

German Jordanian University

School of Applied Technical Sciences

Department of Mechanical and Maintenance Engineering

Bachelor of Science in Mechanical and Maintenance Engineering

Study Plan

2014

I. Program Objectives

The objective of the Mechanical and Maintenance Engineering program at GJU is to prepare graduated for careers in industry or further studies in Mechanical or Maintenance Engineering and related disciplines.

Mechanical and Maintenance Engineering graduates will have:

- Ample knowledge in the theory, principles, tools and processes in the field of mechanical and maintenance engineering including; analysis, management, quality assurance, and reliability.
- A strong background in the design and the structure of mechanical, thermal, and power systems.
- A strong practical experience obtained through hands-on learning methodologies.
- Effective communication, interpersonal, and critical thinking skills, a spirit of curiosity and conduct reflecting professionalism and engineering ethics.

II. Learning Outcomes

Upon completion of the Mechanical and Maintenance Engineering Program, graduates will be able to achieve the following outcomes:

- a) The ability to understand and analyze many of the common mechanical systems such as HVAC systems, hydraulic and pneumatic systems, power plants and many more.
- b) The ability to apply maintenance engineering principles to analyze and manage the maintenance tasks for different mechanical systems.
- c) The ability to implement reliability and quality control programs in the different fields of maintenance systems.
- d) The ability to participate productively on maintenance project teams involving participants from different specializations.
- e) The ability to design and analyze different mechanical systems including the design and fabrication of mechanical replacement components.
- f) Effective communication skills through oral and written reports and software documentation evaluated by both peers and managers.
- g) The ability to elicit, analyze and specify maintenance requirements through productive working relationships with project stakeholders.
- h) The knowledge required to understand the need for and the ability to perform in lifelong learning.

III. Assessment of Learning Outcomes

a) The ability to understand and analyze many of the common mechanical systems such as HVAC systems, hydraulic and pneumatic systems, power plants and many more.

Assessment Methods:

- Performance in applied mechanical engineering courses and Capstone projects.
- Employer surveys.
- Students' evaluation.
- Students' portfolios.

b) The ability to apply maintenance engineering principles to analyze and manage the maintenance tasks for different mechanical systems.

Assessment Methods:

- Exams.
- Performance in laboratory work.
- Capstone projects.
- Employer surveys.
- Students' evaluation.
- c) The ability to implement reliability and quality control programs in the different fields of maintenance systems.

Assessment Methods:

- Performance in applied maintenance engineering courses.
- Employer surveys
- Students' evaluation.
- Students' portfolios.
- d) The ability to participate productively on maintenance project teams involving participants from different specializations.

Assessment Methods:

- Participation in teams of Capstone projects.
- Final year project.
- Employer surveys.
- e) The ability to design and analyze different mechanical systems including the design and fabrication of mechanical replacement components.

Assessment Methods:

- Performance in Machine Design and Manufacturing Processes courses.
- Final year project.
- Employer surveys.
- f) Effective communication skills through oral and written reports and software documentation evaluated by both peers and managers.

Assessment Methods:

- Project reports and project presentations.
- Final year project.
- Employer surveys.

g) The ability to elicit, analyze and specify maintenance requirements through productive working relationships with project stakeholders.

Assessment Methods:

- Project reports and project presentations.
- Final year project.
- Employer surveys.
- h) The knowledge required to understand the need for and the ability to perform in lifelong learning.

Assessment Methods:

- Employer surveys.

IV. Framework for B.Sc. Degree (Semester Credits)

	Credit Hours			
Classification	Compulsory	Elective	Total	
University Requirements	21	6	27	
School Requirements	37	-	37	
Program Requirements	103	12	115	
Total	161	18	179	

1. University Requirements: (27 credit hours)

1.1. Compulsory: (21 credit hours)

Course		Credit	Contact Hours		
ID	Course Title	Hours	Lecture	Lab	Prerequisite
	-	-			
ARB099	Arabic 99ª	0	3	-	-
ARB100 ¹	Arabic	3	3	-	ARB099
ENGL098	English I ¹	0	3	-	-
ENGL099	English II ¹	0	3	-	ENGL098
ENGL101	English III	1	3	-	ENGL099
ENGL102	English IV	1	3	-	ENGL101
ENGL201	English V	2	3	-	ENGL102
ENGL202	English VI	2	3	-	ENGL201
GERL101	German I	3	9	-	-
GERL102	German II	3	9	-	GERL101
MILS100	Military Science	3	3	-	-
NE101	National Education	3	3	-	-
	Total	21	48	-	

1.2. Elective: (6 Credit Hours) (two courses out of the following)

Course		Credit	Credit Contact Hours		
ID	Course Title	Hours	Lecture	Lab	Prerequisite
DES101	Arts' Appreciation	3	3	-	-
EI101	Leadership and Emotional Intelligence	3	3	-	-
IC101	Intercultural Communications	3	3	-	-
SE301	Social Entrepreneurship and Enterprises	3	3	-	-
SFTS101	Soft Skills	3	3	-	-
TW303	Technical and Workplace Writing	3	3	-	-
BE302	Business Entrepreneurship	3	3	-	-
PE101	Sports and Health	3	3	-	-
	Total	6	6	-	

^a Not required for students who pass placement test

2. School Requirements: (37 credit hours)

		Credit	Contact Hours		
Course ID	Course Title	Hours	Lecture	Lab	Prerequisite
CS116	Computing Fundamentals	3	3	-	-
CS1160	Computing Fundamentals Lab	1	-	3	Corequisite: CS116
ENE211	Electrical Circuits I	3	3	-	PHYS104
ENE213	Electrical Circuits Lab	1	-	3	ENE211
GERL201	German III	3	6	-	GERL102
GERL202	German IV	3	6	-	GERL201
IE121	Workshop	1	-	3	-
MATH99	Pre-Math ^a	0	3	-	-
MATH101	Calculus I	3	3	-	MATH99
MATH102	Calculus II	3	3	-	MATH101
MATH203	Applied Mathematics for	3	3	-	MATH102
	Engineers				
MATH205	Differential Equations	3	3	-	MATH102
ME111	Computer Aided Engineering Drawing	3	2	3	CS116, CS1160
PHYS103	Physics I	3	3	-	-
PHYS104	Physics II	3	3	-	PHYS103
PHYS106	General Physics Lab	1	-	3	PHYS103
					Corequisite:
					PHYS104
	Total	37	41	15	

Course		Credit	Contac	t Hours	
ID	Course Title	Hours	Lecture	Lab	Prerequisite
TME212	Statics	3	3	-	PHYS103, MATH102
TME213	Mechanics of Materials	3	3	-	TME212
TME214	Dynamics and Vibrations	3	3	-	TME212
TME221	Thermodynamics	3	3	-	MATH102
TME222	Fluid Mechanics	3	3	-	MATH205
TME323	Thermofluids Lab	1	-	3	TME222, ENE321
TME324	Power and Refrigeration Cycles	3	3	-	TME221
TME331	Theory of Machines	3	3	-	TME214, ME111, MATH203
TME332	Machine Design	4	3	3	TME213, IE325, ME111
TME351	Spare Parts and Storage	3	3	-	IE371
	Management				
TME391	Field Training	0	-	160 hr	Dept. Approval
TME491	International Internship	12	-	20	TME391, TME324, TME332,
				weeks	ENE321
TME515	Mechanical Vibrations	3	3	-	TME214, MATH205
TME520	Applied Thermal Systems Lab	1	-	3	TME324, ENE321
TME522	HVAC	3	3	-	ENE321, IME324
TME523	Internal Combustion Engines	3	3	-	TME324
TME552	Management of Maintenance Systems	3	3	-	TME351
TME538	Applied Machine Design	2	2	0	TME332
TME539	Computer-aided Design	1	0	3	Corequisite: TME538
TME553	Reliability and Quality Control	3	3	-	IE211
TME591	Graduation Project I	3	-	9	TME491, min 124 CH
TME592	Graduation Project II	3	-	9	TME591
IE211	Probability and Statistics	3	3	-	MATH102
IE223	Materials Science	3	3	-	IE121
IE224	Materials and Mechanics Lab	1	-	3	IE223, Corequisite: TME213
IE325	Manufacturing Processes	4	3	3	IE121, TME213
IE371	Engineering Economics	3	3	-	MATH205
ME344	Control Systems I	3	3	-	TME214, ENE211, MATH205
ME345	Vibration and Control Lab	1	-	3	ME344
ME346	Instrumentation and Measurements	2	2	-	ENE211, MATH205
ME347	Instrumentation and Measurements Lab	1	-	3	Corequisite: ME346
ME534	Electrical Machines and Control	3	3	-	ENE211
ME535	Electrical Machines and Control Lab	1	-	3	ME534
BM371	Numerical Methods for Engineers	3	2	3	CS116, MATH203, MATH205
ENE321	Heat Transfer	3	3	-	TME221, TME222, MATH205
GERL301	German V	3	9	-	GERL202
GERL302	German VI	3	9	-	GERL301
-	Total	103	87	48	

Program Requirements (115 credit hours) 3.1. Program Requirements (Compulsory): (103 credit hours)

3.2. Program Requirements (Electives^b): (12 credit hours)

A minimum of 12 credit hours of engineering coursework are required. This list is considered to be open for modifications on the base of the decision of the school council before registration.

		Credit	Contact Hours		
Course ID	Course Title	Hours	Lecture	Lab	Prerequisite
TME512	Finite Element Method	3	3	-	TME332
TME513	Multi-Body Dynamics	3	3	-	TME331
TME514	Machine Dynamics	3	3	-	TME331
TME525	Advanced Heat Transfer	3	3	-	ENE321
TME527	Turbomachinery	3	3	-	TME222
TME529	Renewable Energy	3	3	-	TME324
TME537	Reverse Engineering	3	3	-	TME332
TME5422	Automotive Maintenance	3	3	-	TME332
TME545	Aircraft Maintenance	3	3	-	TME332
TME546	Building Maintenance	3	3	-	TME324
TME551	Safety and Loss prevention	3	3	-	IE325
TME554	Logistics Engineering	3	3	-	TME351
TME555	Maintenance Costing	3	3	-	TME351
TME557	Modern Maintenance Management Systems	3	3	-	TME351
TME596	Special Topics I	1	1	-	Dept. Approval
TME597	Special Topics II	2	2	-	Dept. Approval
TME598	Special Topics in Mechanical Engineering	3	3	-	Dept. Approval
TME599	Special Topics in Maintenance Engineering	3	3	-	Dept. Approval
MGT52	Project Management	3	3	-	IE371
IE541	Industrial Automation	4	3	3	ME344
IE585	Human Resource Management	3	3	-	IE371
ME522	Hydraulics and Pneumatics	3	2	3	TME222
ME548	Control Systems II	3	3	-	ME344
ME551	Robotics	3	3	-	ME344, TME331
ME582	Micro-Electromechanical Systems	3	3	-	ENE211, TME213, TME222
ENE432	Power Plants Engineering	3	3	-	TME222, ENE321
ENE537	Energy Efficiency, management and laws	3	3	-	Corequisite: TME522, TME523

^b TME491 International Internship is prerequisite for all elective courses

V. Study Plan^c Guide for the Bachelor Degree in Mechanical and Maintenance Engineering

First Year				
	First Semester	•		
Course ID	Course Title	Cr.	Prerequisites	Corequisite
		Hr.		
ARB100	Arabic	3	ARB099	-
CS116	Computing Fundamentals	3	-	-
CS1160	Computing Fundamentals Lab	1	-	CS116
ENGL101	English III	1	ENGL099	-
GERL101	German I	3	-	-
IE121	Engineering Workshop	1	-	-
MATH101	Calculus I	3	-	-
PHYS103	Physics I	3	-	-
	Total	18		

First Year				
	Second Semeste	er		
Course ID	Course Title	Cr.	Prerequisites	Corequisite
		Hr.		
ME111	Computer Aided Engineering Drawing	3	CS116,CS1160	-
ME1110	Computer Aided Engineering Drawing Lab	0	-	ME111
ENGL102	English IV	1	ENGL 101	-
GERL102	German II	3	GERL101	-
MATH102	Calculus II	3	MATH101	-
NE101	National Education	3	-	-
MILS100	Military Science	3	-	-
PHYS104	Physics II	3	PHYS103	-
PHYS106	General Physics Lab	1	-	PHYS104
	Total	20		

^c The following study plan guide assumes having passed all placement tests

Second Year				
	First Semest	er		
Course ID	Course Title	Cr.	Prerequisites	Corequisite
		Hr.		
TME212	Statics	3	MATH102,	-
			PHYS103	
TME221	Thermodynamics	3	MATH102	-
IE223	Material Science	3	IE121	-
ENGL201	English V	2	ENGL102	-
GERL201	German III	3	GERL102	-
MATH203	Applied Mathematics for Engineers	3	MATH102	-
MATH205	Differential Equations	3	MATH102	-
	Tota	20		

Second Year				
	Second Semeste	er		
Course ID	Course Title	Corequisite		
		Hr.		
TME213	Mechanics of Materials	3	TME 212	-
TME214	Dynamics and Vibration	3	TME 212	-
TME222	Fluid Mechanics	3	MATH205	-
IE224	Material Science and Mechanics Lab	1	IE223	TME213
ENE211	Electrical Circuits I	3	PHYS106	-
ENGL202	English VI	2	ENGL201	-
GERL202	German IV	3	GERL 201	-
	Total	10		

Total 18

Third Year					
	First Semester				
Course ID	Course Title	Cr.	Prerequisites	Corequisite	
		Hr.			
ENE321	Heat Transfer	3	TME221,	-	
			TME222		
			MATH205		
TME324	Power and Refrigeration Cycles	3	TME221	-	
TME331	Theory of Machines	3	TME214,	-	
			ME111,		
			MATH203,		
BM371	Numerical Methods for Engineers	3	CS116,	-	
			MATH203,		
			MATH205		
BM3710	Numerical Methods for Engineers Lab	0	-	BM371	
IE325	Manufacturing Processes	4	IE121, TME213	-	
IE3250	Manufacturing Processes Lab	0	-	IE325	
GERL301	German V	3	GERL202	-	
ENE213	Electrical Circuits Lab	1	-	ENE211	
	Total 20				

	Third Year				
	Second Semeste	er			
Course ID	Course Title	Cr.	Prerequisites	Corequisite	
		Hr.			
TME323	Thermofluids Lab	1	TME222,	-	
			ENE321		
TME332	Machine Design	4	TME213, IE325,	-	
			ME111		
TME3320	Machine Design Lab	0	-	TME332	
TME391	Field Training	0	Dept. approval	-	
IE211	Probability and Statistics	3	MATH102	-	
IE371	Engineering Economics	3	MATH205	-	
ME344	Control Systems I	3	TME214,	-	
			ENE211,		
			MATH205		
ME346	Instrumentation and Measurements	2	ENE211,	-	
			MATH205		
GERL302	German VI	3	GERL301	-	
	Total	19			

Fourth Year ^d				
First Semester				
Course ID	Course Title	Cr.	Prerequisites	Corequisite
		Hr.		
-	Technical Elective	3	-	-
-	Technical Elective	3	-	-
-	Technical Elective	3	-	-
-	Technical Elective	3	-	-
	Total	12		

Fourth Year*				
Second Semester				
Course ID	Course Title	Cr.	Prerequisites	Corequisite
		Hr.		
TME491	International Internship	12	TME391	-
	Total	12		

German year prerequisites

- A minimum GPA of 60.0%
- Successful completion of 90 credit hours excluding all German language courses
- Passing GERL302 German VI, ENGL201 English VI, and ARB099 Arabic 99
- Passing the following four courses:
 - TME324 Power and Refrigeration Cycles
 - TME331 Theory of Machines
 - TME332 Machine Design
 - ENE321 Heat Transfer

^d Courses attended and/or passed during International Training are not transferable

Fifth Year					
	First Semester				
Course ID	Course Title	Cr.	Prerequisites	Corequisite	
		Hr.			
TME351	Spare Parts and Storage Management	3	IE371	-	
TME515	Mechanical Vibrations	3	TME214,	-	
			MATH205		
TME522	HVAC	3	TME324,	-	
			ENE321		
TME553	Reliability and Quality Control	3	IE211	-	
TME591	Graduation Project I	3	TME491	-	
ME534	Electrical Machines and Control	3	ENE211	-	
ME345	Vibration and Control Lab	1	ME344	-	
ME347	Instrumentation and Measurements Lab	1	-	ME346	
	Total	20			

Fifth Year					
Second Semester					
Course ID	se ID Course Title		Prerequisites	Corequisite	
		Hr.			
TME523	Internal Combustion Engines	3	TME324	-	
TME520	Applied Thermal Systems Lab		TME324,	-	
			ENE321		
TME552	Management of Maintenance Systems	3	TME351	-	
TME538	Applied Machine Design	2	TME332	-	
TME539	Computer-aided Design	1	-	TME538	
TME592	Graduation Project II	3	TME591	-	
ME535	Electrical Machines and Control Lab	1	ME534	-	
-	University Elective	3	-	-	
-	University Elective	3	-	-	
	Total	20			

VI. Course Identification Convention

Example: TME321

Program: TME is the code of Mechanical and Maintenance EngineeringLevel: The first number (3) represents the level of the course in the study planField: The second number (2) represents the group number of the courseSequence: The third number (1) represents a unique serial number of the course in its group

Groups

		Course ID	Course Title
		TME212	Statics
Group 1:		TME213	Mechanics of Materials
	ed	TME214	Dynamics and Vibrations
	pplie	TME512	Finite Element Method
	Ap Med	TME513	Multi-Body Dynamics
	_	TME514	Machine Dynamics
		TME515	Mechanical Vibrations
		TME221	Thermodynamics
		TME222	Fluid Mechanics
	Sa	TME323	Thermofluids Lab
	ence	TME324	Power and Refrigeration Cycles
rb 7	Scie	TME520	Applied Thermal Systems Lab
irou	nal	TME522	HVAC
0	Jerr	TME523	Internal Combustion Engines
	È	TME525	Advanced Heat Transfer
		TME527	Turbomachinery
		TME529	Renewable Energy
	18	TME331	Theory of Machines
33:	nica gn	TME332	Machine Design
ino.	cha	TME537	Reverse Engineering
ษั	D Me	TME538	Applied Machine Design
		TME539	Computer-aided Design
		1	
p 4:	ied ite- ce	TME542	Automotive Maintenance
rou	ppl 1air 1an	TME545	Aircraft Maintenance
Ū	₹2-	TME546	Building Maintenance
p 5:		TME351	Spare Parts and Storage Management
	nance ement	IME551	Safety and Loss prevention
		TME552	Management of Maintenance Systems
rou	nte Jag(TME553	Reliability and Quality Control
Ū	Mai Mar	TME554	Logistics Engineering
	~ ~	TME555	Maintenance Costing
		TME557	Modern Maintenance Management Systems

		Course ID	Course Title
		TME391	Field Training
Group 9:	cial	TME491	International Internship
	Spe	TME591	Graduation Project I
	nd	TME592	Graduation Project II
	ctical a Top	TME596	Special Topics I
		TME597	Special Topics II
	Pra	TME598	Special Topics In Mechanical Engineering
	—	TME599	Special Topics In Maintenance Engineering

VII. Description of Courses offered by the Mechanical and Maintenance Engineering Department

TME212: Statics

Vector mechanics of forces and moments, free-body diagrams, couples, resultants, equilibrium of particles and rigid bodies in two and three dimensions, forces in trusses, frames, and machines, centroids, centers of mass, distributed forces, internal shear forces and bending moments in beams, shear force and bending moment diagrams, friction, area of moments of inertia.

Prerequisites: MATH102, PHYS103

TME213: Mechanics of Materials

TME214: Dynamics and Vibration

Normal and shear stress and strain, deflection of axially loaded members, thermal stress, torsion of bars with circular sections, shear stress, angle of twist, power transmission, bending of beams, bending and shear stress, combined loadings, beam deflection, column buckling.

Kinematics and kinematics of particles, Newton's laws, planar kinematics and kinetics of a rigid

Prerequisites: TME212

bodies, free vibration of single degree of freedom systems, harmonic excitation, general force

Prerequisites: TME212

TME221: Thermodynamics

Prerequisites: MATH102

TME222: Fluid Mechanics

Physical properties of fluids and fundamental concepts in fluid mechanics, hydrostatics, conservation laws for mass, momentum and energy, flow similarity and dimensional analysis as applied to engineering problems in fluid mechanics, laminar and turbulent flow, engineering applications such as flow measurement flow in pipes and fluid forces on moving bodies.

Prerequisites: MATH205

TME314: Mechanical Vibrations

Mathematical techniques for linear system vibrations, review of vibrations of single-degree-offreedom systems, vibrations of multi-degree-of-freedom systems, small oscillation theory, free vibration eigenvalue problem, undamped system response, viscously damped systems, vibrations of continuous systems, modes of vibration of strings, bars, and beams.

Prerequisites: TME214, MATH205

response.

Introduction to thermodynamics concepts, properties of pure substances, first law of thermodynamics: analysis of closed systems, analysis of open systems under steady and unsteady conditions, second law of thermodynamics, entropy.

3 Cr (3,0)

TME323: Thermofluids Lab

TME324: Power and Refrigeration Cycles

Measurement of thermal conductivity, forced convection heat transfer, measurement of specific heat ratio, flow through nozzles, losses in pipes and fittings, hydrostatic pressure, impact of water jet, flow visualizations, performance of hydraulic positive displacement pumps.

Prerequisites: TME222, ENE321

Exergy, gas power cycles, vapor and combined power cycles, refrigeration cycles, gas mixtures, gasvapor mixtures & air conditioning, thermodynamic relations.

Prerequisites: TME221

Position analysis, mechanisms, vector analysis of velocity and acceleration, analytic and graphical loop closure methods, cam design, spur, bevel, and helical gears, gear trains, force analysis, static and dynamic balance of rotors, synthesis of linkage, spatial mechanisms.

Prerequisites: TME214, ME111, MATH203

TME332: Machine Design

TME331: Theory of Machines

Introduction to design process, design considerations, stress analysis and deflection of mechanical elements, energy methods, static strength and failure theories, fatigue strength and failure theories, shafts, nonpermanent joints, mechanical springs, and rolling bearings, CAD software, stress analysis using FEM codes, kinematics simulations, surface generation, 3D printing.

Prerequisites: TME213, IE325, ME111

Forecasting of spare parts needed for equipment maintenance, inventory control models, safety stock and inventory costs, master production schedule and its effect on maintenance operations, spare parts requirement planning.

TME391: Field Training	0 Cr (0,0)
160 hours of training at a company in Jordan.	
	Prerequisites: -
TME491: International Internship	12 Cr (0,0)

Twenty-weeks of internship at a company in Germany.

TME351: Spare Parts and Storage Management

Prerequisites: TME324, TME332, TME391

TME512: Finite Element Method

Definitions and simple finite element formulation truss, beam and triangular elements, modeling principles and mesh specification, computer applications and term project.

Prerequisites: TME332

1 Cr (0,3)

3 Cr (3,0)

4 Cr (3,3)

3 Cr (3,0)

0)

Prerequisites: IE371

3 Cr (3,0)

TME513: Multi-Body Dynamics

Principles of kinematics and dynamics in spatial motion, constraint equations describing various types of spatial kinematic joints, algorithms for automatic generation of the constraint equations, techniques for automatic generation of the spatial equations of motion.

Prerequisites: TME331

TME514: Machine Dynamics

TME515: Mechanical Vibrations

Force analysis of machinery, resonance (symptoms, tests, fixes), rotors dynamics, dynamic balance of machinery, analytical determination of unbalance, dynamic behavior of drives and machine frames as complex systems, typical dynamic effects, such as the gyroscopic effect, damping and absorption, shocks.

Prerequisites: TME331

Fundamentals of vibration, free and force vibration of (undamped/damped) single degree of freedom systems. Vibration under general forcing conditions. Free and force vibration of (undamped/damped) two degree of freedom systems. Free and force vibration of (undamped/damped) multi-degree of freedom systems. Determination of natural frequencies and mode shapes.

Prerequisites: TME214, MATH205

Psychrometric principles, thermal comfort, air conditioning processes, inside and outside design conditions, heating load calculations, infiltration, cooling load calculations, solar gain, design of

Prerequisites: TME324, ENE321

TME523: Internal Combustion Engines

TME520: Applied Thermal Systems Lab

Engine classifications and terminology, engine operating characteristics and performance parameters, air standard engine cycles including: Otto, Diesel, Dual and two-stroke cycles, common fuels used in IC engines, combustion reactions and thermochemical calculations, engine emissions and their control, air and fuel induction methods, heat transfer in engines, friction losses, lubricants and lubrication systems.

Experimental analysis and maintenance of pumps, chillers, heat pumps, compressors, evaporators, condensers, expansion devices, cooling towers, boilers and furnaces, design and integration of

Prerequisites: TME324

Prerequisites: TME324, ENE321

TME525: Advanced Heat Transfer

thermal systems.

Multi-dimensional steady state conduction, analytical, graphical and numerical solutions, onedimensional transient conduction, convective heat transfer in turbulent and high speed flows, freezing, melting, heat pipe and multimode heat transfer.

Prerequisites: ENE321

TME522: HVAC

heating and air conditioning systems, HVAC equipment and components.

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

1 Cr (0,3)

TME527: Turbomachinery

TME537: Reverse Engineering

TME538: Applied Machine Design

aircraft industries.

Impulse and reaction turbines, velocity diagrams, energy equations and degree of reaction, total pressure correlation, turbine design, three dimensional analysis, free vortex design, estimation of stage and design point performance.

Prerequisites: TME222

TME529: Renewable Energy 3 Cr (3,0) Design and analysis of renewable energy systems and technologies including: solar thermal, solar Photovoltaics, wind energy, geothermal energy, biomass, hydropower, fuel cells.

Prerequisites: TME324

3 Cr (3,0)

Prerequisites: TME332

Lubrication and journal bearings, gears (general), spur gears, helical gears, bevel gears, belts, flexible drives and flywheels, brakes and clutches.

Prerequisites: TME332

TME539: Computer-aided Design

Simulation and animation of mechanical problems, optimal synthesis and selection of machine elements, implementation of CAD-Package for visualization.

Corequisites: TME538

TME5422: Automotive Maintenance

TME545: Aircraft Maintenance

Maintenance of automotive systems: automatic transmission and transaxles, power train and axles, suspension and steering, brakes, electrical/electronic systems, cooling system, heating and air conditioning, control system, and engine performance.

Prerequisites: TME332

Aircraft physics, aerodynamics, tools and techniques, hardware and materials, fluid lines and fittings, basic electricity, blueprints and drawings, weight and balance, maintenance standards and documentation, aircraft inspection.

Prerequisites: TME332

3 Cr (3,0)

Introduction to reverse engineering, methodologies and techniques for reverse engineering, selecting a reverse engineering system, introduction to rapid prototyping, applications in the automotive and

2 Cr (2,0)

1 Cr (0,3)

3 Cr (3,0)

TME546: Building Maintenance

TME551: Safety and Loss Prevention

TME552: Management of Maintenance Systems

Building systems overview, building scoping for operational improvement, O&M practices for sustainable buildings, indoor environmental quality, preventive maintenance and troubleshooting principles, HVAC systems maintenance, facility electrical systems maintenance, efficient lighting fundamentals, maintenance of motors and drives.

Study of safety elements and hazards associated with different types of machines and work environment, accident recognition and elimination, OSHA standards of maintenance operations, designing and managing of safety operations procedures and guidelines of maintenance, types of

Reliability, maintainability, availability, and safety of products and systems, building and analyzing reliability models using block diagrams, Fault Tree Analysis (FTA), and Failure Mode and Effect Analysis (FMEA), concepts and methods of maintenance planning and management with a focus on

Prerequisites: TME324

Prerequisites: IE325

corrective and preventive maintenance, cost estimation and scheduling of maintenance activities.

Prerequisites: TME351

Prerequisites: IE211

TME554: Logistics Engineering

Requirements analysis, systems definition, alternatives analysis and systems verification Logistics in the system life-cycle phases, supportability analysis, logistics measures, system life-cycle costing, integrated logistics systems of people, processes and technology.

Prerequisites: TME351

and outsourcing, maintenance costing reports and budgeting activities, financial statements, traditional costing, activity-based costing, fundamental pricing issues and price setting.

TME557: Modern Maintenance Management Systems

Introduction to computerized maintenance management systems, practical applications and case studies.

Prerequisites: TME351

Elements of maintenance costs including material, spare parts, labor (direct and indirect), overhead,

Prerequisites: TME351

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

improvement. Introduction to statistically based quality control and improvement methods.

TME553: Reliability and Quality Control

TME555: Maintenance Costing

losses in production lines and the role of maintenance to reduce it.

Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerated life testing, reliability

3 Cr (3,0)

3 Cr (3,0)

TME591: Graduation Project I	3 Cr (0,9)
The first part of a team-based one-year senior design project in the field maintenance engineering.	d of mechanical and
	Prerequisites: TME 491
TME592: Graduation Project II	3 Cr (0,9)
The second and final part of a team-based one-year senior design proje and maintenance engineering.	ct in the field of mechanical
	Prerequisites: TME 591
TME596: Special Topics I	1 Cr (0,3)
A course on a special topic in mechanical engineering.	
	Prerequisites: Dept. Approval
TME597: Special Topics II	2 Cr (2,0)
A course on a special topic in mechanical engineering.	
	Prerequisites: Dept. Approval
TME598: Special Topics In Mechanical Engineering	3 Cr (3,0)
A course on a special topic in mechanical engineering.	
	Prerequisites: Dept. Approval
TME599: Special Topics In Maintenance Engineering	3 Cr (3,0)
A course on a special topic in maintenance engineering.	

Prerequisites: Dept. Approval

Description of Courses offered by other Departments VIII.

IE121 Engineering Workshop

IE211: Probability and Statistics

IE223: Material Science

General safety, materials and their classifications, measuring devices and their accuracy, basic household plumbing and electricity, fits and tolerances, theoretical background for the practical exercises including fitting, forging, carpentry, casting, welding, mechanical saws, shearers, drills, lathes, milling machines, shapers and grinders.

Prerequisites: -

This course familiarizes students with descriptive statistics, probability basics, random variables, special discrete random variables, and various distributions: normal, Student's t, Chi-square, and Fisher's F. It includes a discussion of inference about one mean, one proportion, difference between two means and difference between two proportions and the ratio of two variances, large and small samples, paired and independent samples. The MINITAB statistical software package will be used; there will also be an introduction to the use of SPSS.

Classification and study of engineering materials, their structure, properties, and behavior, typical metals and alloys, plastics and rubber, and ceramic materials; phase equilibrium and manipulation of properties and behavior by adjustment of composition and processing variables; responses of engineering materials to stress and environmental variables, mechanical properties.

Prerequisites: IE121

Prerequisites: MATH102

IE224: Material and Mechanics Lab

Studying the properties of engineering materials and the relationship between these properties and atomic structure, cross-sectional sample preparation, optical microscopy, heat treatment, corrosion behavior, tensile and compression strength, hardness testing, impact testing, creep behavior, and fatigue behavior.

> Prerequisites: IE223 Corequisite: TME213

IE325: Manufacturing Processes

Traditional manufacturing processing of materials (ferrous and non-ferrous) including metal cutting, casting, rolling, forging, and drawing. Modern manufacturing processes and related topics including ceramics, composites, powder metallurgy, property enhancing and surface processing operations, and rapid prototyping. Manufacturing Processes Lab: Experiments in casting, forming, machining, welding, heat treatment and plastic manufacturing.

Prerequisites: IE121, TME213

IE371: Engineering Economics

Time value of money, interest formula, depreciation models, tax effects, rate of return, cash flow, project evaluation methods, replacement analysis, break even analysis, economic studies for decision making under risk.

Prerequisites: MATH205

3 Cr (3,0)

3 Cr (3,0)

4 Cr (3,3)

1 Cr (0,3)

3 Cr (0,0)

1 Cr (0,3)

IE541: Industrial Automation

Manufacturing automation strategies. Sensors, controllers, and actuators. Signal converters (A/D and D/A) and data acquisition systems. PLC and CNC. Industrial robots in automation. Automated material handling systems.

Prerequisites: ME344

IE585: Human Resource Management

ME111: Computer Aided Engineering Drawing

Hiring, training, and developing, and retaining employees. Employee benefits, health, safety and security; employee and labor relations. Employee rights, privacy and security, compensation, and performance evaluation. The roles of personnel departments, organizational strategic planners, and line supervisors are considered.

Prerequisites: IE371

The use of computer aided software in drawing such as AutoCAD. Geometric construction. Orthographic and Isometric projections; Sketching, sectioning, dimensioning and layering. Model layout (wire-frame, surface, and solid modeling), plotting to scale, blocks and attributes, Introduction to descriptive geometry, perspective drawing. Engineering applications.

Prerequisites: CS116, CS1160

ME344: Control Systems I

Modeling of dynamic systems, linearization of nonlinear systems, transient response, transfer function, block diagrams, steady state error and stability, root locus, PID control, lead, lag, and leadlag control, Bode plots, and Nyquist stability criterion.

Prerequisites: TME214, ENE211, MATH205

ME345: Vibration and Control Lab

Free vibration of simple mass-spring systems, free damped response of simple mass-spring-damper systems, static and dynamic balancing, harmonically excited systems, frequency response of the harmonically excited systems, frequency response with base excitation, introduction to Control, massspring-damper system simulation, PID Controllers, simple and inverted pendulum control, fluid level and temperature control, servo systems, and twin rotor control.

Prerequisites: ME344

ME346: Instrumentation and Measurements

Introduction to instrumentation; Units, Dimensions and standards; Error measurements; Statistical analysis of experimental data; Op-Amp circuits in instrumentation; Basic electrical measurement and sensing devices: physics of electric, magnetic, chemical sensors displacements, area, pressure, flow, temperature, thermal and transport properties, force, torque and strain measurements. Smart sensors and networking of sensor systems. Data acquisition and processing.

Prerequisites: ENE211, MATH205

4 Cr (3,3)

3 Cr (3,0)

3 Cr (2,3)

1 Cr (0,3)

3 Cr (3,0)

2 Cr (2,0)

ME347: Instrumentation and Measurements Lab

Measurements with different micrometers & vernier measuring instruments, angular measurements, tool maker's microscope, optical projectors, surface measurements. Analysis of experimental data and error estimation. Basic electrical measurement and sensing devices: physics of electric, magnetic, chemical sensors. Displacement, area, pressure, flow, temperature, thermal and transport properties, force, torque, and strain measurements. Smart sensors and networking of sensor systems. Data acquisition and processing.

Harmonic oscillator, mechanical and electromagnetic oscillations, forced oscillations, resonance, coupled oscillators, electromagnetic waves, traveling waves, standing waves, interference and

Corequisite: ME346

Prerequisites: TME214

pumps, piping system basic circuits in pneumatics and hydraulics, design and simulation of pneumatic and hydraulic circuits, servo pneumatics and servo hydraulics, basics of servo drives, assembling, measuring techniques. Prerequisites: ME223 or TME222

Pneumatic and hydraulic components; compressor, cooler, compressed-air containers, filters, valves,

Fundamentals of energy, single and three phase AC systems, power quality, magnetic circuits,

Single and three phase transformers (open and short tests), single and three phase induction motors (open and locked rotor tests), three phase synchronous motor and generator, DC motors and generators (shunt, series, separately excited connections), motor control using PLC.

Prerequisites: ME534

State-space modeling of multi-variable systems, stability, sensitivity, controllability, and observability, optimal observers, Kalman filter, linear quadratic regulators, digital control systems, z-transform,

stability, transient response, digital cascade compensators.

Prerequisites: ME344

ME551: Robotics

ME548: Control Systems II

Planar and spatial transformations, forward and inverse kinematics, trajectory planning, robot dynamics, robot control (linear, nonlinear, and force control).

Prerequisites: ME344, TME331

ME534: Electrical Machines and Control

ME535: Electrical Machines and Control Lab

diffraction of waves, dispersion of waves.

ME522: Hydraulics and Pneumatics

ME516: Waves and Vibrations

transformers, single and three phase induction motors, power electronics, synchronous machines, DC machines, control drives and circuits, building electrical systems, and programmable logic controllers (PLCs).

Prerequisites: ENE211

1 Cr (0,3)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

1 Cr (0,3)

4 Cr (3,3)

ME582: Micro Electromechanical Systems

Introduction to micromachining processes; mechanical properties of materials used in micromechanical systems; design and fabrication of free standing structures; sacrificial and structural layers; finite element modeling; micromechanical components; solid lubrication of microbearings; special techniques: double-side lithography, anodic bonding, electro-chemical drilling, deep etching, LIGA process, laser microfabrication; influence of IC fabrication processes on the mechanical properties; applications in microdevices; simulation and packaging.

Prerequisites: ME223, ENE211, TME213

Description of Courses offered by other Schools IX.

BM371: Numerical Methods for Engineers

Fundamentals of error analysis, numerical solutions of linear and nonlinear equations, numerical solution of system of equations, curve fitting, numerical integration and differentiation, numerical solution of ordinary differential equations. Application of numerical methods using relevant software packages.

Prerequisites: CS116, MATH203, MATH205

CS116: Computing Fundamentals

Basic computer skill; Programming concepts; algorithms: data types, arithmetic, logical, relational, Boolean, and assignment operators, simple input and output statements; programming control structures; data structures: single and multidimensional arrays; character strings; functions; pointers; file structures and representation.

CS1160: Computing Fundamentals

3-hours lab session every week to enhance hands-on experience on topics that are theoretically covered in the Computing Fundamentals course using Gnu C compiler on a Solaris/Sun environment. Corequisites: CS116

ENE211: Electrical Circuits I

The course Introduces the students to the basic concept of circuit and devices. And to the concepts of design to all kind of electrical circuits, such as DC and AC electric circuits. It Reinforce in the student a systematic approach to problem solving. The ability to involve in a team work. The concept and link between the theory and practical of electric circuits. Reinforce the communication skills, written and oral.

Prerequisites: PHYS104

ENE213: Electrical Circuits Lab

Resistive circuits, Potentiometers, Superposition, Thevenin's theorem and maximum power transfer, RLC current and voltage characteristics, Frequency response of RL, RC and RLC circuits, Series and parallel resonant circuits, Amplifiers.

Prerequisites: ENE211

Prerequisites: -

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

1 Cr (0,3)

ENE321: Heat Transfer

Basic concepts, heat conduction equation, steady heat conduction, forced convection: external and internal flow, free convection, heat exchangers, radiation heat transfer.

Prerequisites: TME221, TME222, MATH205

ENE432: Power Plants Engineering

This course will be divided in two parts: Power cycle review, thermal power plant and power market. Power cycle review covers: Vapor-cycles, gas turbine-cycles, and combined-cycles. Thermal power plant covers: components, selection and economics for Steam and gas turbine power plants which include: steam generators, condenser and condensate, feed-water heating systems which covers Fuel management and boiler automatic control systems, turbine plant, generator plant, turbine and generator control and protection systems, cooling water systems, steam and water cycle, power plant thermal performance and efficiency losses. power market covers: Alternative power generation technologies, electricity and gas networks and markets, climate change and energy markets.

Prerequisites: TME222, ENE321

ENE537: Energy Efficiency, management and laws

Energy management principles; energy conservation; energy auditing; analysis; formulation of energy management options; economic evaluation, implementation & control; energy conservation techniques – conservation in energy intensive industries; integrated resource planning; demand-side management; cogeneration; total energy schemes; thermal insulation; energy storage; economic evaluation of conservation technologies; analysis of typical applications. Energy law and regulation in Jordan and worldwide.

Corequisites: TME522, TME523

MATH099: Pre-Math

Real numbers and their properties, solutions of equations and inequalities, functions, domain of functions, operations on functions, polynomials, zeros of polynomials, power, exponential, logistic, logarithmic, and trigonometric functions and their graphs, applications of trigonometry, analytic geometry: lines, circles and parabolas.

MATH102: Calculus II

This is a course in multivariate calculus as a continuation of Calculus I. The course focuses on power series, polar coordinates and polar functions, sequences and infinite series, vectors, functions of several variables and their limits, partial differentiation and their applications. The course views multiple integrals: double and triple, line integrals, surface integrals, Green's theorem, Gauss's divergence theorem, and Stoke's theorem.

Prerequisites: MATH101

MATH203: Applied Mathematics for Engineers

Vector analysis in Cartesian coordinates. General Curvilinear Coordinates, Vector calculus in general curvilinear coordinates with emphasis on Spherical and Cylindrical coordinates, transformations between different coordinate systems, vector differentiation. Matrices and linear equations; Matrices and Linear Operators; Determinants, Eigenvalues and eigenvectors. Complex Numbers and Complex Variables; Representation of complex numbers, Powers and roots of complex numbers, Functions of a complex variable. Review of Infinite Series; Infinite series of constant terms, Convergence tests, Power series and radius of convergence, Taylor, and Maclaurin series and Fourier series.

3 Cr (3,0)

0 Cr (3,0)

Prerequisites:-

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

MATH205: Differential Equations

MGT525: Project Management

Ordinary differential equations; Sturm-Liouville theory, properties of Special Functions, Solution methods including Laplace transform, and Fourier transform. Eigenvalue problems and expansions in orthogonal functions. Partial differential equation: classification, separation of variables, solution by series and transform methods. Models in Applied Mathematics; Applications to illustrate typical problems and methods of applied mathematics in solid and fluid mechanics, fields of physics, deformation and vibration, wave phenomena, diffusion phenomena, heat conduction, chemical and nuclear reactors, and biological processes.

Prerequisites: MATH102

Introduction to project management (project definition, project life cycle), project initiation (project selection, project manager, project-organization relationship), project planning (project costing, task scheduling, resource allocation, risk management), and project execution (controlling, auditing, terminating).

Physics and measurement. Motion in one dimension. Vectors. Motion in two dimensions. Force and motion. Kinetic energy and work. Potential energy and conservation of energy. Linear momentum and collisions. Rotation. Rolling and angular momentum.

Prerequisites: -

Prerequisites: IE371

Electric Fields. Gauss's Law. Electric Potential. Capacitance and Dielectrics. Current and Resistance. Direct Current Circuits. Magnetic Fields. Sources of Magnetic Field. Faraday's Law.

PHYS106: General Physics Lab 1 Cr (0,3) Laboratory exercises that apply physical principles introduced in Physics I and Physics II courses. The lab includes the use of data logging techniques, observations, and scientific reasoning in practical situations.

> Prerequisites: PHYS103 Corequisites: PHYS104

ARB099: Arabic 99

This course aims to develop student's ability to read, comprehend, literary analyze, grammatically analyze, linguistically analyze, poetically analyze, and rhetorically analyze texts properly. The course also includes a selection of Arabic literature in poetry and prose representing different literary ages, in addition to several common forms of writing such as: scientific article, news article, and others.

Prerequisites: -

3 Cr (3,0)

ARB100: Arabic

This course aims to improve the student's competence in the various linguistic skills in terms of: reading, comprehension, and taste. This is achieved through the study of selected texts with many implications that raise issues in spelling, grammar, composition, meaning, and inference, and the use of an old and modern thesaurus.

Prerequisites: ARB099

PHYS104: Physics II

PHYS103: Physics I

Prerequisites: PHYS103

0 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

ENGL098: English I

Students will focus on English at an elementary level concentrating on the receptive skills of reading and listening, and the productive skills of writing and speaking. These will include such things as independent clauses, verb tenses, model verbs, adverbs, short dialogues, reading simple material and answering short questions, writing short meaningful sentences, listening to short conversations.

Prerequisites: -

ENGL099: English II

Students will focus on English at a pre-intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. These will include such things as comparatives and superlatives, possessive adjectives and pronouns, vocabulary building, role play activities for speaking, reading comprehension and writing short descriptive paragraphs.

Prerequisites: ENGL098

ENGL101: English III

Students will focus on English at an intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. These will include collocations, tense review, affirmative, negative statements, synonyms and antonyms, time clauses, conditionals, active and passive forms, reported speech, phrasal verbs, reading comprehension with detailed questions, vocabulary and writing developed descriptive and opinion essays.

Prerequisites: ENGL099

ENGL102: English IV

Students will focus on English at an upper-intermediate level concentrating on the receptive skills of reading and listening and the productive skills of writing and speaking. Model verb review, silent letters and proper pronunciation, jobs and careers, requests and offers, more phrasal verbs with vocabulary building, relative clauses and relative pronouns, narrative tenses for writing exercises, wishes and regrets, reading and comprehending longer passages with direct and inference questions of medium difficulty, hypothesizing, and writing fully developed descriptive, argumentative and analytical essays of 350 words.

Prerequisites: ENGL101

ENGL201: English V

Students will focus on English at an Advanced level. Students will analyze and produce 2 – 3 page essays with an emphasis on argumentation and persuasion working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Class activities include interactive lectures, small group and class discussions, informal debates, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using basic literary terms and concepts.

Prerequisites: ENGL102

0 Cr (3,0)

1 Cr (3,0)

0 Cr (3,0)

1 Cr (3,0)

28

ENGL202: English VI

Students will continue to focus on English at an Advanced level. Students will analyze and produce 4 – 5 page essays emphasizing argumentative, persuasive and discursive styles of writing, working both independently and cooperatively to gather, evaluate, and synthesize necessary information. Students will integrate the practice of critical thinking and reading into the writing process. Class activities include interactive lectures, small group and class discussions, informal debates, mini-conferences, peer feedback, individual presentations, focused listening exercises and focused viewing exercises as well as assorted reading, writing, and grammar assignments. There will be some poetry analysis together with reading and understanding a short story and a drama using stronger and more intensive literary terms and concepts than in 201.

Prerequisites: ENGL201

Can understand and use familiar, everyday expressions and very simple sentences, which aim at the satisfaction of specific needs. Can introduce oneself, and others, and ask others questions to themselves - e.g. where they live, which people they know or what kind of things they have - and can give answers on questions of this kind. Can communicate on a basic level if those involved with him/ her in a conversation speak slowly and clearly and are willing to help.

Prerequisites: -

GERL102: German II

GERL101: German I

Can understand sentences and frequently used expressions if those are connected with things of immediate meaning (e.g. information to the person and to the family, buying, work, closer environment). Can communicate in simple, routine situations, with the purpose of a simple and direct exchange of information about familiar and common things. Can describe with simple means their own origin and training, direct environment and things that are in connection with direct needs.

Prerequisites: GERL101

GERL201: German III

Can understand the main points if no dialect is used and if it concerns familiar things about work, school, spare time etc. Can master most situations which one encounters on journeys in a German speaking area. Can express oneself simply and coherently about familiar topics and areas of personal interest. Can report experiences and events, describe dreams, hopes and goals and give short reasons or explanations about plans and opinions.

Prerequisites: GERL102

GERL202: German IV

Can understand the main contents of complex texts, as well as concrete and abstract topics; even discussions between specialists in his/ her own special field. Can communicate spontaneously and fluidly a normal discussion with native speakers, without larger effort on both sides. Can express oneself clearly and in detail in a broad spectrum of topics, describe a point of view to a current question and indicate the pro and cons of different possibilities.

Prerequisites: GERL201

3 Cr (9,0)

3 Cr (6,0)

3 Cr (6,0)

3 Cr (9,0)

GERL301: German V

Can understand and also seize implicit meanings of a broad spectrum of demanding, longer texts. Can express oneself spontaneously and fluidly, recognizing words without having to search for words frequently. Can use the language effectively and flexibly in social and vocational life or in training and study. Can express oneself clearly, structured and detailed, to complex subjects and use appropriate different means for linkage of texts.

Prerequisites: GERL202

IC101: Intercultural Communication

This course is designed to provide prospective students (whose majors have an international flavor) with tools that offer powerful possibilities for improving the communication process. We will examine the process of sending and receiving messages between people whose cultural background could lead them to interpret verbal and nonverbal signs differently. We will learn about the diversity of these cultural differences and at the same time learn how we might overcome them. Our efforts to recognize and surmount cultural differences will hopefully open up business opportunities throughout the world and maximize the contribution of all the employees in a diverse workforce.

Prerequisites: -

MILS100: Military Science

History of the Jordanian Arab Army. United Nations Peace Keeping Forces. Preparation of the nation for defense and liberation. History of the Hashemite Kingdom of Jordan and its development.

Prerequisites: -

NE101: National Education

In a context of striving towards democracy like the one Jordan enjoys today, the meaning and practice of active and responsible citizenship becomes more crucial. It is often argued that democracy requires "democrats" to flourish, and become well established. Democrats are those women and men who recognize pluralism, inclusion, positive engagement, and participation as the main values that govern their interaction with the state as citizens and with each other as diverse people of different interests. In this course you will be able to understand your rights and responsibilities as Jordanian citizen expand your knowledge about the frameworks, and processes that regulates citizen-state relationships as well as the basic necessary skills for you to practice your citizenship rights in a civic manner.

Prerequisites: -

SE301: Social Entrepreneurship and Enterprises

This course will serve as an introduction to the field of social entrepreneurship and social enterprises. Through lectures, field visits, analyses of relevant literature, case studies and exercises, this course will explore social entrepreneurship's potentials, opportunities and limitations. The topics will cover: Defining Social Entrepreneurship. Contextualizing Social Entrepreneurship (need, motives, forms, criteria). Role of Leadership, Creativity and Innovation. Locating SE on the profit/non-profit continuum. SE in the larger fields of development, social change, community activism. Social Enterprises (Missions, Markets, Finances). Ethical business and Corporate social responsibility.

Prerequisites: -

3 Cr (3,0)

3 Cr (3,0)

3 Cr (3,0)

SFTS101: Soft Skills

This course is designed to help develop strong oral and written communication skills. The student will be given opportunities to practice writing and editing professional correspondence and technical reports. Additionally, the student will compose and deliver oral presentations. Assignments will include the use of inductive and deductive approaches to conveying a variety of messages. The course emphasis the use of software tools to prepare presentations, stress management, confidence, and sensitivity to others. It also stresses on resume writing and conducting interviews.

Prerequisites: -