



**Ministry of Higher Education and Scientific Research**

**Thi-Qar University**  
**College of Engineering**

# CURRICULUM

*for the*  
**Mechanical Engineering Department**

**In the**  
**College of Engineering**  
**THI-QAR UNIVERSITY**

**Al-Nasiriyah, Iraq**

**Prepared by: academic staff in the department**  
**Reviewed by: the scientific committee in the department**

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## **1- BACKGROUND INFORMATION**

### ***1.1 Contact Information***

1- Name: Dr Ressol R. Shakir

Dean of Engineering College

Address: Al-Nasiriyah, Iraq

Email: [thengdean@eng.utq.edu.iq](mailto:thengdean@eng.utq.edu.iq)

Site: <http://eng.utq.edu.iq>

Mobile: +9647814302298

2- Name: Dr Hazim I. Radhi

Head of Mechanical Engineering Department

Address: Al-Nasiriyah, Iraq

Email: [hazemismaeel2003@gmail.com](mailto:hazemismaeel2003@gmail.com)

Mobile: +9647805495515

### ***1.2 Overview***

The Department of Mechanical Engineering (ME) was established in 2003 as one of five departments of the College of Engineering in Thi-Qar University which was established at that time. "Mechanical Engineering" is a growing and one of the most sought disciplines in the field of engineering study.

## ***2 Course Descriptions***

### ***2.1 Program Criteria***

The Baccalaureate Degree of Mechanical Engineering program in college engineering at Thi-Qar University consists of 159 Units, which is equivalent to (3540-3600) hours. Table (2-3) a, b, c and d show the curriculum for the four years in addition to the units and hours for every material.

In addition, to obtain the B.Sc. degree, the student must complete his summer training Summer training extends over a period of 30 days excluding weekends and official holidays, and must be undertaken in companies or establishments accepted by the college. Summer training is supervised by a coordinator in each department and a college training coordinator.

The student's performance is evaluated by the training company and by both the Department and College coordinators. The following Tables contain the full set of courses offered in each year.

### ***2.2 Graduation requirements***

The courses are distributed in three main categories as; (see Fig. (2-1), and Table (2-1)).

1. University requirements (UR).
2. Engineering college requirements (ER).
3. Department requirements (ME).

#### ***2.2.1 University requirements***

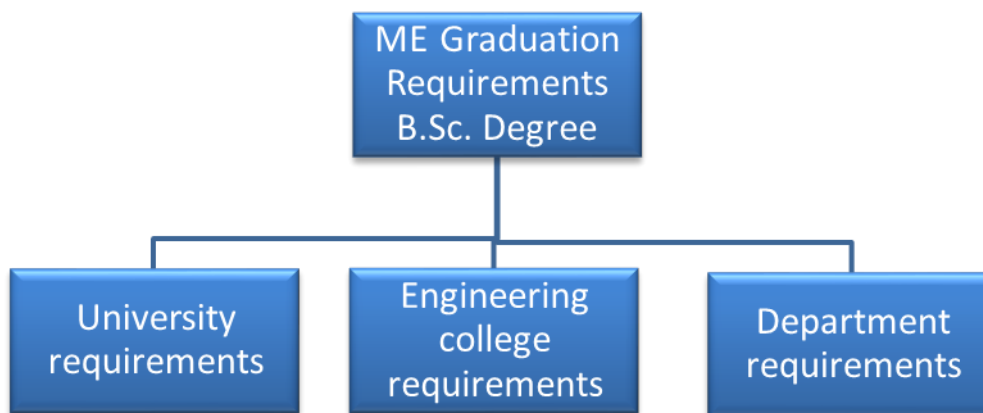
Table (2-2) shows the courses for university requirements. These courses will give (UR) code The total units of the university requirements are 6 units.

## **2.2.2 Engineering college requirements**

Table (2-1) shows the courses for college requirement. These courses will give (ER) code The total units of the college requirements are 32 units.

## **2.2.3 Department requirements**

Table (2-3) shows the courses for department requirements. These courses will give (ME) code The total units of the department requirements are 127 units.



**Fig. (2-1) Graduation requirements**

**Table (2-1) Graduation requirements**

Requirements	Credit
University	6
College	32
Department	121
<b>Total</b>	<b>159</b>

**Table (2-2) University requirements**

Course No.	Course Title	Credit	Weekly hours		
			Theoretical	Tutorial	Practical
UR 101	Arabic Language	2	2		
UR 102	English Language	2	2		
UR201	Human rights and Democracy	2	2		
<b>Total</b>		<b>6</b>			

**Table (2-3) a Plan of study for B.Sc. in Mechanical Engineering**

**(First Year) Freshman year**

	Course No.	Course Title	Type	Theoretical	Tutorial	Practical	Units
First Semester	ER 101	Mathematics I	Math	3	1	-	3
	ME101	Engineering mechanics (static I)	Eng. Science	3	1	-	3
	ME102	Metallurgical Engineering	Eng. Science	2	-	2	3
	ME103	Principle of production processes	Eng. Science	3	-	2	4
	ER 102	Principles of computer science	Science	3	-	2	4
	UR101	Arabic language	Humanity	2	-	-	2
	ER 103	Physics		2	-	-	2
Second Semester	ER 104	Mathematics II	Math	3	1	-	3
	ME104	Engineering mechanics (static II)	Eng. Science	3	1	-	3
	ME105	Properties of Engineering Materials	Eng. Science	2	-	2	3
	ER 105	Engineering drawing +Descriptive engineering	Eng. Science	6	-	2	7
	ME106	Electrical Engineering	Eng. Science	3	-	1	3
	UR 102	Technical English Language	Humanity	2	-	-	2
	ER 106	Fundamental of chemical principles		2	-	-	2
							44

**Table (2-3) b Plan of study for B.Sc. in Mechanical Engineering**

**(Second Year) sophomore year**

	<b>Course No.</b>	<b>Course Title</b>	<b>Type</b>	<b>Theoretical</b>	<b>Tutorial</b>	<b>Practical</b>	<b>Units</b>
<b>First Semester</b>	ER 201	Applied Mathematics II	Math	3	1	-	3
	ME201	Strength of Materials I	Eng. Science	2	1	1	3
	ME202	Thermodynamics I	Eng. Science	2	1	1	3
	ME203	Fluid Mechanics I	Eng. Science	2	1	1	3
	UR 201	Human right and democracy	Social science	2	-	-	2
	ER 202	Computer programming	Comp. science	3	-	2	4
<b>Second Semester</b>	ER 203	Applied Mathematics II	Math	3	1	-	3
	ME204	Strength of Materials II	Eng. Science	2	1	1	3
	ME205	Engineering mechanics (Dynamics )	Eng. Science	4		-	4
	ME206	Thermodynamics II	Eng. Science	2	1	1	3
	ME207	Mechanical Drawing	Eng. Science	3	1	2	4
	ME208	Fluid Mechanics II	Eng. Science	2	1	1	3
	UR 202	English language	Humanity	2	-	-	2
							40

**Table (2-3) c Plan of study for B.Sc. in Mechanical Engineering**

**(Third year) Junior year**

	Course No.	Course Title	Type	Theoretical	Tutorial	Practical	Units
First Semester	ME301	Engineering Analyses	Eng. science	2	2	-	2
	ME302	Heat Transfer I	Eng. science	2	1	1	3
	ME303	Manufacturing Processes	Eng. science	3	-	2	3
	ME306	Internal Combustion Engine I	Eng. science	2	1	1	3
	ME307	Gas dynamics	Eng. science	2	1	2	3
	ME308	Theory of Machine I	Eng. science	2	1	1	3
	UR 301	English language	Humanity	2	-	-	2
Second Semester	ME309	Numerical Analyses	Eng. science	2	2		2
	ME310	Heat Transfer II	Eng. science	2	1	1	3
	ME312	Electrical Machinery Fundamentals	Eng. science	2	1	2	3
	ME313	Computer Aided Design (CAD/CAM)	Eng. science	2	-	2	3
	ME314	Internal Combustion Engine II	Eng. science	2	1	1	3
	ME315	Turbo machinery	Eng. science	2	1	2	3
	ME316	Theory of Machine II	Eng. science	2	1	1	3
	ME317	Summer training	Eng. science	-	-	-	-
						39	



**Table (2-3) d Plan of study for B.Sc. in Mechanical Engineering**

**Fourth Year (Senior year)**

	Course No.	Course Title	Type	Theoretical	Tutorial	Practical	Units
First Semester	ME401	Mechanical Vibrations I	Eng. Science	3	-	-	3
	ME402	Engineering project I (continued)	Eng. Science	-	-	-	-
	ME403	Refrigeration and Air Conditioning I	Eng. Science	3	1	2	4
	ME404	Engineering Materials	Eng. Science	3	-	-	3
	ME405	Machine Design	Eng. Science	4	1	-	4
	ME406	Industrial Engineering and quality control	Eng. Science	3	-	-	3
	ME407	Power Plant I	Eng. Science	2	-	1	2
	ME410	Engineering project II	Eng. Science	2	-	1	2
	ME411	Refrigeration and Air Conditioning II	Eng. Science	3	1	2	4
	ME413	Design of Machine Systems	Eng. Science	4	1	-	4
	ME415	Power Plant II	Eng. Science	2	-	1	2
	ME416	Control and measurements	Eng. Science	3	1	1	4
	ER 401	Ethics		1	-	-	1
							36

## 2.2 Program syllabi

The syllabus of every course in the mechanical engineering is provided here.

### I – Year

**Course Number: ER 101**

**Course Name: Mathematics I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Algebraic, non – algebraic functions and its inverse, Limits, Continuity, Derivation, Logarithmic function, Hyperbolic function, Application of derivation, Polar coordinates and parametric equation, Integration and its application, Indefinite of integration, Method of integration, Definite integral and its application, Area, Volume.

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**Course Number: ER 104**

**Course Name: Mathematics II**

**Credit hours:**

**Pre-requisite: Mathematics I**

**Course Contents:**

Arc length – surface area, Vectors – vectors product, Line and plane equation, Vectors, function – curvature, Matrix and determinant, Simultaneous linear algebraic equations, Cramer method, Matrix – inversion method, Numerical method to solve non- linear algebraic equation, Numerical integration, Interval – halving method false position method newton's method, Numerical integration trapezoidal rule Simpsons rule.

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**Course Number: ME101**

**Course Name: Engineering Mechanics I - Static I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction to Statics, Force Systems, Force, Rectangular Components (2-D), Moment (2-D), Couple (2.D), Resultants (2-D), Rectangular Components (3-.D).

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**Course Number: ME104**

**Course Name: Engineering Mechanics I - Static II**

**Credit hours:**

**Pre-requisite: Engineering Mechanics I - Static I**

**Course Contents:**

Frames and Machines, Distributed Forces, Cancroids, Composite Bodies and Figures, Beams: External Effects, Beams: Internal Effects, Flexible Cables, and Fluid Statics.

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**Course Number: ME102**

**Course Name: Metallurgical Engineering**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction and Classification of engineering materials, Crystal structure, Imperfections in crystals, Thermal equilibrium diagrams, Lever rule, Applications on binary phase diagrams, Mechanical properties of metals, Carbon steel, Cast Iron, Heat treatment of steel, Alloy steel.

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**Course Number: ME105**

**Course Name: Properties of Materials Engineering**

**Credit hours:**

**Pre-requisite: Metallurgical Engineering**

**Course Contents:**

Alloy steel, Copper and its alloys, Aluminum and its alloys, Nano materials, Plastics, Ceramics and glass, Composite Materials.

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**Course Number: ME103**

**Course Name: Principle of production processes**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

انتاج المعادن, الخواص الميكانيكية والفيزيائية, القياس والتحديد وعدد التشغيل اليدوي, تشغيل المعادن, الية انجماد المعادن, عملية السباكة. عمليات التشكيل الميكانيكي, اعادة التبلور والتشكيل الميكانيكي, تقنيات المساحيق, اللدائن, المواد الخزفية والزجاج, وصل المعادن.

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**Course Number: ER 105**

**Course Name: Engineering drawing + Descriptive geometry**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

مقدمة وأدوات الرسم، استخدام أدوات الرسم/ الخط الهندسي وأنواع الخطوط، العمليات الهندسية، المساقط، المساقط المقطوعة، استنساخ مسقط مجهول من مسقطين معلومين (المسقط الثالث)، وضع الأبعاد على المساقط، الرسم الحر، الرسم المجسم، استنساخ المجسمات من المساقط، القطع في المجسمات، الأبعاد في المجسمات، رسم اجزاء المكائن (البراغي)، الرسم التجميعي.

Descriptive geometry and methods of projection, Projection of point, Projection of straight line, Projection plane surface, Auxiliary planes, Development, Application.

**Course Number: ER 102**

**Course Name: Principles of computer science**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Algorithm, Introduction to programming – programming using quick basic, Variables types and their declaration, Input / output commands, Examples, Mathematical relationships, If statement – select case, For loop – do loop, Examples, Arrays, Two dimensions arrays, Arrays example, Triangular function – square root function, Example, Methods of creating a complete program.

Introduction to Visual Basic Language and Environment, Working with controls: Labels, Textboxes, and Command buttons, working with controls: List boxes and Combo boxes, Option buttons and Check boxes, List boxes and Combo boxes, Input box and Msg box, Frames, Lines, Shapes, and Images Controls, Projects.

**Course Number: UR 101**

**Course Name: Arabic Language**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

التاء المربوطة والتاء المبسوطة + قصيدة لاحمد شوقي، العدد والمعدود، اسلوب الشرط + قصيدة ابن الرومي، الالف المدودة والالف المقصورة + نص قرآني، علامات الترقيم، حروف الجر + قصيدة بدر شاكر السياب، الضاد والظاء + الاسماء الخمسة، خطبة الامام علي (عليه السلام)، انواع الهمزة، نشأة اللغة العربية، اسلوب النداء، نص قرآني + المبتدأ والخبر، المعجم العربي، الافعال الخمسة، نصب الفعل المضارع.

**Course Number: UR 102**

**Course Name: Technical English**

**Credit hours:**

**Pre-requisite: None**

**Course Contents: (New English course recommended by the ministry council)**

Parts of speech (nouns, pronouns, verbs, adverbs, prepositions, conjunctions, interjections); kinds of sentences (simple, compound, complex); subordinate clauses; change of sentences from simple to compound and vice versa; tenses; passive and active; direct and indirect speech.

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**Course Number: ER 103**

**Course Name: Physics**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Elementary mechanics with an emphasis on the fundamental concepts and law of mechanics, especially the conservation law. Topics are scalar and vector quantities of mechanic rectilinear and circular motion; equilibrium and Newton's law of motion; work; energy; momentum; the conservation law.

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**Course Number: ER 106**

**Course Name: Fundamental of chemical principles**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction to basic concepts of chemistry including chemical reactions and bonding , electronic and molecular structure , gases and thermochemistry.

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**Course Number:ME106**

**Course Name: Electrical Engineering**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

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## II – Year

**Course Number: ER 201**

**Course Name: Applied Mathematics I**

**Credit hours:**

**Pre-requisite: Mathematics I, II**

**Course Contents:**

Function of several variable, Limit partial derivatives, Gradient, Directional derivatives, Tangent plane, Normal line Extra ( max , min and saddle points), Lagrange multipliers, Double and triple integrals and its application, Area, Volume, Center of mass, Line and surface integral, Green theorem, Divergence theorem of Gauss, Stokes 's theorem.

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**Course Number: ER 203**

**Course Name: Applied Mathematics II**

**Credit hours:**

**Pre-requisite: Mathematics I, II**

**Course Contents:**

Complex numbers, Tangent, De Moivre theorem, Series solutions, Tests, Cramer basic, Power series, Taylor and Maclaurian series, Ordinary differential equations, 1st order solution, 2nd order solution, Linear system of differential equation, 1st and 2nd order with the constant coefficient, Eigen problems, Numerical solutions of O. D. E ., Euler method, Runge Kutta method.

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**Course Number: ME202**

**Course Name: Thermodynamics I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction, Definition / force / pressure, Energy / resource / uses, Heat / work / power, Internal energy / enthalpy / zeroth law, Temperature and its measurement, First law of thermodynamics / perpetual motion machine, Boyles law / Charles law, Equation of state / closed system processes, Constant volume pressure and processes, Adiabatic and polytrophic processes, Open system processes / steady flow energy equation , and its application.

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**Course Number: ME206**

**Course Name: Thermodynamics II**

**Credit hours:**

**Pre-requisite: Thermodynamics I**

**Course Contents:**

Application of steady flow energy equation, Reversible and in reversible processes, Heat engine / reversed heat engine, Heat pump, Second law of thermodynamics, Cycle / Carnot cycle, Reversed Carnot cycle, Entropy / clauses in quality, Entropy in reversed processes, Entropy in reversed processes with heat transfer, Entropy in irreversible processes, Entropy in irreversible processes with heat transfer, Gases mixtures / Dalton's law, Avogadro's law / adiabatic mixing of gases.

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**Course Number: ER 202**

**Course Name: Computer programming**

**Credit hours:**

**Pre-requisite: Principles of computer science**

**Course Contents:**

Introduction to programming in Fortran 90, Rules of Fortran 90, Variables and Constant Types, Assignment statement, Library Function, Input / output statement, Relational Operators and Logical Operands, Control Construct ( IF , Select Case), Loop Statement ( Do Construct), Engineering Examples.

Arrays, One Dimension Arrays, Two Dimension Arrays, Arithmetic operation on Arrays, Sort Arrays, Search Arrays, Subprogram, Statement function, Functions, Subroutines, Modules, Derived Types, Engineering Examples.

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**Course Number: ME201**

**Course Name: Strength of Materials I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Simple stress, Shear Stress-Bearing stress, Thin walled pressure, Simple strain-Hook's law, Axial deformations, Statically Indeterminate Members, Thermal Stresses, Torsion, Shear and moment in beams, Shear force and bending moment diagrams, Stresses in beams, Shear stress in beams, Curved beams.

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**Course Number: ME204**  
**Course Name: Strength of Materials II**  
**Credit hours:**  
**Pre-requisite: Strength of Materials I**  
**Course Contents:**

Slope and deflection in beams, Moment area method, Castiglione's method, Combined stresses, Mohr's circle for stresses, Mohr's circle for strain, Columns, Euler's equation for column, Theories of failure, Helical Springs.

**Course Number: ME207**  
**Course Name: Mechanical Drawing**  
**Credit hours:**  
**Pre-requisite: None**  
**Course Contents:**

البراغي ( انواع البراغي), الربط بواسطة البراغي ( برغي و صاموله), الربط بواسطة برغي فقط, الخوابير, المسامير, البراشيم, التفاوتات, التوافقات, علامات التشغيل, اللحام, النوابض.

التجميع (رسم مقطع امامي كامل لمجمع و مسقط جانبي لتمرين معين), التجميع ( رسم مقطع امامي كامل لا جزء منظومة ميكانيكية ), التجميع (مسقط امامي نصف مقطوع لاجزاء منظومة ميكانيكية ), التجميع (رسم مقطع امامي و مسقط امامي لاجزاء منظومة ميكانيكية), التروس : انواعها و تطبيقاتها, التروس الاسطوانية العدلة : رسم الترس و رسم التعشيق, التروس المخروطية : رسم, التروس المخروطية : تعشيق, الدودة و الدولاب الدودي, الرسم التفصيلي.

**Course Number: ME203**  
**Course Name: Fluid Mechanics I**  
**Credit hours:**  
**Pre-requisite: None**  
**Course Contents:**

General introduction to fluid science, Fluid static and pressure application, Forces on immersed bodies and surface, Accelerated fluid and relative motion, Equilibrium of floating bodies, Introduction to fluid motion, Continuity equation, Equations of motions and their applications.

**Course Number: ME208**  
**Course Name: Fluid Mechanics II**  
**Credit hours:**  
**Pre-requisite: Fluid Mechanics I**  
**Course Contents:**

Dimensional analysis and similarity, Motion of viscous fluid in conduits / and definition of boundary layer, Friction losses in pipe, Measurements of fluid flow, Analysis of piping system.



**Course Number: ME205**

**Course Name: Dynamics**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction, Rectilinear Continuous Motion, Rectilinear Erratic and Curvilinear Motion, Curvilinear Components, Projectile Motion, Normal, Tangent, & Cylindrical Components, Normal, Tangent, & Cylindrical Components, Dependent Motion and Relative Motion, Newton's Laws, Equations of Motion, Rectangular Equations of Motion, Normal, Tangent, & Cylindrical Eqs. of Motion, Force, Work, and Energy, Conservative Forces, Potential Energy, Impulse and Momentum, Conservation of Linear Momentum Angular Momentum and Impulse.

Rigid Body Motion and Translation, Rotation About a Fixed Axis, Relative Motion of, a Rigid Body: Velocity, Relative Motion: Acceleration, Rotation, Moment of Inertia, Rigid Body Eq. of Motion, Rigid Body Motion: Translation, Rotation, General Plane Motion, Kinetic Energy, Work of a Force, Work of a Couple, Work, Energy, and Conservation, Linear and Angular Momentum, Impulse, Conservation of Momentum, Mechanical vibrations.

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**Course Number: UR201**

**Course Name: Human right and democracy**

**Credit hours: 1**

**Pre-requisite: None**

**Course Contents:**

This course covers : Introduction about human rights. The literal and linguistic definition of rights. The historic development of the human rights concept. appearance of Islam and the basis of human right. Europe and human rights. The concept of human in the material civilization. The concept of human in Islam. The status of human in the modern civilization. The status of human in Jurisprudence. The features of human rights in the Islamic intellectuals. The main rules that organize human rights. Admitting of rights under the authority of the modern state of law. The intellectual base of the principle of rights and freedoms in Islam. Properties and the nature of rights and freedoms in Islam. The non-organized rights and freedoms in Islam.

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### III – Year

**Course Number: ME307**

**Course Name: Gas dynamic**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Gases and perfect gas, compressibility, bulk modulus, Continuity equation, Continuity equation, Momentum equation, Momentum equation, System and control volume, Speed of sound, Mach number, Sub sonic flow, incompressible flow, Sonic flow, supersonic flow, Stagnation state, critical state, Nozzle and diffuser, Isentropic flow, choking, Shock waves, Isentropic flow, Adiabatic flow in constant area ducts, Rocket, Turbo jet engine, Adiabatic flow in constant area duct.

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**Course Number: ME315**

**Course Name: Turbo machinery**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Units and dimensions, Theory of turbomachinery, Theory of turbomachinery, Thrust force, impulse turbine, Thrust force, impulse turbine, Reaction turbine, Pumps and blowers, Pumps and blowers, Pumps and blowers, Specific speed, compression, Centrifugal compressor, Wind turbine, Similarity, Turbine of tidal energy.

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**Course Number: ME308**

**Course Name: Theory of Machines I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction, Velocity in mechanism (Instantaneous Center Method), Velocity in mechanism (Relative Velocity Method), Acceleration in mechanism, Balancing of Rotating masses, Balancing of reciprocating masses, Friction clutches, Belts, ropes and chain drives.

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**Course Number: ME316**

**Course Name: Theory of Machines II**

**Credit hours:**

**Pre-requisite: Theory of Machines I**

**Course Contents:**

Toothed gearing, Gear trains, Gyroscopic couple and precessional motion, Turning moment diagrams and flywheel, Governors, Cams, Universal joint (Hooks).

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**Course Number: ME313**

**Course Name: CAD/CAM**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

General introduction CAD, Design process and application of cad, Geometric modeling, Design software package, Modeling techniques, Stress analysis, Read information by using OBD techniques. Applications and CNC machine and link it with the pc. Read G/cod, Programming the solution and example, Element of CAD/CAM interstate, Surfcam program, Modify a current code, Applications.

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**Course Number: ME301**

**Course Name: Engineering Analyses I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Limits, Continuity, Differentiation, Cauchy theorem, Trigonometric function, Logarithmic function, Exponential function, Hyperbolic function, Complex integration, Conformal mapping, Gamma function, Beta function, Error function, Laplace transformation, Inverse Laplace trans, ODE and applications, Initial value problem.

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**Course Number: ME309**

**Course Name: Numerical Analyses I**

**Credit hours:**

**Pre-requisite: Engineering Analyses I**

**Course Contents:**

Differential equations, classification of differential equations, equation of first order and first degree, solution of equation- Separable Equations, Homogenous equation-linear equation, Partial differential equations, Equations forming, Solution of wave equations, Solution of heat equations, Solution by Laplace transformation, Numerical method, Finite method, Solution method.

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**Course Number: ME303**

**Course Name: Manufacturing Processes**

**Credit hours:**

**Pre-requisite: Principle of production processes**

**Course Contents:**

**Course Contents:**

Advanced Welding ,Hydrogen gas welding & Inert gas welding, Electron Beam & Explosive Welding, Numerical Control (NC), Computer aided Manufacturing, (CAM)

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**Course Number: ME312**

**Course Name: Electrical Machinery Fundamentals**

**Credit hours:**

**Pre-requisite: Electrical Engineering**

**Course Contents:**

Introduction to Machinery Principles, DC Machinery Fundamentals, DC Motors and Generators, AC Machinery Fundamentals, Synchronous Generators. Synchronous Generators, Synchronous Motors, Induction Motors, Transformers.

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**Course Number: ME306**

**Course Name: internal combustion engine I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction, Details of Engine Parts, Four-Stroke Engines, Two-Stroke Engines, Engine Operating Characteristics, Introductory Thermodynamic Concepts, Air-Standard Cycles, Valve Timing, Fuel-Air Cycles, Actual Cycles, Thermo-chemistry and Fuels, Ignition Systems,

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**Course Number: ME314**

**Course Name: internal combustion engine II**

**Credit hours:**

**Pre-requisite: internal combustion engine I**

**Course Contents:**



Combustion in SI Engines, Detonation and Octane Number, Combustion in CI Engines, Detonation and Cetane Number, Carburetion, Simple Carburetors, Calculation for AF, Superchargers, Turbochargers, Electronic Fuel Control, Components of a Fuel Injection Systems, Engine management, Engine Testing and Control, Heat Transfer in Engines, Friction and Lubrication System, Overall Engine Performance

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### III – Year

**Course Number: ME401**

**Course Name: Mechanical Vibrations**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Basic concepts of vibration, Introduction to oscillatory motion, Free vibration of an undamped single degree of freedom, Simple energy method (Raleigh principle), Free vibration viscous damped single degree of freedom system, Equivalent springs and dampers, Logarithmic decrement. Forced vibration of single degree of freedom, Forced vibration for constant force, Forced Vibration for sinusoidal force, Rotating unbalance, Support motion example, Vibration isolation, Vibration measuring instrument, Two degree of freedom.

Mode shapes, Lagrange equation, Dynamic absorber (undamped), Study and formulate the eq. of dynamic absorber and its characteristics, Multiple degree of freedom, Influence coefficient matrix and stiffness matrix, Eigen values and Eigen vectors, Torsional vibration, Torsional vibration for stepped shaft, Vibration of continuous system, Rayleigh method for estimation the fundamental natural frequency, Dunkerley method to find 1st natural.

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**Course Number: ME403**

**Course Name: Refrigeration and Air Conditioning I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction to AC & measuring unit, Properties of moist air, Humidity calculations & Dalton's law, Psychrometric chart & Psychrometric process, Heat transfer principles, Overall heat transfer coefficient & wall surface temperature, Comfort conditions, Cooling load calculation, Heating load calculations, Fluid flow through ducts and air distribution.

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**Course Number: ME411**

**Course Name: Refrigeration and Air Conditioning II**

**Credit hours:**

**Pre-requisite: Refrigeration and Air Conditioning I**

**Course Contents:**

Duct design (pressure drop method, velocity method, static regain method), Fans Design of piping system, Introduction to refrigeration, Carnot engine & Carnot cycle, Ideal & actual vapors compression refrigeration cycle, Compound vapor compression refrigeration cycle, Refrigerants, refrigeration system components Absorption refrigeration system, Solar Absorption refrigeration system.

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**Course Number: ME406**

**Course Name: Industrial Engineering and Quality Control**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Linear programming (L.P), Transportation and Assignment models, Network planning, Sequencing models, Replacement and maintenance models, Inventory models.

ISO ( Total quality management (TQM; and ISO:9000), Quality control, Reliability, Failure function, Combined series – parallel system and high –level and low – level redundancy.

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**Course Number: ME404**

**Course Name: Engineering Materials**

**Credit hours:**

**Pre-requisite: Properties of Materials**

**Course Contents:**

Introduction to Engineering Materials, Atomic structure and atomic bonding, The Structure of Crystalline Solids, Imperfections in solids, Dislocation and Strengthening Mechanisms, Mechanical properties, Failure of Materials (fatigue, Fracture, and Creep).



Diffusion, Ceramics, Polymers, Metals, Composite Materials, Nanomaterials, Conductors and semiconductors and insulators.

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**Course Number: ME407**

**Course Name: Power Plants I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction to power plant cycles, Power system Economics, Rankine cycle, Power station superheated processes, Power station reheated processes, Power station regenerative processes, Open feed water – close backward feed water, close forward heater, Boiler operation (water tube, fire tube), Water circulation in boiler, Steam turbine, impulse turbine, Reaction turbine condensers, Circulation of water system, Cooling tower classification, Cooling tower operation, Pumping system.

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**Course Number: ME415**

**Course Name: Power Plants II**

**Credit hours:**

**Pre-requisite: Power Plants I**

**Course Contents:**

Gas turbine power plant principles, Classification of gas turbine and operation, Air compressor (classification and operation), Axial compressors, Centrifugal compressors, Combustion chamber principles, Combustion chamber efficiency and performance, Nuclear power plants principles, Operation of nuclear power plants, Classification of nuclear power plants, Pressurized water reactor (PWR), Boiling water reactor (BWR), Hydropower plants principles, Hydropower plants operation, Nonconventional power plants.

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**Course Number: ME402**

**Course Name: Engineering Project I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

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**Course Number: ME410**

**Course Name: Engineering Project II**

**Credit hours:**

**Pre-requisite: Engineering Project I**

**Course Contents:**

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**Course Number: ME405**

**Course Name: Machine Design I**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Introduction to machine design element, Review of stress and strain, Factor of safety and design codes, Stress Concentration, Static Failure Theories, Fatigue Stresses, Design of welded joint, Screws and Fasteners, Pressure vessels

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**Course Number: ME413**

**Course Name: Design of Machine system II**

**Credit hours:**

**Pre-requisite: Machine Design system**

**Course Contents:**

Pipe and pipe Joints, Power Screw, Spring Design, Shafts, Key, Coupling, Bearing Belt Drive, Gear Design, Machine design system

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**Course Number: ER 401**

**Course Name: Engineering Ethics and Communications**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

Classical Moral Theory as Applied to Science and Engineering, Evaluating Ethical Judgments, Persuasive Communications, Ethics in the Global Engineering Profession.

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**Course Number: ME416**

**Course Name: Measurements and Control**

**Credit hours:**

**Pre-requisite: None**

**Course Contents:**

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الى السيد معاون العميد للشؤون العلمية المحترم

م/ المناهج الفصلية لقسم الهندسة الميكانيكية

تحية طيبة...

نرفق لكم طبا المناهج الفصلية لقسم الهندسة الميكانيكية موزعة حسب المراحل الدراسية بعد اجراء كافة التعديلات الواردة اليانا من لجنة العمداء وحسب الاوامر الادارية الواردة اليانا من قبل السيد معاون العلمي في الكتب المرفقة طبا وقد شملت تلك التعديلات الاتي:-

- تعديل عدد الوحدات والساعات لعدد من الدروس
- ادخال مادة الفيزياء ومادة الكيمياء للمرحلة الاولى
- تغيير مفردات وتسمية مادة التصاميم للمرحلة الرابعة
- تغيير تسمية بعض المواد وحسب الملاحظات الواردة اليانا

مع التقدير...

المرفقات

مفردات المناهج الفصلية لقسم الهندسة الميكانيكية

م.د. حازم اسماعيل راضي  
رئيس قسم الهندسة الميكانيكية

نسخة منة الى

- مكتب السيد العميد المحترم للتفضل بالاطلاع مع التقدير.
- ملفة اللجنة العلمية
- ملفة الصادرة