Course Code	Course Name	Credit Hours	Contact Hours
GE 104	Basics of Engineering Drawing	3	5

Supplemental Materials:

Reference Material	
Title	A Manual of Engineering Drawing Practice
Author/Year	C.H. Simons and D.E. Maguire / 2012
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the constructional geometry and basics of lettering. Sketching, orthographic projection, sectional and auxiliary views, and dimensioning. Introduction to computer graphics and engineering applications.

b. Pre-requisites or Co-requisites

- None

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Recognize** principles of engineering drawing related to design of structures.
- **CLO2: Draw** basic geometric and isometric shapes.
- **CLO3: Deduce** the orthogonal projection, missing views and sectional views.
- **CLO4: Copy** components of mechanical engineering structures on drawing sheets.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3					**CLO4**	

Grading Distribution:

Week	Assessment	Grade %
2-15	Assignments	6%
2-15	Lab Performance	10%
5	Quiz-1	2%
6	Mid-Term Exam-I	15%
10	Quiz-2	2%
12	Mid-Term Exam-II	15%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Constructional geometry and basics of lettering	3	15
Sketching	2	10
Orthographic projection	4	20
Sectional and auxiliary views	2	10
Dimensioning	1	5
Introduction to computer graphics	2	10
Engineering applications	1	5

Course Code	Course Name	Credit Hours	Contact Hours
GE 201	Statics	3	4

Supplemental Materials:

Reference Material	
Title	Engineering Mechanics, Statics
Author/Year	Meriam, J. L.& Kraige, L. G. / 2017
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)
This course introduces the force systems; vector analysis of forces, moments and couples in 2 and 3 dimensions. Equilibrium of force systems. Analysis of structures; plane trusses and frames. Distributed force system; centroids and composite bodies. Area moments of inertia and friction.
b. Pre-requisites or Co-requisites
• MATH 102 Integral Calculus
c. Course Type (Required or Elective)
Required
d. Specific Outcomes of Instruction
By the end of this course, the student should be able to: • **ClO1: Understand** force vector analysis and moment in both 2D and 3D • **ClO2: Apply** equilibrium of rigid bodies on statics applications. • **ClO3: Evaluate** geometrical properties of composite area such as centroid and moment of inertia. • **ClO4: Present** and discuss the types of friction and its applications.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**				

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	5%
4	Assignment-1	2.5%
7	Mid-Term Exam-I	10%
9	Quiz-2	5%
9	Assignment-2	2.5%
12	Mid-Term Exam-II	10%
15	Report	5%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Force systems; vector analysis of forces	2	8
Moments and couples in 2 and 3 dimensions	3	12
Equilibrium of force systems	1	4
Analysis of structures; plane trusses and frames	1	4
Distributed force system	2	8
Centroids and composite bodies	2	8
Area moments of inertia	3	12
Friction and its application	1	4

Course Code	Course Name	Credit Hours	Contact Hours
GE 202	**Dynamics**	**3**	**4**

Supplemental Materials:

Reference Material	
Title	Engineering Mechanics; Volume 2, Dynamics
Author/Year	Meriam, J. L.& Kraige, L. G. / 2012
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the physical basis of kinematics of a particle: curvilinear motion, and relative motion; Kinematics of a rigid body in Plane motion: relative velocity and acceleration, and rotating axes; Kinetics of particles: Newton's law, work and energy, impulse and momentum, and impact; Kinetics of a rigid body in plane motion: translation, fixed axis rotation, general motion, work and energy, and impulse and momentum.

b. Pre-requisites or Co-requisites

- GE 201 Statics

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Define** kinetics and kinematics of particles and rigid bodies.
- **CLO2: Analyze** the motion of particles and rigid bodies.
- **CLO3: Predict** work and energy associated with the motion of particles and rigid bodies.
- **CLO4: Present** the effect of applied forces on motion.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**				

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	1%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	1%
9	Assignment-2	2%
12	Mid-Term Exam-II	15%
13	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Kinematics of Particles: curvilinear motion, and relative motion	5	20
Kinematics of a rigid body in Plane motion: relative velocity and acceleration, and rotating axes	3	12
Kinetics of Particles: Newton's law, work and energy, impulse and momentum, and impact	4	16
Kinetics of Rigid Bodies in plane motion: translation, fixed axis rotation, general motion, work and energy, and impulse and momentum	3	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 241	ME Drawing & Graphics	3	4

Supplemental Materials:

Reference Material	
Title	Geometric and Engineering Drawing
Author/Year	Morling, K. / 2010
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces auxiliary views, skew and inclined planes, surface intersections, developed views, preferred numbers, fits and tolerances. Machine components, structural drawings and assembly drawings. Fundamentals of computer graphics and the use of Auto CAD computer drafting software.

b. Pre-requisites or Co-requisites

- GE 104 Basics of Engineering Drawing

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Identify** functions of AutoCAD program as an efficient drawing tool.
- **CLO2: Construct** mechanical drawings by using AutoCAD program.
- **CLO3: Assemble** mechanical elements by using AutoCAD program.
- **CLO4: Justify** the effectiveness of AutoCAD as a drawing tool.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO4**			**CLO3**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	1%
4	Assignment-1	4%
7	Mid-Term Exam-I	15%
9	Quiz-2	1%
9	Assignment-2	4%
12	Mid-Term Exam-II	15%
13	Report	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Auxiliary views, skew and inclined planes, and surfaces intersections	1	4
Developed views	1	4
Assembly drawing	4	16
Fits and tolerance	1	4
Fundamentals of computer graphics and AutoCAD computer drafting software	8	32

Course Code	Course Name	Credit Hours	Contact Hours
ME 251	Materials Engineering	3	5

Supplemental Materials:

Reference Material	
Title	Materials Science and Engineering, An Introduction
Author/Year	William, D. C. and Rethwisch, D. G. / 2009
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the structures, properties and behavior of engineering materials. Engineering alloys and phase diagrams. Ferrous and nonferrous metals and their alloys. Plastics and ceramics. Corrosion of metallic structure.

b. Pre-requisites or Co-requisites

- CHEM 101 General Chemistry
- PHYS 102 General Physics

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Apply** fundamentals, concepts, principles and theories of materials engineering.
- **CLO2: Determine** characteristics of materials relevant to materials engineering applications.
- **CLO3: Solve** engineering problems related to materials engineering applications.
- **CLO4: Present** and discuss results of scientific reports.
- **CLO5: Perform** the mechanical testing of metals and alloys and analyze their results.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**			**CLO5**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
9	Assignment-2	2%
12	Mid-Term Exam-II	15%
5 & 14	Reports	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Structure and characteristics of metals, polymers and ceramics	2	10
Mechanical properties of materials Stress-Strain curve Tensile, Compression, Impact and Fatigue tests	2	10
Equilibrium phase diagram and theory of alloys	2	10
Heat treatment and diffusion in metals and alloys	1	5
Corrosion of metals	2	10
Destructive and non-destructive testing of metals	2	10
Joining of materials	1	5
Diffusion in metals and case hardening	1	5
Faults in fusion welding Brazing and soldering Solid state joining	2	10

Course Code	Course Name	Credit Hours	Contact Hours
EE 318	Electric & Electronic Circuits	3	4

Supplemental Materials:

Reference Material	
Title	Electric Circuits
Author/Year	Nilsson J. William and Riedel Susan / 2014
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the foundation and knowledge necessary for understanding and analyzing electric circuits. Topics includes an overview of electric circuit elements, Ohm's, Kirchhoff's laws, power calculations, voltage and current divider rules, Nodal and Mesh analysis, Thevenin's theorem, Norton's theorem, source transformation, superposition, maximum power transfer, steady-state sinusoidal circuits analysis and power calculations in AC circuits.

b. Pre-requisites or Co-requisites

- PHYS 102 General Physics (2)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Define** and memorize basic circuit elements, charge, current voltage, and resistance.
- **CLO2: Write** the basic laws of circuit theory: Ohm's law and Kirchhoff's law.
- **CLO3: Calculate** using standard electrical symbols and terminology.
- **CLO4: Interpret** electrical schematic diagrams and design appropriate electrical connections to perform certain operation.
- **CLO5: Present** and discuss ideas effectively with a range of audiences.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO5**			**CLO3, CLO4**	

Grading Distribution:

Week	Assessment	Grade %
6	Quiz-1	5%
2-15	Assignment(s)	10%
7	Mid-Term Exam-I	10%
11	Quiz-2	5%
12	Mid-Term Exam-II	10%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Overview of electric circuit elements	2	8
Ohm's and Kirchhoff's laws	4	16
Power calculations	1	4
Voltage and current divider rules	2	8
Nodal and Mesh analysis	2	8
Thevenin's theorem, Norton's theorem and maximum power transfer	1	4
Source transformation	1	4
Superposition	1	4
Steady-state sinusoidal circuits analysis	1	4
Power calculations in AC circuits	2	8

Course Code	Course Name	Credit Hours	Contact Hours
ME 331	**Manufacturing Proc. 1**	**4**	**6**

Supplemental Materials:

Reference Material	
Title	Fundamentals of Modern Manufacturing Materials, Processes and Systems
Author/Year	Groover, M.P. / 2012
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces manufacturing methods of metals and plastics including, metal casting, forming, machining, welding, and plastic processing. Laboratory experiments and demonstrations in material behavior, forming, casting, welding, and machining operations. Metrology and dimensional control.

b. Pre-requisites or Co-requisites

- ME 241 ME Drawing & Grphics
- ME 251 Materials Engineering
- ME 352 Mechanics of Materials

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** different machining and forming processes.
- **CLO2: Describe** different parts of machines.
- **CLO3: Present** and discuss a machining or forming process.
- **CLO4: Perform** a product on a machine.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO3**		**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
9	Assignment-2	2%
12	Mid-Term Exam-II	15%
5 & 14	Reports	10%
16	Final Exam	50%

Brief List of Topics to be covered:

List of Topics	No. of Weeks	Contact Hours
Introduction of manufacturing methods of metals and plastics	4	24
Metal casting	2	12
Welding	1	6
Plastic processing	2	12
Machining operations	4	24
Metrology and dimensional control	2	12

Course Code	Course Name	Credit Hours	Contact Hours
EE 338	**Electrical Machines**	**2**	**3**

Supplemental Materials:

Reference Material	
Title	Electric Machinery Fundamentals
Author/Year	Chapman / 2011
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces fundamentals of magnetic circuits. Transformer construction, equivalent circuit, operation performance. Three phase induction machines, construction, equivalent circuit, operation performance, starting, and speed control. Special AC motors.

b. Pre-requisites or Co-requisites

- EE 318 Electric & electronic circuits

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Define** fundamental concepts of electromagnetic circuits, single-phase transformer (operation, and equivalent circuit).
- **CLO2: Describe** fundamental concepts of three phase induction motor (theory, operation, equivalent circuit, torque speed characteristics, speed regulation, and motor classes), operation of small AC motors.
- **CLO3: Develop** and solve complex problems related to electric machines by applying principles of electrical engineering and mathematics.
- **CLO4: Interpret** the ability to communicate effectively with a range of audiences.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**				

Grading Distribution:

Week	Assessment	Grade %
5	Quiz-1	5%
7	Mid-Term Exam-I	10%
12	Mid-Term Exam-II	15%
15	Report	10%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Construction and operation of transformers	3	9
Equivalent circuit, voltage regulation, test, and parallel operation of transformers	2	6
Connection of three phase transformer and applications of special transformers	2	6
Construction and operation of three phase induction machines	3	9
Equivalent circuit, speed regulation, and efficiency of three phase induction motors	2	6
Starting and speed control of three phase induction motor	2	6
Construction and operation of single phase AC motors	1	3

Course Code	Course Name	Credit Hours	Contact Hours
ME 341	**Mechanical Engineering Design (1)**	**4**	**6**

Supplemental Materials:

Reference Material	
Title	Shigley's Mechanical Engineering Design
Author/Year	Richard, G., Keith, J. and Shigley, J. / 2014
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces introduction to mechanical engineering design, materials, and failures resulting from static loading. Fatigue failure resulting from variable loading. Design of mechanical elements shafts & screws, fasteners& welding, bonding, and the design of permanent joints & term design project.

b. Pre-requisites or Co-requisites

- ME 331 Manufacturing Proc. (1)
- ME 352 Mechanics of Materials
- ME 361 Mechanics of Machines

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** the different types of stresses.
- **CLO2: Analyze** the types of steady and cyclic loading, for rigidity and stability.
- **CLO3: Present** and discuss the parameter that affects the performance of screw and power screw.
- **CLO4: Perform** a full design of project or case study contains all the machine elements.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO3**		**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
10	Assignment-2	2%
12	Mid-Term Exam-II	15%
5 & 14	Reports	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction to design concepts and process	3	18
Constructional details as affected by manufacturing, assembly, and strength considerations.	2	12
Problem solving and decision-making design	2	12
Design for steady and cyclic loading, and for rigidity and stability	2	12
Design of mechanical elements: screws, power screws and fasteners	2	15
Design the permanent joints (connections), welded, riveted and bonded joint	2	15
Term design project	2	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 352	**Mechanics of Materials**	**4**	**6**

Supplemental Materials:

Reference Material	
Title	Mechanics of Materials
Author/Year	Ferdinand, J., Russell, E., John, D. and David, M. / 2014
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces introduction to mechanical behavior of solid bodies (Rods, Shafts, Beams, etc.) under various types of loading. Mechanical and thermal stress and strain. Stress- strain relations. Axial deformation. Shear and bending moment in beams. Torsion of shafts and thin walled tubes. Combined loading. Theories of failure. Strain gauge measurements. Thick and thin walled cylinders. Deflection of beams. Statically indeterminate problems. Columns.

b. Pre-requisites or Co-requisites

- GE 201 Statics

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** the different types of stresses.
- **CLO2: Analyze** the mechanical behavior of solid bodies (rods, shafts, beams, etc.) under various types of loading.
- **CLO3: Present** and discuss the internal forces in beams (normal& shear forces and the bending moment).
- **CLO4: Perform** a full design of project or case study that contains all the different types of the stresses.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO3**		**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
10	Assignment-2	2%
12	Mid-Term Exam-II	15%
5 & 14	Reports	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
The mechanical behavior of solid bodies (Rods, shafts, beams, etc.) under various types of loading	4	24
Mechanical and thermal stresses and strains; stress-strain relations	2	12
Shear and bending moments in beams; stresses in beams	2	12
Torsion of shafts and thin walled tubes	2	12
Theories of failures	2	12
Thick and thin walled cylinders	1	6
Stability of axially loaded beams (columns)	2	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 353	**Mechanics of Materials Lab.**	**1**	**2**

Supplemental Materials:

Reference Material	
Title	Mechanics of Materials Lab.
Author/Year	Hibbeler, R.C. / 2015
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the strain gauge applications, tension test, torsion test, cantilever beam, pressurized cylindrical vessel, and deflection of beams and buckling of columns.

b. Pre-requisites or Co-requisites

- ME 352 Mechanics of Materials

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** the strain gauge and its applications.
- **CLO2: Analyze** the tensile, torsion, deflection of beams and buckling of columns experimental data.
- **CLO3: Present** and discuss the test data that obtained from the different tests.
- **CLO4: Perform** the experiments professionally and safely.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO3**		**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
10	Assignment-2	2%
12	Mid-Term Exam-II	15%
5 & 14	Reports	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction Strain gauge applications	4	8
Tension test	3	6
Torsion test	2	4
Buckling of columns	1	2
Deflection of beams	2	4
Cantilever beam	1	2
Pressurized cylindrical vessel	2	4

Course Code	Course Name	Credit Hours	Contact Hours
ME 361	**Mechanics of Machines**	**3**	**5**

Supplemental Materials:

Reference Material	
Title	Theory of Machines and Mechanisms
Author/Year	Uicker, J.J., Pennock G.R. and Shigley. J.E. / 2003
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces combination concepts learned in statics and dynamics in the context of mechanisms analysis and design. The students will learn about the different types of links and joints making up mechanisms, kinematics and kinetics of mechanisms.

b. Pre-requisites or Co-requisites

- GE 202 Dynamics

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Determine** the kinetic energy of the flywheel.
- **CLO2: Describe** the basic principles of planar mechanisms of linkages.
- **CLO3: Draw** the profile of the follower.
- **CLO4: Perform** the crank mechanism experiment.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3					**CLO4**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	3%
7	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	3%
12	Mid-Term Exam-II	15%
14	Report	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction of a combination concepts learned in statics and dynamics in the context of mechanisms analysis and design	2	10
Different types of links and joints making up mechanisms	2	10
Kinematics and kinetics of mechanisms	2	10
Fluctuation of speed and energy, and energy stored in flywheel	3	15
Introduction and classifications of cam and follower	2	10
Motion of the follower	2	10
Law of gearing	2	10

Course Code	Course Name	Credit Hours	Contact Hours
ME 371	**Thermodynamics (1)**	**3**	**4**

Supplemental Materials:

Reference Material	
Title	Fundamentals of Engineering Thermodynamic
Author/Year	Moran, M.J. and Shapiro, H.N. / 2014
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces basic concepts of thermodynamics, system and control volume concepts, properties, states, cycles, dimensions and units. Properties of pure substances, phase change of pure substance, tables and charts of pure substances, state equations, and ideal gas. The first law of thermodynamics, work and heat, internal energy, enthalpy, and specific heat. The second law of thermodynamics, heat engines, heat pumps and refrigerators, efficiency of energy transformation, entropy, and concept of entropy increase. Carnot cycle. Power cycles (Carnot and Brayton) steam cycles, and refrigeration cycles.

b. Pre-requisites or Co-requisites

- PHYS 102 General Physics (2)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** 1st law of thermodynamics and types of thermodynamic systems.
- **CLO2: Evaluate** properties of both perfect gases and vapor as working fluids
- **CLO3: Apply** 2nd law of thermodynamics on heat engines and heat pumps.
- **CLO4: Present** and discus types of internal combustion engines and their applications.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**				

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	5%
4	Assignment-1	2.5%
7	Mid-Term Exam-I	10%
9	Quiz-2	5%
9	Assignment-2	2.5%
12	Mid-Term Exam-II	10%
14	Report	5%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Basic concepts of thermodynamics, system and control volume concepts, properties, states, cycles, dimensions and units	3	12
Properties of pure substances, phase change of pure substance, tables and charts of pure substances, state equations and ideal gas	3	12
The first law of thermodynamics, work and heat, internal energy, enthalpy and specific heat	3	12
The second law of thermodynamics, heat engines, heat pumps and refrigerators, efficiency of energy transformation, entropy, concept of entropy increase, reversibility and efficiency	3	12
Power cycles (Carnot and Brayton), steam cycles and refrigeration cycles	3	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 372	**Thermodynamics (2)**	**3**	**4**

Supplemental Materials:

Reference Material	
Title	Thermodynamics: An engineering approach
Author/Year	Yunus, C.A. and Michael, A.B. / 2014
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces basics of exergy and availability, different types of internal combustion engine, operation of reciprocating compressor, combustion, thermodynamics relations, and properties of gas mixture.

b. Pre-requisites or Co-requisites

- ME 371 Thermodynamics (1)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Demonstrate** the basic concepts of gas mixtures and reciprocating compressors.
- **CLO2: Analyze** combustion products of fuel and its relation to gas mixtures.
- **CLO3: Deduce** information and propose solutions for thermodynamics relations using numerical methods and computing tools.
- **CLO4: Present** and discuss different types of reciprocating compressors and their applications in mechanical engineering.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO3		**CLO4**			**CLO2**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
7	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
14	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Exergy and availability	2	8
Thermodynamics relations	1	4
Gas mixture	3	12
Gas vapor mixture	3	12
Thermodynamics of reciprocating gas compressors	3	12
Combustion and introduction to internal combustion engines	3	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 374	Heat Transfer	3	4

Supplemental Materials:

Reference Material	
Title	Fundamentals of Heat and Mass Transfer
Author/Year	Incropera, F. and Dewitt, D. / 2011
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the basic modes of heat transfer, basic concept of fins and fins performance. Steady and unsteady heat conductions, convection and radiation heat transfer concepts.

b. Pre-requisites or Co-requisites

- ME 381 Fluid Mechanics (1)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Demonstrate** the basic concepts, principles and theories relevant to heat transfer.
- **CLO2: Analyze** various heat transfer modes equations and problems.
- **CLO3: Deduce** information and propose solutions for heat transfer equations and problems using numerical methods and computing tools.
- **CLO4: Present** and discuss different types of heat exchangers and their applications in thermal engineering.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO3		**CLO4**			**CLO2**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
7	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
14	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction to heat transfer by conduction, radiation and convection	2	8
Steady state solution for heat conduction in plane and radial walls	4	16
Unsteady heat transfer in plates, cylinders and spheres	3	12
Practical analysis of convection with application to heat exchangers	4	16
Blackbody and gray-body radiation systems	2	8

Course Code	Course Name	Credit Hours	Contact Hours
ME 381	**Fluid Mechanics (1)**	**3**	**4**

Supplemental Materials:

Reference Material	
Title	Engineering Fluid Mechanics
Author/Year	Crowe, C.T. / 2010
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the fundamental concepts in fluids, dimensions and units, fluid statics, control volume, conservation of mass and momentum equations. Energy equation, differential form of equations and stream function. Euler's equations and Bernoulli's equation. Dimensional analysis and model studies. Flow in pipe. Introduction to turbo machinery.

b. Pre-requisites or Co-requisites

- ME371 Thermodynamics (1)
- GE 202 Dynamics

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** basic concepts of fluid mechanics.
- **CLO2: Recall** fluid properties and pipe materials.
- **CLO3: Analyze** the fundamentals equations of the fluid systems.
- **CLO4: Present** and discuss different types of fluid flow.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO4**			**CLO3**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2.5%
4	Assignment-1	2.5%
7	Mid-Term Exam-I	10%
9	Quiz-2	2.5%
9	Assignment-2	2.5%
12	Mid-Term Exam-II	10%
14	Report	10%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Fluid properties	2	8
Fluid statics	2	8
Flowing fluids and pressure variation	2	8
Control volume approach: continuity equation, momentum equations and energy equation	6	24
Dimensional analysis	1	4
Flow in conduits	2	8

Course Code	Course Name	Credit Hours	Contact Hours
ME 383	**Thermo-fluid Lab (1)**	**1**	**2**

Supplemental Materials:

Reference Material	
Title	Introduction to Fluid Mechanics
Author/Year	Fox, R.W. and McDonalds, A.T. / 2015
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces performance test for a multi-stage reciprocating air compressor. Measurement of heating value of a gaseous fuel. Exhaust-gas analysis. Performance of spark ignition engine. Performance of compression ignition engine. Demonstration of fluid flow (flow visualization). Performance test for a multi-stage reciprocating air compressor. Determination of hydrostatic force. Measurement of viscosity.

b. Pre-requisites or Co-requisites

- ME 372 Thermodynamics (2)
- ME 381 Fluid Mechanics (1)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Define** thermo-fluid parameters and properties and calibrate their measuring devices and instruments.
- **CLO2: Analyze** experimental results and compare it with that in the literature and estimate the accuracy.
- **CLO3: Handle** measuring devices and laboratory equipment appropriately and safely.
- **CLO4: Present** and discuss experimental results.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1		**CLO4**			**CLO2, CLO3**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	5%
7	Mid-Term Exam-I	10%
9	Quiz-2	5%
12	Mid-Term Exam-II	10%
14	Report	20%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Performance test for a multi-stage reciprocating air compressor	2	4
Measurement of heating value of a gaseous fuel	1	2
Exhaust-gas analysis	2	4
Performance of spark ignition engine	2	4
Performance of compression ignition engine	3	6
Determination of hydrostatic force	2	4
Measurement of viscosity	1	2
Demonstration of fluid flow (flow visualization)	2	4

Course Code	Course Name	Credit Hours	Contact Hours
ME 384	**Fluid Mechanics (2)**	**2**	**3**

Supplemental Materials:

Reference Material	
Title	Viscous Fluid Flow
Author/Year	White, F.M. / 2005
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)
This course introduces dynamics of fluid flow and Navier-Stokes equations. Flow in pipes. Boundary layer equations. Blasius flow. Momentum integral equation. Potential flow and complex potential of elementary flows. Super-positioning. Introduction to one dimensional compressible flows. Types of flows. Isentropic flow in variable-area passages. Shock waves.
b. Pre-requisites or Co-requisites
• ME 381 Fluid Mechanics (1)
c. Course Type (Required or Elective)
Required
d. Specific Outcomes of Instruction
By the end of this course, the student should be able to: • **CLO1: Demonstrate** concepts and fundamentals of fluid dynamics. • **CLO2: Describe** one-dimensional compressible flow and isentropic flow in variable-area passages applications. • **CLO3: Recall** characteristics and properties of isentropic flows relevant to compressible flow applications. • **CLO4: Present** and discuss results of scientific reports.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO3		**CLO4**				

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	1%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	1%
9	Assignment-2	2%
12	Mid-Term Exam-II	15%
13	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Dynamics of fluid flow and Navier-Stokes equations	2	6
Flow in pipes	2	6
Boundary layer equations	2	6
Blasius flow	1	3
Momentum integral equation	1	3
Potential flow, complex potential of elementary flows and super positioning	2	6
Introduction to one dimensional compressible flow	1	3
Types of flows	2	6
Isentropic flow in variable-area passages and shock waves	2	6

Course Code	Course Name	Credit Hours	Contact Hours
ME 387	**Thermo-fluid Lab. 2**	**1**	**2**

Supplemental Materials:

Reference Material	
Title	Introduction to Fluid Mechanics
Author/Year	Fox, R.W. and McDonalds, A.T. / 2011
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces visualization of potential flow fields. Visualization of real flow around streamlined and bluff bodies. Pipe flow, velocity distribution, pressure drop and friction factor. Flow measurements: orifice, venturi and nozzle calibrations. Calibration of thermocouples. Free convection for a lumped. Thermal capacitance system. Determination of thermal conductivities of new metals. Thermal performance of fins (in free and forced convection).

b. Pre-requisites or Co-requisites

- ME 384 Fluid Mechanics (2)
- ME 374 Heat Transfer

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** the calibration of measurement devices.
- **CLO2: Correlate** the experimental results using software.
- **CLO3: Handle** laboratory devices professionally and safely.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1			**CLO2**		**CLO3**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	5%
4	Assignment-1	5%
7	Mid-Term Exam-I	10%
9	Quiz-2	5%
9	Assignment-2	5%
12	Mid-Term Exam-II	10%
14	Report	10%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Pressure measurements	2	4
Flow rate measurement through orifice, nozzle and venturi	3	6
Measure of impulse force on flat and curved surface	2	4
Friction loss through pipes	2	4
Thermal conductivity of material	4	8
Performance of the fins	2	4

Course Code	Course Name	Credit Hours	Contact Hours
GE 401	Engineering Economy	3	4

Supplemental Materials:

Reference Material	
Title	Basics of Engineering Economy
Author/Year	Blank, L. T. and Tarquin, A. J. / 2013
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course includes an introduction to engineering economy. Interest formulas and equivalence. Bases for comparison of alternatives. Decision making among alternatives. Evaluating replacement alternatives. Break-even and minimum cost analysis. Cost accounting. Depreciation. Economic analysis of operations. Economic analysis of public projects.

b. Pre-requisites or Co-requisites

- None

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** fundamental, concepts, principles, theories and contemporary issues of engineering economy.
- **CLO2: Demonstrate** the impact of mechanical engineering solutions in an economic context.
- **CLO3: Solve** the economic engineering problems.
- **CLO4: Contribute** actively in group discussion.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1	**CLO3**		**CLO2**	**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
7	Mid-Term Exam-I	15%
8	Report	4%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction to engineering economy	2	8
Interest formulas and equivalence	6	24
Comparison of alternatives and decision making	1	4
Evaluating replacement alternatives	2	8
Break-even and minimum cost analysis	1	4
Depreciation and economic analysis of operations	1	4
Economic analysis of public projects	2	8

Course Code	Course Name	Credit Hours	Contact Hours
CE 402	Management of Engineering Projects	3	4

Supplemental Materials:

Reference Material	
Title	Project Management with CPM, PERT and Precedence Diagramming
Author/Year	Moder, J., Phillips, C. and Davis, E. / 2015
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces basic management process approach, strategies and planning methods, project planning and scheduling, bar-charts, critical path methods, PERT method, resource leveling and allocation, time-cost trade off. Construction and organizational approaches, leadership elements and decision making, time and cost control, computer applications.

b. Pre-requisites or Co-requisites

- None

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Apply** fundamentals, concepts, principles and theories of project management.
- **CLO2: Determine** characteristics of projects relevant to project management applications.
- **CLO3: Demonstrate** the computational results of project management in an economical context.
- **CLO4: Solve** engineering problems related to project management applications.
- **CLO5: Present** and discuss results of scientific reports.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2	**CLO4**		**CLO3**	**CLO5**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
7	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
13	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Basic concepts and principles of project management Introduction to the PM 9-knowledge area Basic definitions in PM	1	4
Role and skills of project manager Project resources Project life cycle Project five process group	1	4
Scope management Project charter Work break down structure WBS dictionary Scope verification and control	2	8
Time management Time planning and activity definition PERT weighted ratio	3	12
Cost management Cost estimate and budgeting Cost base line and cost control	2	8
Communication management Types of communications Communication channels Communication plan	1	4

Quality management Quality assurance and continuous improvement Perform quality control	1	4
Human resource Management H.R Plan &Responsibility Assignment matrix Characteristics of effective team & Motivation Seven sources of conflict	2	8
Risk management Procurement management Integration management	2	8

Course Code	Course Name	Credit Hours	Contact Hours
ME 447	Mech. Eng. Design (2)	3	4

Supplemental Materials:

Reference Material	
Title	Mechanical Engineering Design
Author/Year	Shigley, J.E. and Mischke, R./ 2008
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces design of mechanical elements, springs, lubrication and journal bearings. Helical, bevel, and worm gears. Clutches and brakes. Miscellaneous power transmission components.

b. Pre-requisites or Co-requisites

- ME 341 Mech. Eng. Design (1)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** different types of machine elements.
- **CLO2: Analyze** the mechanical elements under different loads and stresses.
- **CLO3: Present** and discuss a machine element design.
- **CLO4: Perform** a full design project that contains different machine elements.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO 2		**CLO3**		**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
7	Mid-Term Exam-I	15%
9	Quiz-2	3%
9	Assignment-2	2%
10	Report-1	5
12	Mid-Term Exam-II	15%
13	Report-2	5%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction of design of mechanical elements	2	5
Springs	2	10
Lubrication and journal bearings	2	10
Spur, helical, bevel, and worm gears	7	30
Clutches and brakes	2	10

Course Code	Course Name	Credit Hours	Contact Hours
ME 466	Automatic Control	3	4

Supplemental Materials:

Reference Material	
Title	Automatic Control Systems
Author/Year	Kuo, B.C. / 2009
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the basic principles of automatic control for a mechanical engineer and techniques used to design controllers.

b. Pre-requisites or Co-requisites

- MATH 204 Differential Equation

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** basic concepts of automatic control systems
- **CLO2: Design** control systems, components and elements in a creative and innovative way
- **CLO3: Solve** control engineering problems
- **CLO4: Interpret** information and propose solutions using modern numerical techniques, skills, and computing tools as MATLAB.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1			**CLO2**		**CLO3**	**CLO 4**

Grading Distribution:

Week	Assessment	Grade %
5	Quiz-1	2.5%
5	Assignment-1	2.5%
7	Mid-Term Exam-I	10%
9	Quiz-2	2.5%
9	Assignment-2	2.5%
12	Mid-Term Exam-II	10%
14	Report	10%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Introduction to feedback control systems	2	8
Representation of control system components	1	4
Laplace transformation	2	8
Transfer functions and block diagrams	2	8
Time response of feedback control system	2	8
Root locus technique	2	8
Frequency response method	4	16

Course Code	Course Name	Credit Hours	Contact Hours
ME 469	Mechanical Vibrations	3	4

Supplemental Materials:

Reference Material	
Title	Mechanical Vibrations
Author/Year	Rao, S.S. / 2011
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the design of isolators for shock and harmonic loading, response spectrum. Multi-degree-of-freedom systems. Natural and forced vibrations. Approximate and numerical methods. Rotor dynamics. Machinery vibration. Monitoring and diagnosis vibration problems.

b. Pre-requisites or Co-requisites

- None

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Apply** fundamentals, concepts, principles and theories of mechanical vibrations.
- **CLO2: Determine** characteristics of materials relevant to mechanical vibration applications.
- **CLO3: Analyze** the computational results of vibration responses.
- **CLO4: Solve** engineering problems related to mechanical vibration applications.
- **CLO5: Present** and discuss results of scientific reports.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2, CLO4		**CLO5**			**CLO3**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
7	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
14	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Simple harmonic motion	2	8
Free vibration of one-degree-of-freedom system	2	8
Design of isolators for shock and harmonic loading	1	4
Describe the response spectrum and multi-degree-of-freedom systems	2	8
Natural and forced vibrations	2	8
Rotor dynamics	2	8
Machinery vibration	2	8
Monitoring and diagnosis vibration problems	2	8

Course Code	Course Name	Credit Hours	Contact Hours
ME 471	**Power and Desalination Plants**	**3**	**4**

Supplemental Materials:

Reference Material	
Title	Power Plant Technology
Author/Year	El-Wakil, M.M. / 2002
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces basis of steam power plants with superheat, reheat and regeneration, description, thermal analysis and performance of the plant systems and components. Gas power plants: thermal analysis of the simple cycle, intercooling, reheat and regeneration. Combined gas and steam cycle plants. Desalination plants and fundamentals of water desalination. thermal methods of desalination: MSF & MED.

b. Pre-requisites or Co-requisites

- ME 374 Heat Transfer
- EE 338 Electrical Machines

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Understand** fundamentals of thermal and desalination plants.
- **CLO2: Solve** the engineering problems in power plants and desalination plants.
- **CLO3: Demonstrate** the power plants components and the thermal cycles.
- **CLO4: Contribute** actively in group discussion.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO 2, CLO3				**CLO4**		

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	2%
4	Assignment-1	1%
6	Mid-Term Exam-I	15%
9	Quiz-2	2%
9	Assignment-2	1%
12	Mid-Term Exam-II	15%
13	Report	4%
16	Final Exam	60%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Steam power plant components	2	8
Reheat cycle	1	4
Regenerative cycle	2	8
Gas turbine plant	2	8
Combined cycles	1	4
Diesel Power Plant –Nuclear Power Plant	2	8
Renewable Energy Plants	2	8
Water desalination technology	3	12

Course Code	Course Name	Credit Hours	Contact Hours
ME 472	Refrigeration and Air Conditioning	3	5

Supplemental Materials:

Reference Material	
Title	ASHRAE Handbook (Fundamentals Volume)
Author/Year	ASHRAE / 2013
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This course introduces the vapor compression refrigeration systems: standard cycle and its modification. Compressors, condensers, evaporators and expansion devices. System analysis, multi-pressure systems, absorption refrigeration systems, psychrometric processes, air conditioning systems and load calculations.

b. Pre-requisites or Co-requisites

- ME 374 Heat Transfer

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Demonstrate** fundamentals and principles of refrigeration and air conditioning.
- **CLO2: Solve** engineering problems in refrigeration and air conditioning applications.
- **CLO3: Contribute** actively in group discussion.
- **CLO4: Perform** a refrigeration experiment and interpret the data.

e. Student Outcomes Addressed by the Course						
SO1	**SO2**	**SO3**	**SO4**	**SO5**	**SO6**	**SO7**
CLO1, CLO2		**CLO3**			**CLO4**	

Grading Distribution:

Week	Assessment	Grade %
4	Quiz-1	3%
4	Assignment-1	2%
6	Mid-Term Exam-I	15%
7	Report-1	4%
9	Quiz-2	3%
9	Assignment-2	2%
12	Mid-Term Exam-II	15%
14	Report-2	6%
16	Final Exam	50%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Vapor compression refrigeration systems: standard cycle and its modification	3	15
Compressors, condensers, evaporators and expansion devices	2	10
System analysis, multi-pressure systems	1	5
Absorption refrigeration systems	2	10
Psychrometric processes	3	15
Air conditioning systems	3	15
Load calculations	1	5

Course Code	Course Name	Credit Hours	Contact Hours
ME 498	Senior Design Project (1)	2	3

Supplemental Materials:

Reference Material	
Title	Related to the project topic
Author/Year	
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This graduation project work focuses on choosing the topic of the project, establishing the project, performing a literature review, conducting preliminary experiments, collecting the field data and developing the mathematical/computer model and writing the first two chapters along with any preliminary findings.

b. Pre-requisites or Co-requisites

- Finishing 80 credit hours

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Identify** the objectives and milestones of the assigned project and compare it with previous related work.
- **CLO2: Analyze** problem statement through detail/in depth research and literature review.
- **CLO3: Systematically** gather requirements and data, combine it, and compose the solution to develop/ reproduce the components and engineering systems for advance computing problems.
- **CLO4: Apply** the composed solution to construct/design computing systems using specific engineering tools and techniques.

- **CLO5: Demonstrate** a wide range of technical skills by testing and evaluating a working prototype that has passed through design and implementation phases.
- **CLO6: Present** his research/project work in logical and well-planned way by appropriate communication and presentation skills.

e. Student Outcomes Addressed by the Course

SO1	SO2	SO3	SO4	SO5	SO6	SO7
CLO1, CLO2	CLO3	CLO6			CLO4, CLO5	

Grading Distribution:

Week	Assessment	Grade %
-	Project Understanding and Objectives	20%
-	Problem Analysis and Literature Review	16%
-	Requirements and Data Collection	10%
-	Construct/Design and Implementation	20%
-	Testing and Evaluation	10%
-	Project Report and Presentation	24%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Project objectives and the expected outcomes	2	6
Literature review survey	3	9
Modeling of the project	2	6
Design of the project	2	6
Selecting materials	2	6
Writing the GP report	2	6
Preparing the presentation	2	6

Course Code	Course Name	Credit Hours	Contact Hours
ME 499	Senior Design Project (2)	2	3

Supplemental Materials:

Reference Material	
Title	Related to the project topic
Author/Year	
Electronic Materials (e.g. Websites, Social Media, Blackboard, etc.)	
Websites	https://lms.ju.edu.sa

Specific Course Information:

a. Brief Description of the Content of the Course (Catalog Description)

This graduation project work focuses on the continuation of Part-I of the project including: running and finalizing the experimental work or the mathematical/computer model, analyzing the results and findings and drawing the conclusion, writing the complete project report, presenting and defending the project work.

b. Pre-requisites or Co-requisites

- Senior Design Project (1)

c. Course Type (Required or Elective)

Required

d. Specific Outcomes of Instruction

By the end of this course, the student should be able to:

- **CLO1: Demonstrate** a wide range of technical skills by testing and evaluating a working prototype that has passed through design and implementation phases.
- **CLO2: Perform** necessary tasks required in the completion of research/project work as an individual or a team member.
- **CLO3: Integrate** the societal and environmental effects of the project into the proposed engineering solution.
- **CLO4: Compile**, write and present the project work carried out in the form of a project report.

- **CLO5: Complete** a project by practicing management principles including punctuality, commitment and dedication.
- **CLO6: Identify** personal professional goals that support lifelong learning, productivity and satisfaction in large framework of rapidly evolving technology.

e. Student Outcomes Addressed by the Course

SO1	SO2	SO3	SO4	SO5	SO6	SO7
			CLO3	CLO2, CLO5	CLO1	CLO4, CLO6

Grading Distribution:

Week	Assessment	Grade %
-	Testing and Evaluation	20%
-	Meetings and Discussions with Advisor	15%
-	Societal and Environmental Effects	15%
-	Report Writing & Presentation	20%
-	Project Management	15%
-	Life Long Learning	15%

Brief List of Topics to be Covered:

List of Topics	No. of Weeks	Contact Hours
Reviewing the latest achievement in project (1)	1	3
Execution and construction of the project	4	12
Preparing experimental setup and collect data	5	15
Analyze the experimental data	2	6
Writing the GP report	2	6
Preparing the presentation	1	3