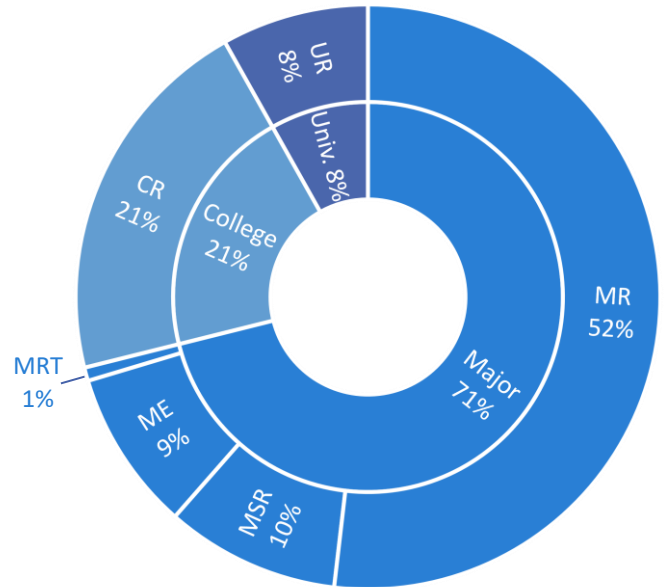


# B.Sc. in Mechanical Engineering 2022

## The Mechanical Engineering 2022 B.Sc. Program for Batch 2022 Onwards

### Program Components

Course Type	CRD
University Requirement (UR)	11
College Requirement (CR)	28
Major Requirement (MR)	70
Major Elective (ME)	12
Major Support Requirement (MSR)	13
Minor Requirements (Minor)	-----
MR Industrial Training (MRT)	1
<b>Total Credits (CRD)</b>	<b>135</b>



### Detailed Study Plan

#### Year 1 - Semester 1

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
CHEMY 101	General Chemistry I	3	3	4	CR	-----	No
ENGL 101	Communication Skills I	3	0	3	CR	-----	No
MATHS 101	Calculus I	3	0	3	CR	-----	No
PHYCS 111	Fundamentals of Physics	3	3	4	MSR	-----	No
ISLM 101	Islamic Culture	3	0	3	UR	-----	No
Total		15	6	17			

### Year 1 - Semester 2

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
HRLC 107	Human Rights	2	0	2	UR	-----	No
ENGL 242	Report Writing and Presentation	3	0	3	CR	ENGL 101	No
MATHS 102	Calculus II	3	0	3	CR	MATHS 101	No
MENG 161	Engineering Drawing	1	6	3	MR	MATHS 101	YES
MENG 163	Statics	3	2	3	MR	PHYCS 111	YES
PHYCS 209	Bulk Properties of Matter	3	2	3	MSR	PHYCS 111	No
Total		15	10	17			

### Year 2 - Semester 3

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
EENG 201	Elements of Electrical Engineering	3	2	3	MSR	MATHS 102	No
MATHS 211	Linear Algebra	3	0	3	MSR	MATHS 101	No
MATHS 205	Differential Equations	3	0	3	CR	MATHS 102	No
MENG 202	Materials Science	3	2	3	MR	CHEMY 101 & ENGL 101	Yes
MENG 232	Thermofluids	3	2	3	MR	PHYCS 209	Yes
MENG 263	Dynamics	3	2	3	MR	MENG 163	Yes
Total		18	8	18			

### Year 2 - Semester 4

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 209	Introduction to Engineering Profession	2	3	3	CR	ENGL 242	Yes
MATHS 203	Calculus III	3	0	3	CR	MATHS 102	No
MENG 212	Manufacturing Fundamentals	2	3	3	MR	MENG 202	YES
MENG 236	Applied Thermodynamics	3	2	3	MR	MENG 232	YES
MENG 274	Numerical Analysis	2	3	3	MR	MATHS 211	YES
STAT 275	Statistical Data Analysis for Engineering	3	0	3	CR	MATHS 101	No
Total		15	11	18			

### Year 3 - Semester 5

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
HIST 122	Modern History of Bahrain and Citizenship	3	0	3	UR	-----	No
MENG 382	Computer Programming and Application	2	3	3	MR	MENG 274	YES
MENG 312	Manufacturing Processes	3	2	3	MR	MENG 212 & MENG 209	YES
MENG 333	Fluid Mechanics	3	2	3	MR	MATHS 205 & MENG 236	YES
MENG 371	Mechanics of Materials	3	2	3	MR	MENG 202	YES
MENG 373	Kinematics and Dynamics of Machinery	3	2	3	MR	MENG 263	YES
Total		14	11	18			

### Year 3 - Semester 6

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
ARAB 110	Arabic Language Skills	3	0	3	UR	-----	No
MENG 303	Engineering Economics	3	1	3	MR	Completion of 70 credits	YES
MENG 375	Design of Mechanical Elements	2	3	3	MR	MENG 371 & MENG 312	YES
MENG 384	Vibration	3	2	3	MR	MENG 373	YES
MENG 335	Heat Transfer	3	2	3	MR	MENG 333	YES
Total		14	8	15			

### Training Requirement

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 395	Industrial Training	0	3*	1	Training	Completion of 85 credits	YES

\* Does not need a time slot

**Year 4 - Semester 7**

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 415	Engineering Management	3	1	3	MR	STAT 275 & MENG 303	YES
MENG 430	Power Plant and Desalination	3	2	3	MR	MENG 335	YES
MENG 475	Design of Mechanical Systems	2	3	3	MR	MENG 375	YES
MENG 495	Senior Design Project I	0	6*	2	MR	MENG 375 & Competition of 90 credits	YES
MENG 4xx	Major Elective I <sup>1</sup>	3	2	3	ME	As per ME list	YES
MENG 4xx	Major Elective II <sup>1</sup>	3	2	3	ME	As per ME list	YES
Total		14	16	17			

**Year 4 - Semester 8**

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 440	Refrigeration and Air Conditioning	3	2	3	MR	MENG 335	YES
MENG 485	Systems and Control	3	2	3	MR	MENG 274 & MENG 384	YES
MENG 4xx	Major Elective III <sup>1</sup>	3	2	3	ME	As per ME list	YES
MENG 4xx	Major Elective IV <sup>1</sup>	3	2	3	ME	As per ME list	YES
MENG 496	Senior Design Project II	0	6*	2	MR	MENG 495	YES
Total		12	14	14			

\* Does not need a time slot

## Major Elective Courses

Course Code	Course Title	Course Hours			Course Type	Pre requisite	Major GPA
		LEC	PRAC	CRD			
MENG 441	Energy Conversion and Management	3	2	3	ME	MENG 335	Yes
MENG 442	Fluid Machinery	3	2	3	ME	MENG 333	Yes
MENG 444	Internal Combustion Engines	3	2	3	ME	MENG 236	Yes
MENG 446	Design of Thermal Systems	3	2	3	ME	MENG 335	Yes
MENG 447	Computational Fluid Dynamics	3	2	3	ME	MENG 333	Yes
MENG 448	Aerodynamics	3	2	3	ME	MENG 333	Yes
MENG 410	Production and Processing of Aluminum	3	2	3	ME	MENG 312	Yes
MENG 422	Advanced Manufacturing	3	2	3	ME	MENG 312	Yes
MENG 421	Operations Research	3	1	3	ME	MENG 415	Yes
MENG 426	Quality Management	3	1	3	ME	MENG 415	Yes
MENG 471	Failure Analysis	3	2	3	ME	MENG 371	Yes
MENG 455	Special Topics	3	2	3	ME	Selected	Yes
MENG 473	Tribology	3	2	3	ME	MENG 375	Yes
MENG 476	Control Systems Design	3	2	3	ME	MENG 485	Yes
MENG 477	Machine Health Monitoring	3	2	3	ME	MENG 384	Yes
MENG 478	Product Design and Development	3	2	3	ME	MENG 375	Yes
MENG 479	Introduction to Finite Element Methods	3	2	3	ME	MENG 375	Yes

## Course Descriptions:

**Course Code:** MENG 161      **Course Title:** Engineering Drawing

Freehand sketch. Isometric and oblique views, orthographic projection, sectional and auxiliary views, linear dimensioning, fundamentals of interpenetrations and developments of surfaces. Limits and fits: geometric tolerances, fasteners and fastenings, surface finish notations, welds and welding symbols and representations of standard elements. Applications with CAD; such as AutoCAD and Inventor.

**Course Code:** MENG 163      **Course Title:** Statics

Introduction to statics, forces in plane, forces in space, equilibrium of particles and rigid bodies in two and three dimensions, centroid and center of gravity, distributed forces, moment of inertia, analysis of trusses, frames and machines, forces in beams, friction in square-threaded screws and bolts.

**Course Code:** MENG 202      **Course Title:** Materials Science

Structure, process, and properties relationships of materials. Types of Bonding. Material classification and their distinguishing properties. Mechanical behavior of materials and introduction to failure analysis. Standards and standard methods of mechanical testing. Structure of materials. Microstructure visualization basic methods. Imperfections in solids and their effect on the mechanical behavior of materials. Phase diagrams and microstructure. Phase transformations. Material selection case studies.

**Course Code:** MENG 209      **Course Title:** Introduction to Engineering Profession

Engineering as a profession, Ethics, and technology: Ethics (including professional ethics), Interaction technology and society, Corporate Responsibility, Sustainability, Teamwork / Group Processes, Project work, Innovation / change expertise, Dissemination, project management.

**Course Code:** MENG 212      **Course Title:** Manufacturing Fundamentals

Workplace safety. Measurement tools. Layout tools and procedures. Hand tools and bench works. Metal casting processes: sand casting, die casting, and investment casting. Sheet metal processes: Piercing, coining, stamping, deep drawing, and stretch forming. Welding of metals. Material removal processes: turning, milling, drilling, and grinding. Non-traditional machining.

**Course Code:** MENG 230      **Course Title:** Thermal Sciences

Basic concepts of thermodynamics, properties of pure substances, phase equilibrium, properties tables. The ideal gas equation of state. The First Law of thermodynamics: heat, work applications to closed and open systems. The Second Law of Thermodynamics: the concept of entropy. Power cycles. Introduction to heat transfer, modes of heat transfer: conduction, convection, and radiation. Heat exchangers.

**Course Code:** MENG 232      **Course Title:** Thermofluids

Energy and the first law of thermodynamics: Energy balance for closed systems, energy analysis for cycles. Properties of pure substances. Control volume energy analysis. Second law of thermodynamics: statements of second law, Carnot cycle. Fluid Statics: Properties of fluids, Hydrostatic force on a plane and curved surface, Pressure measurements, Buoyancy, Stability of floating and submerged bodies. Rigid body motion, Internal viscous flows.

**Course Code:** MENG 236      **Course Title:** Applied Thermodynamics

Irreversibility, availability and second law efficiency. Exergy destruction, non-flow exergy and flow exergy. Vapor power cycles and exergy analysis: basic cycles; Rankine cycle, Otto cycle, Diesel cycle, Brayton cycle. Refrigeration: vapor-compression refrigeration, refrigerant properties, absorption refrigeration. Heat pump systems. Chemical Reactions; balancing the combustion equation, adiabatic flame temperature.

**Course Code:** MENG 263      **Course Title:** Dynamics

Rectilinear and curvilinear motion of the particles, kinetics of particles, linear and angular momentum, work, energy and power, principle of impulse and momentum, impact: kinematics of rigid bodies, kinetics of rigid bodies, introduction to three-dimensional dynamics of rigid bodies. Computer applications are employed throughout the course.

**Course Code:** MENG 274      **Course Title:** Numerical Analysis

Taylor series, Matrix algebra: Gauss-Jordan elimination, EVP. Interpolating polynomials, least square method, integration rules: trapezoidal, Simpson's, improper integrals. Finite difference formulation; differentiation schemes, roots of equations. Initial and boundary value problems of ODE: Euler and Runge-kutta methods. Finite Element: shape functions, elemental matrices, global coordinates, elements assembly. Applications using commercial packages.

**Course Code:** MENG 303      **Course Title:** Engineering Economics

Fundamentals of engineering economy. Time value of money. Present worth analysis. Annual worth analysis. Rate of return analysis. Replacement and retention analysis. Capital rationing. Breakeven analysis. Payback period analysis. Cost estimation and indirect cost allocation. Depreciation methods.

**Course Code:** MENG 312      **Course Title:** Manufacturing Processes

Production of iron and steel. Production of aluminum. Bulk deformation processes: hot and cold working, forging, rolling, extrusion and drawing. Metal cutting: theory of metal cutting, multi-point cutting, machinability and economics of metal cutting. Grinding and abrasive processes. Introduction to CNC machining. Metrology: Surface texture and geometrical feature measurement. Polymer processing. Introduction to advanced manufacturing systems.

**Course Code:** MENG 333      **Course Title:** Fluid Mechanics

Fluid kinematics, energy, and Bernoulli's equation. Dimensional analysis and similitude. Momentum and energy equations (Integral Relations), Differential relations in two and three dimensions: velocity and acceleration, Navier Stokes relations, energy relation, introduction to stream and potential functions, introduction to boundary layer theory with applications to flat plates, cylinders. Compressible flow, normal shock waves.

**Course Code:** MENG 335      **Course Title:** Heat Transfer

Basic modes of heat transfer. Thermal circuits, surface energy balance. Steady one-dimensional heat conduction, conduction across flat plate, cylindrical and spherical shells. Fins. Convection fundamentals and correlations, external flow, internal flow, tube banks, impinging jets, packed beds. Types of heat exchangers, overall heat transfer coefficient, design of heat exchanger. Radiation, black body and gray radiation, view factor, radiation exchange between surfaces.

**Course Code:** MENG 371      **Course Title:** Mechanics of Materials

The concept of stress and strain, types of stresses, types of loading: axial loads, pure bending symmetric and unsymmetrical bending, torsion. Deflection of beams, statically indeterminate beams, curved beams, buckling of columns, shear center, thin and thick-walled pressure vessels. Analysis of interference fit applications, fatigue strength, marine factors, introduction to fatigue failure theories, finite element applications, introduction to the theory of elasticity and plasticity.

**Course Code:** MENG 373      **Course Title:** Kinematics and Dynamics of Machinery

Basic concepts of mechanisms and machines, analysis of displacement, velocity and acceleration of mechanisms, static and dynamics force analysis, cam design, spur, helical, bevel and worm gears, ordinary and epicycle gear trains, balancing of rotating and reciprocating machinery, and flywheels. Computer applications are employed throughout the course.

**Course Code:** MENG 375      **Course Title:** Design of Mechanical Elements

Design consideration; Assembly loading analysis, stresses and strain analysis for static and fatigue loading. The design, selection, analysis, and synthesis of springs, joining and fastening methods, shafts, and other elements. Design project using computer facilities.

**Course Code:** MENG 382      **Course Title:** Computer Programming and Application

Introduction to modern programming languages. MATLAB®: creating vector and matrices, if statements, while and for loops, script and function files, matrix operations, MATLAB® built-in functions, plot commands. Solving systems of linear and nonlinear equations. Data manipulation, application of linear and nonlinear algebraic and differential equations in mechanical engineering systems, numerical solution of optimization problem.

**Course Code:** MENG 384      **Course Title:** Vibration

A review of simple harmonic motion and Fourier series, undamped and damped free vibration of SDFS, Coulomb damping, torsional vibration, forced vibration of SDFS: equivalent viscous damping, vibration isolation and control, transient vibration to arbitrary excitation, multi-degree of freedom systems, modal analysis, dynamic absorber, forced vibration of lumped mass system. Lagrange's equation, applications using computer facilities.

**Course Code:** MENG 395      **Course Title:** Industrial Training

In this industrial training course, all students in the program must participate in an approved training program in the relevant industry. At the completion of 300 hours of supervised training each student must submit a formal report and conduct an oral presentation.

**Course Code:** MENG 410      **Course Title:** Production and Processing of Aluminum

Flow diagrams and process description of various sections of aluminum plant including raw materials preparation, carbon plant, anode and cathode preparation, pot-house and finished product, and furnace operation. Principles of electrolysis and current efficiency. Melt contamination. Production of aluminum alloys by mixing. Cast Aluminum Alloys.

**Course Code:** MENG 415      **Course Title:** Engineering Management

Introduction to engineering management. Types and characteristics of production systems. Product design. Process and service design. Capacity planning. Project planning. Supply chain management. Forecasting methods and techniques. Inventory management. Quality management. Material requirements planning (MRP). Production scheduling.

**Course Code:** MENG 421      **Course Title:** Operations Research

Linear Programming: formulation of Linear Programming models, graphical solution, and simplex method. Duality theory and sensitivity analysis. Transportation problem, assignment model, and transshipment model. Introduction to Dynamic, Integer and Goal Programming.

**Course Code:** MENG 422      **Course Title:** Advanced Manufacturing

Introduction to advanced manufacturing as an innovative technology to improve products or processes. Overview and components of manufacturing systems: types and performance of manufacturing system. Manufacturing automation systems; group technology (GT), cellular manufacturing, FMS, CIM, and robotics. Advanced manufacturing practices: lean, agile, networking, and cyber manufacturing. Enterprise integration. Digital manufacturing. Smart manufacturing systems. Introduction to resource planning systems.

**Course Code:** MENG 426      **Course Title:** Quality Management

Quality philosophies and management strategies. Quality Dimensions. Process Improvement Technique: PDCA cycle and the seven basic quality control tools. Quality systems: TQM and ISO. Performance measurement systems: Six Sigma and Balanced Scorecard. Quality improvement tools: QFD and FMEA. Statistical process control. Quality control charts for variables and attributes. Quality and liability costs.

**Course Code:** MENG 430      **Course Title:** Power Plant and Desalination

Power stations classifications, steam power plant, feed water heaters, performance. Steam generators, fuels and combustion processes, turbine, water systems. Gas power stations and diesel power plant, characteristics and performance. Combined power cycles. Co-generation concepts and systems. Power generation and environmental impact. Water desalination, reverse osmosis, multiple flash evaporator.

**Course Code:** MENG 440      **Course Title:** Refrigeration and Air Conditioning

Applications of Refrigeration and Air Conditioning: Major uses. Air-conditioning processes and cycles. Refrigerant and refrigeration cycles. Outdoor design conditions and indoor design criteria. Load calculation. Refrigeration components and evaporative coolers. Air system basics: fan and duct systems, fan combinations in air-handling units and packaged units. Absorption systems: the absorption cycle. Air conditioning systems and selection.



**Course Code:** MENG 441      **Course Title:** Energy Conversion and Management

Solar energy and applications: solar radiation, solar water heating, photovoltaic generation. Power from wind: turbine types and terms, characteristics of wind. Energy storage and distribution. Fuel cells and hydrogen applications. Nuclear, tidal, and geothermal energy. Analysis methods and energy saving potentials, energy audit in domestic, transport and industry, economic evaluation of energy conservation opportunities.

**Course Code:** MENG 442      **Course Title:** Fluid Machinery

Classifications of fluid machinery. Momentum and energy transfer between fluid and rotor. Principles and practice of scaling laws. Performance characteristics of centrifugal and axial flow fans, compressors, and pumps. Positive displacement pumps. Cavitation and water-hammer problems. Valves, types, and characteristics. Performance characteristics of axial and radial flow turbines. Fluid machinery noise.

**Course Code:** MENG 444      **Course Title:** Internal Combustion Engines

Basic engine operation, introduction to engine cycles. Air standard cycles, fuel-air and actual cycles, volumetric efficiency. Performance and the effects of operating variables on it. Two stroke engine air capacity and scavenging. Ideal combustion of S.I engines, real combustion of S.I engines, abnormal combustion of S.I engines, diesel combustion. Emission sources, exhaust after treatment, emission reduction systems and diesel emissions.

**Course Code:** MENG 446      **Course Title:** Design of Thermal Systems

Piping systems, Friction factor, pipe roughness, pressure losses, series and parallel piping systems, Optimization process, economic pipe diameter, and equivalent length of fittings, Types of pumps, Pump testing methods, cavitation, net positive suction head, dimensional analysis of pumps, specific speed, Shell and tube heat exchangers, analysis of shell and tube heat exchangers, Effectiveness-NTU analysis, design considerations.

**Course Code:** MENG 447      **Course Title:** Computation Fluids Dynamics (CFD)

The Navier-Stokes; direct and iterative methods for linear systems; finite differences for elliptic, parabolic and hyperbolic equations; Fourier decomposition, error analysis and stability; high-order and compact finite-differences; finite volume methods; time marching methods; Navier-Stokes solvers; grid generation; finite volumes on complex geometries; finite element methods; spectral methods; boundary element and panel methods; turbulent flows; boundary layers; and Lagrangian coherent structures (LCSs).

**Course Code:** MENG 448      **Course Title:** Aerodynamics

Aerodynamic forces and moments, Dimensional analysis: Buckingham Pi Theorem, types of fluid flow: continuum, inviscid/viscous, incompressible, subsonic, transonic, supersonic, hypersonic flows. Concept of boundary layer theory, introduction to a method for dealing with friction, continuity, momentum, and energy equations. Stream and potential functions, circulation, angular velocity, vorticity and strain. Inviscid incompressible flow in a duct with applications. Gas dynamics, inviscid compressible flow with applications to ducts of various geometry and airfoils. CFD applications to various geometries (Ducts, Airfoils).

**Course Code:** MENG 455      **Course Title:** Special Topics

Any important, relevant and possibly hot topic in the field that is not covered in the approved elective list. Topics may vary based on students' interest and availability of staff.

**Course Code:** MENG 471      **Course Title:** Failure Analysis

Course goals, materials selection, material processing, aesthetics, and environmental considerations. Macroscopic and microscopic fracture analysis, Principles of fracture mechanics and failure analysis, tribological failure, types of complete failure: distortion, buckling, yielding, plastic instability, creep, fatigue, cumulative failure, and crack propagation. Fail-safe design analysis, diagnostics methods and control of mechanical failures, case studies of failure analysis.

**Course Code:** MENG 473      **Course Title:** Tribology

Surface properties and surface contact stress; Friction, measurement of friction, theories of friction, thermal effects in sliding friction; Types of wear, wear of lubricated surfaces. Tribological properties of solid materials, solid lubricants, polymers, and composites, the pv factor, lubricant properties, fluid lubricated thrust bearings. Fluid-lubricated journal bearings, oil supply grooves, wear failure analysis, and industrial preventive maintenance: case studies.

**Course Code:** MENG 475      **Course Title:** Design of Mechanical Systems

Design and analysis of mechanical systems based on critical studies of high-performance machinery. Applications of design fundamentals to mechanical components, and integration of components to form systems. Advanced techniques such as optimization and finite element analysis, design case studies using the computer facilities (at least 2 case studies).

**Course Code:** MENG 476      **Course Title:** Control Systems Design

Introduction, concept of optimal designs, gain adjustment design methods, closed loop tracking performance, cascade & feedback compensation, root locus compensation, frequency response design, PID Controls, state-space design methods, industrial controllers, actuators, introduction to advanced design methods (QFT, LQG, H2 & H $\infty$ ), case studies.

**Course Code:** MENG 477      **Course Title:** Machine Health Monitoring

Machine maintenance; run to failure, preventive maintenance and predictive maintenance, costs, planning and benefits, role of vibration, bearing temperature, lubricant oil and acoustics in predictive maintenance, vibration analysis, overall vibration, time waveform, FFT spectrum analysis, vibration diagnostic charts. Software and hardware requirements: sensor, data collectors, and analyzers. Real world case studies.

**Course Code:** MENG 478      **Course Title:** Product Design and Development

Introduction to product design and development, methods used for opportunity identification, product planning based on customer needs, product specifications and concept generation, concept selection process and techniques, Product design and modelling, prototyping and robust designing, the intellectual property rights and product development economics.

**Course Code:** MENG 479      **Course Title:** Introduction to Finite Element Methods

Basics of Finite Element Method, Stiffness (Displacement) Method, Truss Equations, Weighted Residual (Galerkin's Residual Method), Beam Equations, Plane Stress and Plane Strain Stiffness Equations, Plane stress and Plane Strain Concepts, Constant Strain Triangular Element (CST), Linear Strain Triangular Element (LST), Isoparametric Formulation, Review Numerical Integration (Gaussian & Newton-Cotes Quadrature), 3D Stress Analysis, Heat Transfer, Basic Differential Equations, One Dimensional Elements, Two Dimensional Elements, Fluid Flow, Basic Differential Equations, One Dimensional Elements, Two Dimensional Elements, Application of FEM to structural dynamics. Applications using commercial packages. Application of ANSYS (student version is available for free download) package to solid mechanics, fluid mechanics, heat transfer problems and dynamic structural problems.

**Course Code:** MENG 485      **Course Title:** Systems and Control

Concept of systems, concept of open and closed loop systems, modeling of systems, state variable models, systems performance and characteristics, stability and sensitivity analysis, basic control actions, root-locus analysis & design, frequency response analysis & design, introduction to modern control, applications.

**Course Code:** MENG 495      **Course Title:** Senior Design Project I

The first is a two-part course sequence applying an integrated system design approach on a team-based project, open-ended problem with realistic constraints. Team effort and both oral and written presentations are a part of the experience. Important topics are discussed in the meeting with the project supervisor including the design process, design tools, engineering communication, engineering ethics, and intellectual property. In the end of semester, the project supervisor submit grade passed on a progress report.

**Course Code:** MENG 496      **Course Title:** Senior Design Project II

Completion of the team designed functional working model, submission of final written report of the design project are essential requirements for the completion of the course then conduct oral presentation in front of examination committee for grade evaluation.