
Course Description: Data collection, error analysis. Tension tests, bending tests, hardness tests, strain, nondestructive testing, ultrasonic testing, electrical testing, radiation testing.		

Course Number	Course Title	Credit Hours
0906579	Rapid Prototyping and E-Manufacturing	
Prerequisite: (0906415**)**		**3**
Course Description: Rapid prototyping techniques, rapid prototyping applications, e manufacturing, integrated e-manufacturing and remote manufacturing.		

Course Number	Course Title	Credit Hours
0916580	Manufacturing Systems	
Prerequisite: (0916542**)**		**3**
Course Description: Introduction to production systems and processes, analysis of production systems, cellular manufacturing, flexible manufacturing, and computer integrated manufacturing.		

Course Number	Course Title	Credit Hours
0906423	Cost Accounting	
Prerequisite: (0901420**)**		**3**
Course Description: Concepts and theories in accounting and cost accounting, financial statements, product cost accounting models and methods, product cost accounting systems and computerized cost accounting systems.		

Course Number	Course Title	Credit Hours
0906506	Lean and Agile production systems	
Prerequisite: (0906425**)**		**3**
Course Description: Multidimensional lean thinking, the spirit of lean philosophy, agility and agile manufacturing, Toyota production system, waste elimination methodologies, lean and agile manufacturing principles, theories, methods, practices, and techniques in modern manufacturing enterprises; pull production systems, production smoothing, shop floor control policies, Kanban, Kaizen (continuous improvement), 5S, six-sigma, value stream mapping, DMAIC approach, Autonomation, mistake proofing ..... etc., investigation and discussion of lean manufacturing case studies.		

Course Number	Course Title	Credit Hours
0936574	Nano-materials Engineering	
Prerequisite: (0946513**)**		**3**
Course Description: Introduction to Nanotechnology, Characterization of Nano-materials, Nano-scale structure in metals, polymers and ceramics. In addition, applications of Nano-materials.		

Course Number	Course Title	Credit Hours
0916577	Composite Materials Ceramic and Powder Technology	
Prerequisite: (0946513**)**		**3**
Course Description: Classification of composite materials, hardening, metallic matrix, polymer matrix, ceramic matrix, powder technology, powder manufacture.		

Course Number	Course Title	Credit Hours
0906454	Algorithms Design and Programming	
Prerequisite: (0916555**)**		**3**
Course Description: Advanced programming techniques. Introduction to Industrial Engineering algorithms and their programming. Sorting algorithms, search algorithms, shortest path, matrix operations, curve fitting.		

Course Number	Course Title	Credit Hours
0916566	Management of Maintenance and Operating systems	
Prerequisite: (0916500**)**		**3**
Course Description: All types of maintenance management including preventive, corrective and predictive maintenance. Planning and controlling of maintenance material and spare parts, Component and systems reliability failure rate. Management of safety and industrial safety.		

Course Number	Course Title	Credit Hours
0946501	Selected Topics in Manufacturing engineering	
Prerequisite: (0906415**)**		**3**
Course Description:		

Course offered in special topics related to general areas of interest in manufacturing engineering.

Course Number 0936500	**Course Title** Selected Topics in Engineering Management	**Credit Hours**
Prerequisite: (0906425**)**		**3**
Course Description: Course offered in special topics related to general areas of interest in engineering and industrial management		

Course Number 0906275	**Course Title** Materials Science	**Credit Hours**
Prerequisite: (0303101**)**		**2**
Course Description: Classification of materials, material composition, mechanical properties, binary phase diagram, ferrous alloys and non-ferrous metals, ceramics, polymers and composite alloys.		

Course Number 0906310	**Course Title** Manufacturing Processes	**Credit Hours**
Prerequisite: (0904372**)**		**3**
Course Description: Metal forming processes, metal cutting operations, welding operations, and casting operations.		