



المعرفة حق طبيعي لكل انسان

رقم: .....

التاريخ: .....

الموافق: .....

**MECHANICAL DEPARTMENT  
SYLLABUSES OF  
MECHANICAL ENGINEERING COURSES**

**ME 101 Engineering Drawing I**

3 lecture hours per week, (3+3) 6 units Prerequisite (s):

The need for a graphic language. Use and care of drawing instruments and equipment. Freehand sketching. Orthographic projections sectioning and dimensioning of single machine elements. Isometric drawing and dimensioning. Space analysis of points and lines with applications.

**ME 102 Engineering Drawing II**

3 lecture hours per week, (3+3) 6 units Prerequisite: ME101

Thread dimensioning, standard M/C elements assembly, inking, space analysis, views of a point, lines, true length of line and oblique lines, bearing slope and grade, Steel structure drawing.

**ME 203 Materials Science**

3 lecture hours per week, (3+4) 7 Units Prerequisite: ES122  
Co requisites: ME205

Introduction to Mechanical behavior. Chemical bonding, Inter-atomic relations and coordination. Atomic order in solids. Crystalline structures and Crystal Geometry. Atomic disorder in solids, Vibrations, Atomic rearrangements. Single phase metals, Elastic and plastic deformation of metal crystals, strain hardening and recrystallization. Multiphase materials, Phase diagrams. Fundamental phase reactions, Phase diagrams of some industrial alloys.

### **ME 204 Engineering Materials**

3 lecture hours per week, (3+6) 9 Units. Prerequisite: ME203

Industrial Phase diagram, Iron-Carbon system. Plain Fe-C alloys. Alloy steels. Nonferrous Alloys, Copper and Copper Alloys, Aluminum and aluminum Alloys, Bearing: Alloys. Thermal Processing of multiphase materials. Heat treatment hardening of steels, Corrosion of metal. Mechanical Failure, fatigue, creep. Plastics.

### **ME 205 Materials Science Lab**

3 lecture hours per week, (3+2) 5 Units, Prerequisite: ES122  
Co requisite: ME203

Macroscopic examination of metals, flow lines, welded sections, sulphur printing. Microscopic examination of ferrous and nonferrous alloys, polishing, etching, and microanalysis, Electro-chemical nature of corrosion. Tensile tests of structural steels and cast iron. Compression test of ductile and brittle materials. Bending test of wooden beams, load-deflection curves, modulus of rupture.

### **ME211 Thermodynamics I**

3 lecture hours per week, (3+6) 9 Units. prerequisite: ES111

Units and some definitions, Thermodynamic properties, temperature, work, heat, energy. State of pure substances, state equation of ideal gases. First law of thermodynamics. Energy equation. Specific heats. Internal energy. Enthalpy, Control volume and systems, Steady state, uniform state processes. Second law of thermodynamics, Reversibility. Entropy. Inequality of Clausius, Entropy changes.

### **ME 212 Thermodynamics II**

3 lecture hours per week, (3+6) 9 Units. Prerequisite: ME211

Mixtures; General considerations, Dalton's, Amagat model of a mixture of gas and a vapor, psychometric chart. Combustion: Fuels, combustion process, enthalpy of formation, adiabatic flame temperature, heat of reaction, Bomb and Junker's calorimeters, Thermodynamic cycles: Carnot, Rankine, Reheat, Otto, Diesel, Dual, Brayton, Vapor compression refrigeration, ammonia absorption refrigeration cycles, Thermodynamics Relations: Maxwell relations, relations involving; enthalpy, internal energy and entropy, thermodynamic tables.

**ME 222 Strength of Materials I**

3 lecture hours per week, (3+6) 9 units. Prerequisite: ES215, ES201

Linear and non-linear elasticity; plasticity; stress and strain; the elastic constants. Fatigue loads; statically indeterminate force system; Stresses due to bending, shear and direct force for symmetrical sections. Torsion of circular section, shear force, bending moment and axial force, combined bending and torsion; columns; composite beams; deflection of beams; Equation of elastic curve; thin walled vessels.

**ME 301 Elements of Machinery I**

4 lecture hours per week, (4+5) 9 units. Prerequisites: ME102, ME204, ME222

Process of designing. Recording the design ideas, forms of the design documentation, Design analysis, Optimum design. Calculation models, Mathematical, Physical of the real elements. Stresses and external loads, Stress concentration, Fatigue analysis, Optimization of elements loading. Joints: Weld joints, Riveted joints. Screw joints, Bolted joints with initial tension, Design of power screws. Tolerances and fits in connections, Standards and international fitting systems. Shaft-hub connections: Press fit. Axis and Shafts: A rational approach to shaft design.

**ME 303 Mechanisms**

3 lecture hours nor week, (3+6) 9 units Prerequisites: ES216, ME102

Fundamental concepts. Properties of Motion, Relative Motion, Linkages, Instant Centers, Velocities by Instant Centers and by Components. Method of Relative Velocities Acceleration in Mechanisms, Cams, Miscellaneous Mechanisms, Introduction to Synthesis of Mechanisms.

**ME 304 Refrigeration, Air conditioning & Heat Transfer Lab.**

3 lecture hours per week, (3+2) 5 units Prerequisites: ME 212, ME 311

Experiments with Refrigerator and Heat pump, Radiation and Natural Convection experiments. Study and working of Air conditioning unit. Cross flow heat exchanger. vortex of flow experiment. Air motor test etc.

### **ME 305 Fluid Mechanics I**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 211, ES 216

Fundamental principle governing fluid flow, including conservation of mass, momentum and energy and its application to engineering problems. The course covers: fluid properties, fluid statics, fluid flow concepts and the basic equations, dimensional analysis and dynamic similitude, viscous effects(flow through pipes, boundary layers, forces on immersed bodies). Digital computer programmers are used in solving some practical engineering applications such as pipe-flow problems.

### **ME 306 Fluid Mechanics II**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 212, ME 305

Multi-dimension flow of in viscid fluid: Equation of motion rotational and irrotational flows, potential plane flows; conformal mapping, flow nets. Basic principles of compressible fluid flow: perfect gas relations, isentropic flow shock wave, adiabatic flow with friction in conduits, frictionless flow through ducts with heat transfer. Turbo machinery: elementary cascade theory, theory turbo machinery, impulse and reaction turbines, pumps and blowers.

### **ME 311 Heat Transfer**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME211, ES201

Concept in heat transfer and method of analysis. Study one dimensional heat transfer, extended surface, steady tow dimensional heat transfer, and shape factors. Unsteady heat conduction in one or more dimensions, lumped heat capacity, charts, product solution. Numerical methods in steady and unsteady conduction. Fundamentals of convection, non-dimensional parameters. Forced convection. Analogies between momentum and heat transfer. Free convection. Heat exchanger. Radiation physics. Radiative exchange between black surface and between gray surface. Radiation circuits. Radiation and convection.

### **ME 314 Elements of Machinery II**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 301, ME 323\*

Design analysis of the shaft couplings and clutches. Introduction to the friction and wear theory. Bearing: rolling bearing, calculation models. Example of correct design of bearing system, journal bearing, bearing with fluid and mixed friction. Construction and calculation of journal bearings, spur gears. Geometry of gearing. Determination of teeth load. Design analysis of gear trains. Planetary gear trains- constructional arrangements. Bevel, worm, and helical gears. Computer method application for optimum design of machine element, (selected problem)

\*ME 323 is recommended but not required.

### **ME 316 Dynamics of Machinery**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 303

Static force and moment analysis, analytical and graphical methods, superposition principle typical member, frictional analysis, dynamic analysis, dynamic of rigid bodies, center of percussion, shaking forces and moments. Vibration analysis, critical speeds and resonance, vibration isolation and absorption, balancing, static and dynamic balancing, balancing machines. Dynamic and balancing of reciprocating engines, flywheel selection, dynamic analysis of cam mechanism. Governors.

### **ME 323 Strength of Materials II**

4 Lecture hours per week, (4+6) 10 Units. Prerequisite(s): ME 222

Review of stress, equilibrium equation. Review of complex strain. Stress relation. Analysis of torsion: non circular section, torsion stress functions, hollow section, selected problem of beam calculation, thick walled cylinders, composite tubes, constant stresses, rotating discs of uniform thickness. Curve beams, energy methods; impact loads.

### **ME 324 Machine Design Project**

2 Lecture hours per week, (2+1) 3 Units. Prerequisite(s): ME 301, ME 314\*

Examples of simple design projects. Lorry jacks, screw press with hand drive, steel rope brakes, shafts, couplings, etc. Project consists of: Calculations, proving the selected solution correctness, assembly drawing as well as working drawings.

**Note:** Number of the projects to be worked out by a student are not less than tow.

\*May be taken as a co requisite.

### **ME 325 Strength of Materials Lab.**

3 Lecture hours per week, (3+2) 5 Units. Prerequisite(s): ME 222

Strength and toughness of elastic materials. Absorption of strain energy, shear test, strength of joints. Torsion of circular and non-circular shafts. Deflection of I-beam using single and tow point loads, strength of composite beams, spring test Euler bucking load under different end conditions.

### **ME 401 Internal Combustion Engines**

4 Lecture hours per week, (4+8) 12 Units. Prerequisite(s): ME 212

Basic engine types and their operation. Testing and dynamometers, performance factor, pressure measurement. Combustion and the SI-engine, combustion and the CI-engine. Fuels, octane and cetane ratings. knock and the engine variables. Fuel metering in SI-engine, elementary carburetor, ignition on system, Fuel metering in CI-engine, injection nozzles, fuel line hydraulics. Engine characteristics. Combustion chamber design in CI-engine. Wankel engine, gas turbine.

### **ME 402 Thermal Power Plants**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 306, ME 311

Steam power plant cycle, fossils fuels, steam generators, boiler maintenance, steam turbine and components, gas turbine and steam combination cycles. Economic of power plant, optimization problems and control of power equipment.

### **ME 405 Hydraulic Machines**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 306

Hydraulic pumps: pump classification. Theory of centrifugal pump: theoretical head, theoretical characteristics curves, actual flow through impeller. Design of centrifugal pump: dimensional analysis and similitude, design parameter and design procedure, design of volute casing, pump performance: losses in pumps, characteristics curves, pump operation, suction condition and cavitations, pump system: system head curves, operating point, capacity control. Hydraulic turbines: analysis and design of pelton wheel, radial flow and axial flow turbines, turbine performance. Computer programmers are used in solving some problems specially design problems.

### **ME 406 Automatic Control**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ES201

Review of complex variable and laplace transformers. Block diagrams, feedback control, stability of linear feedback control system, root locus method, frequency response methods, stability in frequency domain, design and compensation of feedback control system, introduction to advanced topics in automatic control.

### **ME 407 Refrigeration & Air-Conditioning**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 311

Introduction, vapor-compression cycle, multi-pressure vapor-compression system, components vapor-compression system: compressor, condensers, expansion devices, evaporators, the complete vapor-compression system, psychometric, cooling towers. and evaporative condensers, cooling and dehumidifying coils, air conditioning calculations.

### **ME 408 Corrosion Control**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s): ME 204

Principles of corrosion, electrochemical mechanisms, oxidation and hot corrosion, mechanical aspects of corrosion, corrosion in natural environments, corrosion prevention, metallic coatings, organic and inorganic coatings, corrosion inhibitors electrochemical methods of protection, materials selection, corrosion testing and simulation, economic of corrosion, modern experimental techniques.

### **ME 409 Heat Laboratory**

3 Lecture hours per week, (3+2) 5 Units.

Prerequisite(s): ME 212, ME 305

Co requisite(s): ME 401

Calorific value of solid and liquid fuels using bomb calorimeters, calorific value of gaseous fuels using Junker's calorimeters, flash and fire point of various fuels, viscosity measurement by means of Redwood's and Saybolt's viscosimeter, performance tests of Diesel Gasoline, tow stroke engine, gas turbine, steam turbine, Rankin steam engine, Stirling engine, air compressor, rocket, ramjet, and steam boiler plant.

### **ME 419 Fluid Mechanics Laboratory**

3 Lecture hours per week, (3+2) 5 Units.

Prerequisite(s): ME 306

Co requisite(s): ME 405

Determination of discharge coefficient of different flow meters(orifice, venture, Rota meter).Determination of friction losses in pipes and pipe bends(laminar & turbulent flow).Determination of drag force and pressure distribution around immersed bodies (cylinder- airfoil) study of flow in an open channel(flow over weirs- hydraulic jump). Performance of Pelton wheel. Performance of Francis and or Kaplan turbine. Cavitations test.

### **ME 421 Project I**

4 Lecture hours per week, (4+4) 8 Units. Prerequisite(s): \*

Project courses allocated to the students over several fields such as design, thermal sciences, manufacturing processes, material science, etc. the topics offered take into consideration the problems existing in local industry, the project consisting of tow parts is assigned to each student, where suitable data collections, creative thinking, proper method of calculations, decision-making abilities and set of technical drawings are the prime requirements. The project results are presented on specially arranged seminars.

**Note:** \* project can be taken only the students who are likely to graduate in tow semesters and according to department decisions in this regard can take project.

### **ME 422 Project II**

6 Lecture hours per week,(6+12)18 Units. Prerequisite(s):ME 421

Continuation of ME 421.



### **ES 201 Differential Equations**

4 Lecture hours per week, (4+8)12 Units.

Prerequisite(s):

Co-requisite(s): ES 102

Basic concepts. First-order differential equations. Equations of second order and higher order. Boundary value problem. Series solutions. Some classical equations. System of first order equations. Laplace transform and operational methods. Simple numerical methods. Linear difference equations.

### **ES 206 Linear Algebra**

4 Lecture hours per week, (4+8)12 Units. Prerequisite:ES101, ES 102 or equivalent

Vector spaces. matrices and determinants. Simultaneous linear equations, linear transformations, eigenvalue problems, canonical forms, numerical linear algebra, linear differential equations, linear programming, inner product spaces. Applications in various areas such as control theory, statistics, linear circuits and vibration theory, ....etc.

### **ES 215 Engineering Mechanics I**

4 Lecture hours per week, (4+8)12 Units. Prerequisite: ES 112, ES 102

Forces on particles and rigid bodies in two and three dimensions. Equilibrium of forces on particles and rigid bodies in two and three dimensions. Centroids and center of gravity. Moments of inertia. Second Moment of areas. Parallel-axis theorem. Mass moment of inertia.

Friction. Reactions, shearing forces bending moments and axial forces in statically determinate beams.

### **ES 216 Engineering Mechanics II**

4 Lecture hours per week, (4+8)12 Units. Prerequisite: ES 115

Kinematics of particles including rectilinear and curvilinear motion Kinetics of particles, force, mass, acceleration, work and energy, impulse and moments Kinematics of rigid bodies including translation, rotation and plane motion. Kinematics of rigid bodies Free and forced mechanical vibrations.

### **ES 261 Fundamentals of computers & programming**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite :ES101, ES 102 or equivalent

Introduction to the organization and characteristics of computers. Concept of an algorithm. Flowcharting. The programming process. Programming in Fortran. Programming in basic. Application to numerical and non-numerical problems.

### **IE 207 Mechanical Workshop**

3 laboratory hours per week, (3+3) 6 Units Prerequisite: ME 102

The vernier principle, tools used in measuring (micrometers and vernier calipers) limits and fits. Gauging, Use of various hand tools, fitting, principles of location and clamping, location and clamping devices. Basic structure of machine tools. Setting of cutting tools, tools and cutter grinding. Use of various machines such as lathe, milling machine, shaper, grinding machine, drilling machine, etc. Planning and operation sequences. Soldering and brazing, Methods of welding, weld joints. Gas Welding. Arc welding TIG and MIG Processes. Spot welding,

### **IE 208 Manufacturing Processes**

3 lecture hours per week, (3+6) 9 Units Prerequisites: ME 203, IE 207

Introduction: Classification of Manufacturing Processes. Casting preparation and melting of metals Sand Casting Process. Cooling characteristics of castings. Special casting processes. Forging: plastic deformation of metals. The forging processes - Classification of forging processes. Design considerations of forged parts. Welding: Weldability of metals. Types of welding, welded joints, basic types, technical and design considerations, Process selection. Plastic molding, Powder metallurgy, and some special machining processes.

### **IE 307 Engineering Economy**

3 lecture hours per week, (3+6) 9 Units Prerequisite: ES102

A study of methods for determining the comparative financial desirability of engineering alternatives. Topics include interest, time value of investments, breakeven and minimum cost analysis, replacement analysis, and depreciation analysis. The computer use in solving some problems in engineering economy.

### **IE 308 Manufacturing Processes and Machine Tools**

4 Lecture hours per week, (4+8)12 Units      Prerequisite: IE 208

Metal cutting and machining; Machining time, metal removal rate, and Electrical power consumed in machining operations Cutting conditions; Single-point tool, geometry, nomenclature and materials. Lubrication of cutting tools. Cutting Action; Chip formation and its types, Mechanics of metal cutting.

Machine Tools: Classification, Elements of construction and Kinematic design.

Metal Forming: Mechanics of Metal Forming: Yielding criteria for ductile metals.

Metal working processes: Classification of deforming processes, Typical processes.

### **EE 301 Electric Engineering fundamentals I**

3 lecture hours per week, (3+6) 9 Units      Prerequisite: ES 102, ES 182

Electric quantities, electric elements, circuits and laws, different methods of network analysis, network theorems. Delta-Wye transformation, steady state response of AC circuits, resonance simple filter, three phase circuits, introduction to diodes and transistors.

### **EE 302 Electric Engineering fundamentals II**

3 lecture hours per week, (3+6) 9 Units      Prerequisite: EE 301

Magnetism, Transforms, Transmission lines and cable, AC-Generator(1-phase and 3-phase) , DC- Generator, DC-motors, AC- motors, Operational amplifiers, Introduction to analog computers, Combinational logic gates.

## *Elective Courses*

### **ME 430 Solar Energy Systems**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):ME 306,ME 311

Study of fundamental of solar radiation, calculation and measurement of insolation. Theory, performance, and design of flat plate collectors. Concentrating type collectors. Uses of solar energy: power production, building, and water heating. Solar thermal system.

### **ME 432 Desalination Plants**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):ME 212, ME 305

Water quality standards, desalination processes and their applicability (distillation, electro dialysis, reverse osmosis) multi-stage flash desalination. Application of desalination, conjunctive use domestic use. Combined power and water generation plants.

### **ME 434 Petroleum Engineering**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):

Mechanics of rock breakage and drilling, basic principle of cable tool drilling and rotary drilling, general methods, and equipments. Rotary drilling liquids and hydraulics. Well completion. Transportation of crude oil and natural gas. Design factors, construction of pipelines, maintenance, pumps, compressors, tanks, loading terminals.

### **ME 436 Air Pollution Control**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):

Introduction to the problem of air pollution, sources of air pollution, air quality criteria, effects of air pollution on humans, animals, vegetation and minerals. Instrumentation for measuring the various pollutions. Automotive pollution, control of air pollution for the present sources. EPA standard. Alternate strategies for future.

**ME 440 Motor Vehicles and Tractors**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):ME 314, ME 401, ME 405

Forces acting on a motor vehicle, traction dynamics of a motor vehicle, general design classification of motor vehicle, vehicle layout suspension system, steering system, final drive and differentials, brakes, transmission, force created by implements, types and special properties of tractors.

**ME 443 Heat Exchanger Design**

3 Lecture hours per week, (3+6) 9 Units. Prerequisite(s):ME 306, ME 311

Heat exchanger types and construction, review of fundamental concepts from heat transfer, liquid to liquid gas to gas, liquid to gas heat exchangers, boiler and condensers, calculation of pressure drop across different components of heat exchangers.

## List of Courses

### First Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME101	Engineering drawing I	(3+3) 6		
2	ES101	Mathematics I	(4+8)12		
3	ES111	Physics I	(4+8)12		
4	ES121	Chemistry I	(3+6) 9		
5	ES181	Physics Lab. I	(3+0) 3		ES111
6	AL100	Arabic Language	(3+3) 6		
7	EL101	English Language I	(3+6) 9		
8	PC 101	Political Culture I	(2+1) 6		
<b>Sum</b>			<b>63</b>		

### Second Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME102	Engineering drawing II	(3+3) 6	ME101	
2	ES 102	Mathematics II	(4+8) 12	ES101	
3	ES 112	Physics II	(4+8) 12	ES111	
4	ES 182	Physics Lab. II	(3+0) 3	ES181	ES112
5	ES 122	Chemistry I	(3+6) 9	ES122	
6	PC 102	Political Culture II	(2+1) 6	PC101	
7	EL 102	English Language II	(3+3) 6	EL101	
<b>Sum</b>			<b>54</b>		

### Third Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME203	Materials Science	(3+4) 7	ES122, ES112	
2	ME211	Thermodynamics I	(3+6) 9	ES111	
3	IE 207	Mechanical Workshop	(3+3) 6	ME102	
4	ES 201	Differential Equations	(4+8)12	ES102	
5	ES 215	Mechanics I	(4+8)12	ES102,ES112	
6	ES 261	Introd. to Computer & Programming	(3+6) 9		
7	PC 103	Political Culture III	(2+1) 6	PC102	
<b>Sum</b>			<b>60</b>		

### Fourth Semester

S.No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME204	Engineering Materials	(3+6) 9	ME203	
2	ME212	Thermodynamics II	(3+6) 9	ME211	
3	ME222	Strength of Materials I	(3+6) 9	ES201, ES215	
4	IE 208	Manufacturing Processes	(3+6) 9	ME203, IE207	
5	ES 206	Linear algebra	(4+8) 12	ES102	
6	ME205	Materials Science lab.	(3+2) 5	ME203	ME204
7	ES 216	Mechanics II	(4+8) 12	ES215	
8	PC 104	Political Culture VI	(2+1) 6	PC103	
<b>Sum</b>			<b>60</b>		

### Fifth Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME301	Elements of Machinery I	(4+5) 9	ME102,ME204, ME222	
2	ME303	Mechanisms	(3+6) 9	ME102,ES216	
3	ME305	Fluid Mechanics I	(3+6) 9	ME211,ES216	
4	ME311	Heat Transfer	(3+6) 9	ME211,ES201	
5	ME323	Strength of Materials II	(4+6)10	ME222	
6	ME325	Strength of Materials lab.	(3+2) 5	ME222	
7	EE 301	Electrical Engg. Fundamentals I	(3+6) 9	ES102,ES182	
<b>Sum</b>			<b>60</b>		

### Sixth Semester

S.No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME304	Refri. Air cond.& Heat Transfer Lab.	(3+2) 5	ME212, ME311	
2	ME306	Fluid Mechanics II	(3+6) 9	ME212, ES305	
3	ME314	Elements of Machinery II	(3+6) 9	ME301, ME323	
4	ME316	Dynamics of Mechanics	(3+6) 9	ME303	
5	ME324	Machine Design Project	(2+1) 3	ME301	ME314
6	IE 308	Manuf. Processes & M/C Tools	(4+8) 12	IE208	
7	EE 302	Electrical Engg. Fundamentals II	(3+6) 9	EE301	
<b>Sum</b>			<b>56</b>		

### Seventh Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME401	Internal Combustion Engines	(4+8) 12	ME311	
2	ME405	Hydraulic Machines	(3+6) 9	ME306	
3	ME407	Refri. & Air-conditioning I	(3+6) 9	ME311	
4	ME409	Heat Lab.	(3+2) 5	ME212,ME305	ME401
5	ME419	Fluid Mechanics Lab.	(3+2) 5	ME306	ME405
6	ME421	Project I	(4+4) 8	**	
7	IE 307	Engineering Economy	(3+6) 9	ES102	
<b>Sum</b>			<b>57</b>		

### Eighth Semester

S. No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME402	Thermal power plants	(3+6) 9	ME306,ME311	
2	ME406	Automatic control **	(3+6) 9	ES201	
3	ME408	Corrosion control **	(3+6) 9	ME204	
4	+	Elective			
5	ME422	Project II	(6+12)18	ME421	
<b>Sum</b>			<b>54</b>		

### Electives

S.No.	Course No.	Course Title	Unit	Prereq.	Coreq.
1	ME430	Solar energy Engineering	(3+6) 9	ME306,ME311	
2	ME432	Desalination plants	(3+6) 9	ME212,ME305	
3	ME440	Refri. & airconditioning II	(3+6) 9	ME407	
4	ME443	Heat exchangers design	(3+6) 9	ME306,ME311	
5	ME444	Engineering materials II	(3+6) 9	ME314,ME324	

### Notes:

- \* This course is the first Part of the project ME 422 to be continued in the 8<sup>th</sup> semester.
- \*\* Can be taken only by the students who are likely to graduate in the same academic year.  
Prerequisites and co-requisites are dependent on particular project. Registration according to relevant department decision.
- \*\*\* Can be taken only by the students who are finished 340 credits out of 464 credits.
- + One of the electives should be selected.
- Total units of the 8 semesters are : **464**
- Total units of the last 6 semesters (without ES261) are: **338**