كتيب برنامج الهندسة الصناعية و الانتاج

كلية الهندسة

2202

قسم الهندسة الميكانيكية والصناعية

Mechanical & Industrial Engineering Department

ملاحظة: نهاية الكتيب تجد الخطة الدراسية

أولا:- قوائم مسميات المقررات الدراسية للمرحلة العامة :-1st: List of General Courses

العلوم الإنسانية Humanities Courses

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
GH141	English I	Nil	3	اللغة الإنجليزية 1	ع إ 141
GH142	English II	GH141	3	اللغة الإنجليزية 2	ع إ 142
GH150	Arabic I	Nil	2	اللغة العربية 1	ع إ 150
GH151	Arabic II	GH150	1	اللغة العربية 2	ع إ 151
GH152	Technical Writing in Arabic	GH151	1	كتابا التقارير الفنية	ع إ 152
Total Credits			10	إجمالي عدد الوحدات	

العلوم الاساسية العامة General Science Course

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
GS101	Mathematics I	Nil	3	الرياضيات 1	ع ع 101
GS102	Mathematics II	GS101	4	الرياضيات 2	ع ع 102
GS111	Physics I	Nil	3	الفيزياء 1	ع ع 111
GS112	Physics II	GS111	3	الفيزياء 2	ع ع 112
GS112L	Physics Lab	GS111	1	فيزياء معمل	ع ع 112 م
GS115	Chemistry	Nil	3	الكيمياء العامة	ع ع 115
GS115L	Chemistry Lab	Nil	1	الكيمياء معمل	ع ع 115 م
GS200	Computer Programming	Nil	3	برمجة حاسوب	ع ع 200
GS203	Mathematics III	GS102	3	الرياضيات 3	ع ع 203
GS204	Mathematics IV	GS102	3	الرياضيات 4	ع ع 204
GS206	Probability & Statistics	Nil	3	الإحصاء والاحتمالات	ع ع 206
Total Credits			30	إجمالي عدد الوحدات	

ثانيا :- قائمة العلوم الهندسية العامة General Engineering Courses

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
GE121	Engineering Mechanics I	Nil	3	ميكانيكا هندسية 1	هـ ع121
GE125	Engineering Graphics	Nil	2	الهندسة الوصفية	هـ ع 125
GE127	Engineering Drawing	Nil	2	الرسم الهندسي	هـ ع 127
GE129	Workshop Technology	Nil	2	تقنية الورش	هـ ع 129
GE129 L	Workshop Technology Lab	GE 129	1	معمل تقنية الورش	هـ ع 129 م
GE133	Properties of Materials	GS101 GS111 GS115	3	خواص المواد	هـ ع 133
GE222	Engineering Mechanics II	GE121	3	ميكانيكا هندسية 2	هـ ع 222
Total Credits			16	إجمالي عدد الوحدات	

مسميات المقررات الدراسية الملزمة لجميع طلبة القسم

2nd . List of Departmental Compolasory Courses.

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
EE280	Electrical Eng. Fundamentals	GS101,S112L	3	أساسيات الهندسة الكهربية	هـ كه 280
ME 201	Mechanical Drawing	GE127	2	الرسم الميكانيكي	هـ مك 201
ME202	Workshop Practice	GE129 GE129L	2	تدريبات الورش	هـ مك 202
ME204	Strength of materials	GE121 GE133	3	مقاومة المواد	هـ مك204
ME205	Stress Analysis I	ME204 CE203	3	تحليل الإجهادات 1	هـ مك 205
ME206	Metallurgy	GE129 GE133	3	علم المعادن	هـ مك 206
ME210	Thermodynamics I	GS102 GS111	3	ديناميكا حرارية 1	هـ مك 210

ME215	Production Engineering I	ME206	3	هندسة الإنتاج 1	هـ مك 215
ME261	Industrial Management	Nil	3	الإدارة الصناعية	هـ مك 261
ME301	Design Of Mechanical ElementsI	ME201 ME205	3	تصميم العناصر الميكانيكية	هـ مك 301
ME302	Heat Transfer I	GS102 ME210	3	انتقال الحرارة 1	هـ مك 302
ME306	Mechanics Of Machines I	GE222	3	ميكانيكا الآلات 1	هـ مك 306
ME309	Numerical Analysis	GS200 GS203 GS204	3	التحليل العددي	هـ مك 309
ME 312	Fluid Mechanics I	GE222 GS203 ME210	3	ميكانيكا الموائع 1	هـ مك 312
ME315	Production Engineering II	ME206	3	هندسة الإنتاج 2	هـ مك 315
ME317	Energy Conversion sys.	ME302	3	منظومات تحويل الطاقة	هـ مك 317
ME318	Measur. & Instrumentations	ME306 ME312 GH152	3	معمل المقاييس وأجهزة القياس	هـ مك 318
ME 322	Principles of Air Con. & Ref.	ME302	3	اساسيات التبريد والتكييف	هـ مك 322
ME325	Mechanical Vibrations	GS204 ME306	3	الاهتزازات الميكانيكية	هـ مك 325
ME330	Automatic Control I	GS204 GE222 EE280	3	التحكم الآلي الصناعي	هـ مك 330
ME365	Eng. Economics & feasibility	ME261	3	الاقتصاد الهندسي ودراسة الجدوى	هـ مك 365
ME599	B.Sc. Project	Min 130 credit	3	المشروع	هـ مك 599
Total Credits			64	إجمالي عدد الوحدات	

ثالثا :- قوائم مسميات المقررات الدراسية الملزمة والاختيارية لشعبة الهندسة الصناعية والانتاج

3rd . List for each Branch Compulsory and Elective Courses

- **. Industrial & Production Branch**

قائمة مسميات المقررات الملزمة والخاصة بطلبة شعبة الهندسة الصناعية والانتاج فقط.

List Of Courses.

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
ME316	Production Engineering III	ME215	3	هندسة الإنتاج 3	هـ مك 316
ME363	Operation Research	GS203	3	بحوث العمليات I	هـ مك 363
ME371	Quality Control	GS206 ME261	3	مراقبة الجودة 1	هـ مك 371
ME416	Production Engineering IV	ME316	3	هندسة الإنتاج 4	هـ مك 416
ME460	Factory Planning & Layout	ME261	3	تخطيط المصانع	هـ مك 460
Total Credits			15	إجمالي عدد الوحدات	

- **قائمة مسميات المقررات الإختيارية الخاصة بشعبة الهندسة الصناعية والانتاج**
- **. List of Elrctive Courses**

على الطالب إختيار عدد 5 مقررات إختيارية بإجمالي عدد وحدات 15 وحدة

Course No.	Course name	Pre request المتطلبات	Credits الوحدات	اسم المقرر	رقم المقرر
ME415	Modeling and Simulation	GS200 GS204	3	النمذجة والمحاكاة	هـ مك 415
ME424	Expert Systems	GS200	3	النظم الخبيرة	هـ مك 424
ME466	Production Planning and Scheduling	ME261	3	تخطيط الإنتاج	هـ مك 466
ME467	Human Engineering	ME460 ME261	3	الهندسة البشرية	هـ مك 467
ME469	Tool Design	ME301 ME416	3	تصميم العدد	هـ مك 469
ME473	Machine Tool Design	ME301 ME416	3	تصميم آلات الخراطة والتفريز	هـ مك 473
ME475	Product Design	ME301 ME315	3	تصميم المنتج	هـ مك 475
ME477	Project Planning	GS206 ME261	3	تخطيط المشروعات	هـ مك 477

ME501	Engineering Analysis	ME309	3	التحليل الهندسي	هـ مك 501
ME511	Quality Control II	ME371	3	مراقبة الجودة 2	هـ مك 511
ME515	Welding Technology	ME315	3	تقنيات اللحام	هـ مك 515
ME516	Foundry Practice	ME315	3	تدريبات السباكة	هـ مك 516
ME517	Ferrous & Non-Ferrous Mat.	ME315	3	إنتاج المعادن الحديدية وغير الحديدية	هـ مك 517
ME518	Plastics & Cermics Manufacturing	ME315	3	إنتاج اللدائن والخزفيات	هـ مك 518
ME519	Mech. Behavior Of Engg. Mat.	ME315	3	السلوك الميكانيكي للمواد الهندسية	هـ مك 519
ME 520	Industrial Automation	ME330	3	الأتمتة الصناعية	هـ مك 520
ME521	Management Information Systems	GS200 ME261	3	نظم وإدارة المعلومات	هـ مك 521
ME526	Metrology	ME416	3	علم القياسات	هـ مك 526
ME533	Jigs & Fixtures	ME416	3	الموجهات والمثبتات	هـ مك 533
ME535	Maintenance Planning	ME261	3	تخطيط الصيانة	هـ مك 535
ME536	Industrial safety	ME261	3	السلامة الصناعية	هـ مك 536
ME563	Operation Research II	ME363	3	بحوث العمليات 2	هـ مك 563
ME567	Work study	ME460	3	دراسة الشغل	هـ مك 567
ME591	Special topics		3	مواضيع خاصة	هـ مك 591

الجدول التالي الذي يوضح تفاصيل متطلبات عدد الوحدت التخرج لكل شعبة بالقسم :

القسم	الشعبة أو البرنامج	العلوم الإنسانية		العلوم الاساسية العامة		العلوم الهندسية العامة		المقررات التخصصية الملزمة لجميع طلبة القسم		المقررات التخصصية الملزمة لطلبة الشعبة فقط		العلوم التخصصية الاختيارية		الإجمالي
		عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	عدد الوحدات	النسبة المئوية من اجمالي عدد الوحدات الكلية	
الهندسة الميكانيكية والصناعية	قوى	10	6.7%	30	20.1%	16	10.7%	64	43.0%	14	9.4%	15	10.1%	149
	صناعية		6.7%		20.0%		10.7%		42.7%	15	10.0%	15	10.0%	150
	تطبيقية		6.7%		20.1%		10.7%		43.0%	17	11.4%	12	8.1%	149

Syllabus of General Courses

GH141 and GH142	English (I,II)	& 3 respectively 3Credits	NIL

GH141 and GH142 are complimentary courses designed to introduce the student to the basic patterns of scientific English at the introductory stage and thereafter deals with inure advanced materials. Each covers:

(a) Intensive reading of passage containing material to student needs with comprehension question, contextual references, vocabulary exercises and affixation.

(b) The study of scientific vocabulary which includes use of dictionary, spelling rules and affixation.

(c) Revision and studs of Basic English verb tenses, active and passive.

(d) Description of the laboratory experiment.

(e) Study arid use of the passive voice in scientific technical English.

(f) Ing form;

(g) Compound nouns. The English noun phrases, relative clauses, deletion of relative, relation in active and passive voice.

(h) Summary writing.

GH150 and GH151	ARABIC (I , II)	respectively 1 & 2Credits	NIL

Review to Arabic courses taken in high school including construction of Arabic sentence, spilling and punctuation.

GH152	ARABIC TECHNICAL WRITING	Credits 1	NIL

Writing technical reports, Report preparation and presentation. preparation of minutes of meetings. Translation of technical document.

GS-101	MATH I	Credits 3	NILL

Limits, continuity, derivatives, chain rule, higher derivatives implied differentiation, trigonometric functions, maxima, minima, point of inflection. Curve sketching, role's theorem, mean value theorem. Definite, and indefinite integrals: Definition,

GS102	MATH. II	Credits 4	GS101

Methods of integration: By partial fractions, by successive reduction formulaic, transcendental functions; differentiation & integration of transcendental function. Complex numbers, partial differentiation, applications on relative maxima and minima, the method of Lagrange multiplier. Multiple integration with application.

GS-111	Physics I	Credits 3	NIL

Waves: Wave equations, traveling waves and stationary waves; principles of superposition, Doppler effect.

Sound; Definitions, velocity of sound in air and material media and its variation, velocity of transverse & longitudinal vibration in wires and rods. Echoes briefly.

Optics: properties of light, the electromagnetic character of light; sources of light and their spectra, absorption & scattering, dispersion, polarization of light.

GS-112	Physics II	Credits 3	GS111

Electrostatics: changes and fields, the electric potential; electric current; the magnetic field, electric fields in matter. Photoelectric effect, Einstein's explanation and quantum theory of the hydrogen atom. Radioactive decay law derivation.

GS-112L	Physics Lab	Credits 1	NIL

Experiments about sound, light, electricity, magnetism, heat and electro-chemical conversion.

GS-115	Chemistry	Credits 3	NIL

Measurements and SI units; chemical equations and stoichiometry; structures of atoms and periodic relationships, chemical compounds:

The gaseous state; solutions-electrolytes and non-electrolytes; acids and bases; thermochemistry; chemical equilibrium; ionic equilibrium I and II; organic chemistry.

GS-115L	Chemistry Lab	Credits 1	NIL

Some experiments related to GS115 course.

GS-200	Computer Programming	Credits 3	NIL

Introduction to computer science; basic principles of computer structure; basic components of programming languages; problem solving steps; Algorithms; introduction to Programming Language; Tokens; Values & variables; Input & Output statements; Statements, Expressions and Operators; Flow of Controls (if, if..elseif, switch

statements, ternary operator); Iteration and loops (while, do-while and for loop statements); Continue and Break statements; Built-in functions, User defined functions; Scope of variables (global, local and static variables); Arrays (one dimensional array, 2 dimensional array , multi-dimensional arrays); some arithmetic operations on arrays; Arrays and functions; File I/O, files and streams, opening and closing files, reading & writing text files; other data types (i.e. structures, pointers)

GS-203	Mathematics III	Credits 3	GS-102

Vector analysis, diy, grad, curl, Green's, Gauss's and Stokes theorems and their alications, Linear algebra, matrices and their applications. N-Euclidean space, vector spaces. Matrices, algebra of matrices, rank of a matrix, linear transformation, system of linear equation, equivalent and similar matrices, eigen values and eigenvectors.

GS-204	Mathematics IV	Credits 3	GS-203

Ordinary differential equations, differential equations of first order and first degree, different forms, non-linear differential equations of first order, linear differential equations constant coefficients; homogeneous case, method of variation of parameters, method of undetermined coefficient; method of laplace transforms, simultaneous differential equations in series; gamma, beta functions, Bessel function, modified bessel function, Legendre polynomials; spherical harmonics, hyper-geometric function.

GS-206	Probability and Statistics	Credits 3	NIL

Probability: concept of a random experiment and sample space; addition and multiplication laws of probability; conditional probability and independence, Bay's theorem and its application. Random variables and their probability distribution; Binomial, poisson, Normal, Gamma, Exponential, Uniform and cauchy distributions and their properties.

Basic statistical concepts: Statistical data, measures of central simple linear regression, regression coefficient and correlation coefficient, non-linear regression. Fitting of linear and non-linear regression to data. Multiple linear regression and multiple correlation coefficient.

GE-121	Engineering Mechanics I (Statics)	Credits 3	NIL

Statics of particles; forces in plane and spree; statics of rigid bodies : Equivalent system of forces; equilibrium in two and three dimensions, work and energy, analysis of trusses, frames, and machines, free body diagram; kinematic; stability friction, centroids and center of gravity-lines, area and volumes. Moment of inertia of areas and masses.

GE-125	ENGINEERING GRAPHICS or " DESCRIPTIVE GEOMETRY "	2Credits	Nil

Introduction, the purpose of Descriptive Geometry, different types of projection. Representation of point, line arid plane. Position problems. Metric problems. Projection on auxiliary views. Polyhedrons, development and intersections. Circle and sphere. Cone and cylinder. Curved surfaces, development arid Intersection.

GE-127	ENGINEERING DRAWING	Credits 2	Nil

Introduction; definitions, conventions. Instrument, dimensioning, some geometrical constructions; e.g., drawing of some polygons, parallel lines, line and arc tangents. Projection; theory, types of projection, one view projection, multi-view projection, first and third angle projection, applications, including missing line views. Sectional vie s; complete section, half section, pant section, removed sections, revolved section, and applications.

GE-129 & GE129L	WORKSHOP TECHNOLOGY and Lab	Credits2+1	Nil

Industrial safety; engineering materials and their mechanical and physical properties; classifications, ferrous and nonferrous metals, natural and synthetic materials; introduction to manufacturing processes: casting, welding, forging, rolling, extrusion; sheet metal working methods, metal machining.

GE-133	PROPERTIES OF MATERIALS	Credits 3	Nil

Elastic and plastic behavior of metals, plastic deformation of metals; atomic structure of materials, crystal geometry of; electrical, magnetic and optical properties of materials; materials at high temperature; recovery, recrystallization, grain growth; fatigue of metals; corrosion of metals and alloys; oxidation of metals and alloys.

GE-222	ENGINEERING MECHANICS II	Credits 3	GE-121

Introduction to dynamics. Kinematics of particles; Kinematics of rigid bodies. Three-dimensional motion of a particle relative to a rotating frame (Coriolis acceleration). D'Alembert's principle. Kinetic energy of a rigid body in plane motion. Kinetics of rigid bodies in three dimensions; motion of a gyroscope. Introduction to mechanical vibrations.

محتويات المقررات الملزمة لجميع البرامج (الشعب) بالقسم

for Mechanical & Industrial Syllabus of Departmental Compulsory Courses Engineering

EE280	Electrical Engineering Fundamentals	3 Credits

Pre-requisite: GS101,S112L

Kirchoff laws and applications, network theorems, applied electromagnetism and magnetic circuits, self and mutual inductance, rise and fall of current in an inductive circuit, capacitance, charging and discharging of capacitors, stored energy, alternating voltages and currents, average and R.M.S. values pastors, complex notation, R-L-C circuits resonance, quality factor. Power calculations.

ME201	Mechanical Drawing	2 Credits

Pre-requisite: GE127

Introduction: Revision to engineering drawing. Types of mechanical drawings: Symbols, abbreviation and conventions. Fasting elements: Screw, key, pin, welding. Surface texture and surface finish symbols: Dimensional fits, tolerances. General purpose constructional machine elements: Gears, coupling, bearing, pipe thread, pipe joints, cams, springs, rivets.

ME202	Workshop Practice	2 Credits

Pre-requisite: GE129 & GE129L

Bench .work operation-drilling, countersinking, drilling blind holes, tapping; operation of lathe, drill press, shaper and milling machine-turning operation, thread cutting; plane surface and V-surface on shaper; side and face milling, T-slot milling. Welding straight and vertical. Foundry pattern making, sand testing hardness, permeability and strength.

ME204	Strength of Materials	3 Credits

Pre-requisite GE121

Structural loading analysis: Types of structural loading, Classification of frames and beams, Statically determinate and indeterminate structures, Calculation of structure reactions.

Loading diagrams (beams): The method of sections, Shear in beams, axial force in beams, bending moment in beams; Shear, axial-force and moment diagrams; Step by step procedure, Shear diagram by summation; Moment diagram by summation; Shear force and bending moment relations.

Deflection of beams: Differential equation of deflection curve; Deflection by integration of the bending equation; Moment-area method; Temperature effects; Continuous beams.

Torsion: Circular and non-circular solid shafts; Hollow circular shafts; Thin-walled tubes; Shear center and shear flow.

Introduction to stress and strain analyses: Normal and shear stresses and strains; volumetric strains; Poisson's ratio; Hook's law; Engineering strains; True strains; Uniform deformation; Tensile tests; True stress-true strain curves; Point of instability.

ME205	Stress Analysis I	3 Credits

Pre-requisite: ME204

Introduction to stress and strain analysis: Engineering and true stresses and strains, Stress-strain relationship, Stress equilibrium equation, Simple torsion theory, Normal and shear stresses, Stresses of combined loading.

Stresses in bodies of revolution: Thin-walled pressure vessels (cylinders and spherical).

Stresses on oblique surfaces: Graphical representation of stress and strain, Principle stresses and strains, Mohr's circle for stress and strain, Plain stress and strain conditions.

Introduction to Failure theories: Static failure theories for ductile and brittle materials; Maximum shear stress theory, Maximum distortion energy theory, Maximum principle stress theory, Mohr-coulomb theory.

ME206	Metallurgy	3 Credits

Pre-requisite: GS111-GS102

Elementary theory of structure of metals, atoms, space lattice, crystal systems, arrangement of atoms; plastic deformation of metals, hot and cold working, recovery, recrystallization; grain growth; phase diagram, solidification of pure metals and alloys, equilibrium diagram; heat treatment of steel, TTT curves, heat treating processes, corrosion of metals; cast irons, carbon steels, alloy steels, nickel and its alloys, bearing metals, fusible alloys; introduction to powder metallurgy.

ME210	Thermodynamics I	3 Credits

Pre-requisite: GS111-GS102

Introduction; historical background, units, definitions, concepts of heat, temperature, force and work. Closed system and control volume; equation of state for ideal gas; properties of pure substances. The first law of thermodynamic s, reversible and irreversible processes. The second law of thermodynamk .s and Its corollaries, temperature scale, entropy, closed system processes, steady and unsteady flow processes, thermodynamic cycles.

ME215	Production Engineering I	3 Credits

Pre-requisite: ME202 - ME206

Mechanical working of metals, hot and cold working. Analysis of forging, rolling, drawing extrusion. Press working processes, equipment's and tools. Rubber and plastic forming methods. Introduction and classification of machine tools, cutting tools and their materials. Cat Ling fluids.

ME261	Industrial Management	3 Credits

Pre-requisite: NIL

Concept of management, scientific management, functions and types of management, span of control; forecasting, factory planning, production planning and control, material management, work study, decision making, capital budgeting, personal management, industrial safety, maintenance planning.

ME301	Design Of Mechanical Elements I	3 Credits

Pre-requisite: ME201, ME204 & ME205

Introduction to design and design processes; Calculations of bolted and riveted joints, Power screws and welded joints. Keys and splines: types and stress calculations. Design of spur gears and springs, Selection of rolling elements bearings.

ME302	Heat Transfer I	3 Credits

Pre-requisite: GS203 & ME210

Introduction: conduction, convection, radiation, electrical analogy. Overall heat transfer coefficient. Conduction: steady state one dimensional heat flow in slabs, cylinders and spheres; critical insulation, internal heat generation, variable conductivity, extended surfaces; Steady state two dimensional conduction (Cartesian coordinates). Transient Heat Conduction. Radiation, absorption, reflection and transmission. Kirchoff`s law, Stefan Boltzmann lap. Radiation intensity, emissive power, radiation between black and grey bodies. Heat exchangers.

ME306	Mechanics Of Machines I	3 Credits

Pre-requisite: GE222

Kinematics: Mechanisms, Classification, Velocity and acceleration by analytical and graphical methods, Force analysis. Introduction to the theory of cams.Gears: Terminology, Classification, Gear trains.

Crank-effort diagrams: Flywheel effect on speed and energy fluctuations in engines.

ME309	Numerical Analysis	3 Credits

Pre-requisite: GS200 GS203 & GS204

Basic concepts and analysis of errors, the Taylor series and numerical differentiation, roots of equations, optimization, simultaneous linear algebraic and nonlinear set of equations, curve fitting and interpolation, numerical integration, ordinary differential equations (initial value problems, boundary value problems and Eigen value problems), and using computer for solving these numerical methods.

ME312	Fluid Mechanics I	3 Credits

Pre-requisite: GE222, GS203 &ME210

Introduction: continuum concepts and fluid properties; static pressure and its variation with height; pressure and force on `submerged surfaces, buoyancy, fluid motion under linear acceleration and rotation of the container; stream line, vortices and circulation; concept of control volume, integral form of continuity and momentum equations; Euler's equation, Bernoulli's equation; Navier—Stoke's equation and stress field, viscous effects and energy dissipation; application of Bernoulli's equation, momentum equations; energy equation in integral form; static, dynamic and stagnation pressures; Pitot and static tube.

ME315	Production Engineering II	3 Credits

Pre-requisite: GE129

Metal casting; molding materials, pattern, core making. Various casting processes; melting practices, feling, finishing, and casting defects. Welding processes and equipment. Types of welds, welding rods and electrodes, defects, inspection of welding joints.

ME317	Energy Conversion sys	3 Credits

Pre-requisite: ME302

Fuels and Combustion: Types of fuels, Combustion equation, Stoichiometry, theoretical air required for complete combustion, Excess air, Calculation of combustion products.

Heat engines: definition, classification, basic components, Standard cycles, Terminology and Working principle and power conversion mechanism. Environmental impacts.

Renewable energies: definition of renewable energy, Classification, Applications. Working principle and energy conversion mechanism and environmental impacts.

ME318	Measur. & Instrumentations	3 Credits

Pre-requisite: ME306, ME312 & GH152

Introduction to measurement systems, experiment planning, report writing, analysis of experimental data, error analysis, uncertainty analysis, statistical and probability analysis, normal distribution; correlation and regression analysis method of least square; mechanical and electrical devices for measuring displacement, velocity, pressure, temperature, flow rate, thermal and transport properties, force, torque and strain. Mechanical sensors, input-output devices, amplifications and instrumentation.

ME322	Principles of Air Con. & Ref	3 Credits

Pre-requisite: ME302

Principle, concept and methods of air conditioning; Properties of moist air; Air conditioning processes; Summer and winter air conditioning cycles; human comfort and air conditioning; Ventilation and infiltration of air for buildings and the equipment of ventilation; Air conditioning systems types and selections; Principle of refrigeration systems and applications; Refrigerants properties and how to selections; Refrigeration cycles and performance.

ME325	Mechanical Vibrations	3 Credits

Pre-requisite: GS204 & ME306

Free vibration: equation of motion, natural frequency, viscous damping; forced vibration: Harmonically exited vibration, rotating unbalance. Multi-degrees of freedom system: Normal mode vibration, co-ordinate coupling, vibration absorber, vibration isolation.

ME330	Automatic Control I	3 Credits

Pre-requisite: GS204, EE280 & GE222

Introduction to automatic control, review of Laplace transformation, mathematical models of dynamic system: system modeling, electrical and electronic circuits, block diagrams and signal flow graphs, mechanical system, electromechanical systems, sensors, temperature control system, robotic control system, analogous systems and linearization; State variable models, Characteristics of closed loop control system, performance of feedback control system in time domain; Basic modes of control, pneumatic controllers; Poles, zeros and stability; Root locus analysis; introduction to frequency response analysis; Introduction to discrete processes control.

ME365	Eng. Economics & feasibility	3 Credits

Pre-requisite: ME261

Elements of engineering economics: measures of financial effective- ness, economical studies and accounting, costing, break even analysis. Value analysis. Interest and money time relationship, depreciation, capital financing and budgeting. Selection between alternatives. Replacement theory. Economic studies of public projects. Case studies.

ME599	B.Sc. Project	3 Credits

Pre-requisite: Min.130 credits and completion of 100, 200 & 300 level courses

Projects is an in-depth theoretical and/or an experimental investigation of specific problem in different fields of mechanical and industrial engineering.

محتويات المقررات الملزمة لبرنامج (شعبة)الهندسة الصناعية و الانتاج

Syllabus of Compulsory courses for Industrial & Production Branch only

ME316	Production Engineering III	3 Credits

Pre-requisite: GE129

Constructional details- accessories- machining calculations of: centre lathe, capstan and turret lathes, drilling machine, shaper and planer, boring and broaching machines; uses and applications of index head; grinding and grinding wheels; gears and thread manufacturing methods; introduction and applications of jigs and fixtures; measurement and gauging, limits and tolerances, limit systems, limit calculations, slip gauges, spirit level, sine bar, measurement of taper and surface texture.

ME363	Operation Research	3 Credits

Pre-requisite: GS203

Nature, development and scope, mathematical Preliminaries, formulation of linear programming models, graphical solutions, simplex algorithm, duality; assignment model, transportation problems; degeneracy; game theory, two persons zero sum game; queuing theory; integer programming; simulation.

ME371	Quality Control	3 Credits

Pre-requisite: GS206 &ME261

Definitions, concept or quality and quality control; quality characteristics; frequency distribution charts; mean median, mode and standard deviation; theory of centre charts, X bar, R, standard deviation charts, fraction defectives, P chart and C chart; acceptance sampling, single and double sampling plans; use of curves.

ME416	Production Engineering IV	3 Credits

Pre-requisite: ME316

Geometry of chip formation, single point cutting tool force analysis, dynamometer-turning and drilling; orthogonal and oblique cutting; mechanics of orthogonal cutting, Merchant force diagram, velocity relationship, stress and strain in chips, lee and Shaffer

theories; friction in metal cutting, tool life and tool wear, mach inability; heat in metal cutting; economics of machining.

Modern machining processes: comparison with conventional methods, classification, principles and applications of electro discharge, electro-chemical, ultra-sonic, electro beam, laser beam, abrasive jet and hot machining methods.

ME460	Factory Planning & Layout	3 Credits

Pre-requisite: ME261

Objectives and criteria; site selection; location theory; types of layouts, factors affecting layouts, material flow and process chart, preparation of layout, analytical evaluation of layout; industrial buildings; material handling and analysis, transportation problem; material handling system, storage system; assembly line balancing.

محتويات المقررات الاختيارية لشعبة الهندسة الصناعية ولانتاج

Syllabus of Elective courses for Industrial & Production Branch

ME415	Modeling and Simulation	3 Credits

Pre-requisite: GS206

Modeling and Simulation: Introduction to modeling and simulation, Modeling concepts, Simulation concepts, Introduction to available software, Hands on practice.

ME424	Expert Systems	3 Credits

Pre-requisite: GS200

Concepts of expert system: knowledge base, inference engine, user inference, explanation subsystem, learning facility;
Knowledge representation: design data base, examples of expert systems, some well known systems and their approaches;
Practice: introduction to expert systems software, project on building expert systems in the applied mechanics field.

ME466	Production Planning and Scheduling	3 Credits

Pre-requisite ME261

Introduction to production Planning; Production systems; Forecasting and forecasting methods ; aggregate planning; Capacity planning; Productivity; Resources Requirement Planning(RRP);Master Production schedule (MPS) ;types of workshops; deterministic inventory control Models; scheduling in production systems. Material Requirement Planning (MRP); Just in Time production systems (JIT);role of supply chins in planning; Case studies, homework, exams.

ME467	Human Engineering	3 Credits

Pre-requisite ME460&ME261

Human factors: definition, need and scope; man machine system; human factors in design process; human activities: nature and effects; visual displays; controls; hand tools and devices; environment: illumination, atmospheric conditions, noise and motion.

ME469	Tool Design	3 Credits

Pre-requisite ME301&ME416

Tool materials, heat treatment of cutting tools, design of single point tools, drills, milling and form relieved milling cutters, broaches and their heat treatment, thread cutting tools, tools operated by generated principles, tool grinding; press work die design principles, design of press working dies, drawing die design; forming die design principles, design of open die and closed die, materials of die block.

ME473	Machine Tool Design	3 Credits

Pre-requisite ME301&ME416

Requirements of machine tools, design analysis of machine tool elements- structure, spindle, slides and guideways, layouts of kinematics' schemes of machine tools, design. of steped step less drives; electrical and hydraulic drives; control systems, safety devices; acceptance tests.

ME475	Product Design	3 Credits

Pre-requisite ME301&ME315

Product classification and characteristics, product analysis, product design functions; various stages of design, market research, feasibility studies; various aspects of design

functional, aesthetic, visual, ergonomics; manufacturing process; economic analysis, break even analysis, bill of materials, selection of materials; value analysis; industrial packaging.

ME477	Project Planning	3 Credits

Pre-requisite ME261

Characteristics of effective planning; project planning by net work, network construction principles, properties of events and activities, calculations of total project duration, critical path analysis, PERT applications, time cost trade off, smoothing the load, scheduling, manpower resource allocation, line of balance technique.

ME501	Engineering Analysis	3 Credits

Pre-requisite ME309

For the syllabus contents details of this course see the same code in elective courses for Mechanics Power Branch.

ME511	Quality Control II	3 Credits

Pre-requisite ME371

Introduction to quality assurance, quality acceptance, lot by lot acceptance by attributes, lot by lot acceptance by variables. Quality engineering; quality control of tools, gauges and test equipment. Reliability. Organization for quality. Economics of quality.

ME515	Welding Technology	3 Credits

Pre-requisite ME315

Welding metallurgy; fusion welding methods, selection of electrodes, filler materials, fluxes; resistance welding methods; modern welding methods- electron beam, ultrasonic, explosive, plasma arc laser and friction; design and testing of welds, welding defects; mechanism and types of metal transfer, factors controlling melting rate; calculations of peak temperature, width of affected

zone, cooling rates, solidification rates, residua- stresses, weld distortion, weld thermal cycles.

ME516	Foundry Practice	3 Credits

Pre-requisite ME315

Foundry basic concepts, furnaces, handling system and handling equipments. Molding materials, sand blasting, special foundry equipment, casting and sand testing. Design of foundries, manual semi- automatic. Metallurgy concepts of sand castings. Die casting: processes, technology, dies, die design, metallurgy. Precise castings.

ME517	Ferrous & Non-Ferrous Mat.	3 Credits

Pre-requisite ME315

Classification and composition of iron ores; extraction and preparation of iron ores; construction, control, operation and charge of blast furnace, production of pig iron; types,

construction, operation and charge of steel making furnaces; production of steel ingots, blooms and sections; physical chemistry of iron and steel; extraction and preparation of ores of aluminum and copper, production of aluminum and copper; an overview of production of alloy steels, zinc, nickel, brass and aluminum bronze.

ME518	Plastics & Cermics Manufacturing	3 Credits

Pre-requisite ME215

Polymer crystals, elastomers, thermosetting and thermoplastic materials; deformation of polymers, yielding, visco-elastic behavior, fracture, toughness, stability; manufacturing methods compression molding, transfer molding, injection molding, extrusion, casting, cold working, thermoforming, blow molding, machining; laminated sheets, PVC plastics, welding, forming of pipes, plastic riveting; ceramics and powder metals production methods, properties and design consideration refractory ceramics, alumina, silica, carbon.

ME519	Mech. Behavior Of Engg. Mat.	3 Credits

Pre-requisite : ME315

Elastic and plastic behavior of medals, plastic working and microstructure; fatigue tests, factors affecting fatigue properties, Basquini's law, Coffin Manson Law; creep tests, factors affecting creep, creep resistant materials; fundamentals of corrosion-, types, corrosion fatigue stress, corrosion cracking, corrosion prevention, corrosion. Resistant materials; wear of metals; wear tests, types, factors influencing wear, protection against wear, wear resistant materials; fracture, catastrophic crack growth, fast fracture, toughness, fracture toughness.

ME520	Industrial Automation	3 Credits

Pre-requisite: ME330

For the syllabus contents details of this course see the same code in elective courses for Applied Mechanics Branch

ME521	Management Information Systems	3 Credits

Pre-requisite ME261

System concept; data processing, techniques, computers; system analysis and design; system documentation; information theory; strategic and tactical information systems; role of information in decision making.

ME526	Metrology	3 Credits

Pre-requisite ME318

Errors and tolerances: standards, inspection, calibration; geometric tolerances, linear measurements, angle measurements, form measurements. Surface texture, automatic gauging.

ME533	Jigs & Fixtures	3 Credits

Pre-requisite ME416

Basic concepts, clamping methods, tolerances for jigs and fixtures, reference surfaces. Design of jigs for applications during drilling, milling, planning, turning, etc. Fixtures and economics of fixtures in mass production.

ME535	Maintenance Planning	3 Credits

Pre-requisite ME261

Maintenance and need for planning of maintenance. Maintenance practices: breakdown maintenance, preventive maintenance. Elements of preventive maintenance system. Categorizations of equipment, design of an inspection system and methods of lubrication. Planning and scheduling of maintenance work. Spare parts management. Maintenance records and their analysis. organization of maintenance.

ME536	Industrial safety	3 Credits

Pre-requisite ME261

Safety management , OSHA,Safety in workplace and health program, Hazard determination and accident investigation , Safety cost analysis ,Industrial hygine (Noise , light, air and thermal stresses) , personal protection appliances, Hand and mobile tool protection , electricity safety, Material processing and storage,fire safety,Design for location safety, Safety for environment.

ME563	Operation Research II	3 Credits

Pre-requisite ME363

Revised simplex algorithm, duality theorems, sensitivity analysis, traveling salesmen problem, parametric programming, game problems, mini- max criterion, optional strategy, games by simplex, dominance rules; waiting line theory, classification of queuing situations, Poisson’s arrival with exponential or erlang distribution, finite and infinite ques, Monte Carlo simulation, quasi and pseudo random numbers, applications in queuing and inventory problems, Bellman's principle of optimality, problems with finite number of stages, sequencing and co-ordinating problems goal programming and decision making.

ME567	Work study	3 Credits

Pre-requisite ME460

Work study, method study and work measurement.. Basic procedure of work study. Role of management, supervisor, worker and work study man. Applications of work study. Method study: definition, purpose and basic procedure, recording techniques for process, method of movement. Critical examination. Development, installation and maintenance of new method. Work measurement: definition, purpose and basic procedure. Time study, work sampling, analytical estimation, PMTS, standard data, concept of rating and qualified worker, allowances and standard time. Role of work study in job design.

ME591	Special Topics	3 Credits

نموذج قائمة المقررات الدراسية للبرنامج الدراسي للهندسة الصناعية و الانتاج
لدرجة البكالوريوس

Department of Mechanical & industrial Engineering Faculty of Engineering

Study Plan of Industrial & Production Program

Program : Industrial & Production Department Establishment Date : 1961
Study Period : 10 semesters Number of Total Passed Credits : 150 Unit

Total Credits	Pre-request	Type of coure	Distribution by hours			By hours	Credits	Course name	Course No.	The Semester
			Lab- Practes	Tutorial	Lectures					
16	-	د		1	3	4	3	Mathematics I	GS101	First Semester
	-	د		1	3	4	3	Physics I	GS111	
	-	د		1	3	4	3	Engineering Mechanics I	GE121	
	-	د			2	2	2	Workshop Technology	GE129	
	-	ج			3	3	3	English I	GH141	
	-	ج			2	2	2	Arabic I	GH150	
15	GS101	د		1	4	5	4	Mathematics II	GS102	Second Semester
	GS111	د		1	3	4	3	Physics II	GS112	
	GS111	د	3			3	1	Physics Lab	GS112L	
	GH141	د			3	3	3	English II	GH142	
	GH150	ج			1	1	1	Arabic II	GH151	
	-	د	3		1	2	2	Engineering Drawing	GE127	
	GE129	د	3			3	1	Workshop Technology Lab	GE129L	
15	-	د		1	3	4	3	Chemistry	GS115	Thread Semester
	GS102	د		1	3	4	3	Mathematics III	GS203	
	-	د	3		1	2	2	Engineering Graphics	GE125	
	GS101 GS111	د		1	3	4	3	Properties of Materials	GE133	
	GE121	د		1	3	4	3	Engineering Mechanics II	GE22	
	-	د	3			3	1	Chemistry Lab	GS115L	
17	GS102	د		1	3	4	3	Mathematics IV	GS204	Fourth Semester
	-	د	2		2	4	3	Computer Programming	GS200	
	GS101 GH112L	د		1	3	4	3	Electrical Eng. Fundamentals	EE280	
	-	د		1	3	4	3	Probability & Statistics	GS206	
	GE127	ت	2	3	1	5	2	Mechanical Drawing	ME201	
	GS111 -	ت		1	3	4	3	Thermodynamics I	ME210	

Total Credits	Pre-request	Type of coure	Distribution by hours			By hours	Credits	Course name	Course No.	The Semester
			Lab-	Tutorial	Lectures					
15	GE129 GE129L	تخصصي	3			3	2	Workshop Practice	ME202	Fifth Semester
	GE129 GE133	تخصصي		1	3	4	3	Metallurgy	ME206	
	GH151	جامعي			1	1	1	Technical Writing	GH152	
	GE121 GE133	داعم		1	3	4	3	Strength of materials	ME204	
	GE222	تخصصي		1	3	4	3	Mechanics Of Machines I	ME306	
	GS203 GS204 GS200	تخصصي		1	3	4	3	Numerical Analysis	ME309	
15	ME206	تخصصي		1	3	4	3	Production Engineering I	ME215	Sixth Semester
	ME210	تخصصي		1	3	4	3	Heat Transfer I	ME302	
	ME204	تخصصي		1	2	3	3	Stress Analysis I	ME205	
	ME206	تخصصي		1	3	4	3	Production Engineering II	ME315	
	GS204 GE222	تخصصي		1	3	4	3	Mechanical Vibrations	ME325	
15	GS203 GE222 ME210	تخصصي		1	3	4	3	Fluid Mechanics I	ME312	Seventh Semester
	ME302	تخصصي		1	3	4	3	Principles of Air Con. & Ref.	ME322	
	ME302	تخصصي		1	3	4	3	Energy Conversion sys.	ME317	
	ME201 ME205	تخصصي		1	3	4	3	Design Of Mechanical Elements I	ME301	
	ME206	تخصصي		1	3	4	3	Industrial Management	ME261	
15	ME306 ME312 GH152	تخصصي		1	3	4	3	Measur. & Instrumentations	ME318	Eighth Semester
	GS204 EE280 GE222	تخصصي		1	3	4	3	Automatic Control I	ME330	
	GS200	تخصصي		1	3	4	3	Eng. Economics & feasibility	ME365	
	ME215	تخصصي		1	3	4	3	Production Engineering III	ME316	
	GS203	تخصصي		1	3	4	3	Operation Research	ME363	
15	GS206 ME261	تخصصي		1	3	4	3	Quality Control	ME371	Ninth Semester
	ME316	تخصصي		1	3	4	3	Production Engineering IV	ME416	
	ME261	تخصصي		1	3	4	3	Factory Planning & Layout	ME460	
	Choose From Table of Elective Industrial & Production Courses	تخصصي		1	3	4	3	Elective Industrial. Course # 1	ME***	
		تخصصي		1	3	4	3	Elective Industrial. Course # 2	ME***	
12	Choose From Table of Elective Industrial & Production Courses	تخصصي		1	3	4	3	Elective Industrial. Course # 3	ME***	tenth Semester
		تخصصي		1	3	4	3	Elective Industrial. Course # 4	ME***	
		تخصصي		1	3	4	3	Elective Industrial. Course # 5	ME***	
	Min 130 credit	تخصصي		1	3	4	3	مشروع التخرج B.Sc project	ME599	