



Faculty of Engineering
Renewable Energy Engineering

Study Plan of the Bachelor's Degree
In: Renewable Energy Engineering
Academic Year: 2025/2026

Study Plan Credit hours (162)

Type of Program: **Blended**

Major Type:

Humanities

Scientific/Technical

Medical Science

Teaching Type	Percentage of study plan hours/number	Actual Ratio
Complete Online E-Learning	20% - 10% Maximum	17%
Blended learning (for scientific majors)	50% - 30% Maximum	43%
Face-to-face learning (for scientific majors)	30% Minimum	40%

Note: The learning types of the courses are disseminated at all academic levels in the program



Department Vision

Entrepreneurship and distinction in renewable energy engineering in teaching, research and application locally and regionally.

Department Mission

Preparing and employing staff of engineers who are able to compete in the labor market with high professionalism, supported by the skills, knowledge and ethics of the profession in achieving comprehensive and sustainable development.

Program Mission

Providing distinguished academic programs in the field of renewable energy engineering supported by the knowledge, skills and ethics of the profession through qualified cadres capable of keeping pace with local and international standards in accordance with the e-learning integration standards.

Educational Program Objectives

Graduates of the Renewable Energy Engineering program will be expected within a few years of graduation:

1. Take on significant positions within the renewable energy sectors, both on a local and global scale, with a firm commitment to improving society. This commitment should be accompanied by a thorough understanding of professional and ethical engineering principles, as well as a dedication to community service.
2. Display adeptness in communication by expressing ideas and concepts concisely, with a proven record of delivering compelling presentations to sizeable audiences.
3. Exhibit a commitment to ongoing professional development, essential for securing initial employment opportunities and achieving a thriving career trajectory that adapts successfully to all technological advancements.
4. Work jointly with academic institutions to carry out advanced scientific research, leading to innovative discoveries that help tackle intricate engineering problems, while being proficient in working collaboratively within cross-functional teams.



Educational Program Outcomes

It is expected that, after completing the program requirements, the student will be able to:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.



Plan Contents

The study plan for a bachelor's degree consists of a major in Renewable Energy Engineering Of (162) credit hours disseminated as follows:

Sequence	Classification	Credit Hours	Percent %
1st	University Requirements	27	17
2nd	College Requirements	23	14
3rd	Program Requirements	109	67
4th	Free course	3	2
Total		162	100%

Coding System Approved by the University

6	0	4	x	Semester	Year	x	x
College Code	Major Code		Knowledge domain	Course Level		Sequence	
Engineering	Renewable Energy Engineering						

Knowledge Domain

Domain Code	Knowledge Domain	Credit Hours of Study Plan
01	Mathematics and Sciences	30
02	Basic Engineering Sciences	16
03	Engineering Mechanics	23
04	Thermal and Fluids	15
05	Electrical Engineering	8
06	Renewable energy sources	14
07	Transform and store energy	9
08	Energy Economics and Management	9
09	Graduation Project and Field Training	6

**First: University Requirements: (27) Credit Hours****A. Compulsory Requirements: (18) Credit Hours**

Teaching type			Course Number	Course Title	Credit Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
✓			50511104	Communication Skills - Arabic Language (I)	3	50511111
✓			50511105	Communication Skills - English Language (I)	3	50511112
✓			50511205	Life Skills and Social Responsibility	3	-
✓			50511206	National Education	3	-
✓			50511305	Entrepreneurship and Innovation	3	-
✓			50511308	Military Sciences	3	-
✓			50541209	Volunteering and Community Development	0	-
Total					18	

B. Elective Requirements: (9) Credit Hours from the following list:

Teaching type			Course Number	Course Title	Credit Hours	Pre-Requisite
Online E-Learning	Blended	Face-to-Face				
✓			50521106	Communication Skills - Arabic Language (2)	3	50511104
✓			50521107	Communication Skills - English Language (2)	3	50511105
✓			50521203	Principles of Psychology	3	-
✓			50521204	Human Rights	3	-
✓			50531101	Islamic Culture	3	-
✓			50531205	Quds and Hashemite Custodianship	3	-
✓			50541103	Computer Skills	3	50511113
✓			50541204	Environment and Society	3	-
✓			50541206	Health of Individuals and Society	3	-
✓			50541208	Introduction to Sustainable Development	3	-
✓			50541211	Introduction to Artificial Intelligence	3	-
✓			50541308	Foreign Language	3	-
✓			50541309	Digital Culture	3	50511113
Total					9	

C. Remedial course: (0) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
✓			5051111	Remedial Course in Arabic	3			-
✓			5051112	Remedial Course in English	3			-
✓			5051113	Remedial Course in Computer Science	3			-
				Total	0			

Second: College Requirements: (23) Credit Hours

A. Compulsory Requirements: (23) Credit Hours

Teaching type			Course Number	Course Title	Cr.h	Contact Hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		50521101	Calculus (I)	3	3	-	-
	✓		50551101	General Physics (I)	3	3	-	-
		✓	50551102	General Physics Lab (I)	1	-	2	50551101*
		✓	60221101	Engineering Drawing	2	-	4	-
	✓		60222102	Introduction to Engineering	1	1	-	-
	✓		60224203	Engineering Economy	3	3	-	50521101
		✓	60331204	Engineering Workshop	1	-	2	-
		✓	60363206	Engineering Programming using Artificial Intelligence	3	3	-	5051113
	✓		60372201	Communication Skills and Profession Ethics	3	3	-	5051105
	✓		60375102	Project Management	3	3	-	60224203
				Total	23	19	8	

* Or Co-requisite



Third: Program Requirements (109) Credit Hours

A. Compulsory Requirements: (80) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours *	Contact hours		Pre-Requisite
Online E-	Blended	Face-to-Face				Theoretical	Practical	
	✓		60232204	Materials Science	3	3	-	50551103
		✓	60241201	Statics	3	3	-	50551101
		✓	60242102	Strength of Materials	3	3	-	60241201
		✓	60242203	Dynamics	3	3	-	60241201
		✓	60243104	Fluid Mechanics	3	3	-	60242203
		✓	60264103	Fluid Lab.	1	-	2	60243104*
		✓	60434105	Mechanical Design	3	3		60242102
	✓		60443101	Thermodynamics	3	3	-	50551101
	✓		60443102	Heat Transfer	3	3	-	60443101
		✓	60443103	Heat Transfer Lab	1	-	2	60443102*
	✓		60453101	Measurement Devices	3	3	-	60243104
		✓	60453102	Measurement Devices Lab.	1	-	2	60453101*
		✓	60453103	Automatic Control	3	3	-	60243104
		✓	60453104	Automatic Control Lab.	1	-	2	60453103*
		✓	60453105	Electric Machines	3	3	-	60453107
		✓	60453106	Electric Machines Lab.	1	-	2	60453105*
		✓	60453107	Electric Circuits	3	3	-	50551201
		✓	60453108	Electric Circuits Lab.	1	-	2	60453107*
	✓		60463101	Renewable Energy	3	3	-	50551201
		✓	60463102	Photovoltaic Solar Energy	3	3	-	60463101
		✓	60464103	Photovoltaic Solar Energy Lab.	1	-	2	60463102*
	✓		60464104	Wind Energy	3	3	-	60463101
		✓	60464105	Wind Energy Lab.	1	-	2	60464104*
		✓	60474101	Power electronics	3	3	-	60453107
		✓	60474202	Production and Conversion of Energy	3	3	-	60463101



Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-	Blended	Face-to-Face				Theoretical	Practical	
		✓	60474204	Transmission and Distribution System Systems	3	3	-	60453105
	✓		60475103	Energy Storage	3	3	-	60474202
	✓		60482202	Environment and Energy	3	3	-	60463101
	✓		60485101	Energy Management and Protocols	3	3	-	60482202
	✓		60485103	Energy Efficiency and Economy	3	3	-	60482202
		✓	60494302	Renewable Energy Engineering Practical Training	3	3	-	Completion of 115 Cr. Hrs.
		✓	60495102	Graduation Project (1)	1	1	-	Completion of 118 Cr. Hrs.+ Completion of Engineering Practical Training
		✓	60495203	Graduation Project (2)	2	2	-	60495102
			Total		80	72	16	

* Credit Hours

B. Elective Requirements: (6) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		60454201	Electric Power Systems	3	3	-	60453105
	✓		60464207	Fuel Cells and Hydrogen	3	3	-	60463101
	✓		60464209	Solar Thermal Systems	3	3	-	60463102
	✓		60464210	Design of Renewable Energy Systems	3	3	-	60463101



Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		60464213	Special Topics in Renewable Energy Engineering and Artificial Intelligence Application	3	3	-	Completion of 115 Cr. Hrs.
	✓		60484206	Green Buildings	3	3	-	60463101
Total					6	6		

C. Ancillary Courses: (23) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
	✓		50212104	Linear Algebra (I)	3	3	-	50521101
		✓	50222209	Ordinary Differential Equations (I)	3	3	-	50221202
	✓		50223111	Numerical Analysis (I)	3	3	-	50521101
	✓		50531100	Principles of Statistics and Probability	3	3	-	-
		✓	50551103	General Chemistry	3	3	-	-
		✓	50551104	General Chemistry Practical.	1	-	2	50551103*
	✓		50551201	General Physics (2)	3	3	-	50551101
		✓	50551202	General Physics Lab. (2)	1	-	2	50551201*
	✓		50221202	Calculus (2)	3	3	-	50521101
Total					23	21	4	

* Or Co-requisite

Fourth: Free course: (3) Credit Hours

Teaching type			Course Number	Course Title	Credit Hours*	Contact hours		Pre-Requisite
Online E-Learning	Blended	Face-to-Face				Theoretical	Practical	
			-	Free Course	3	3		



Guidance Plan

First Year

First Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
50551101	General Physics (I)	B	3	-	-
50551102	General Physics Lab. (I)	F	1	-	50551101
50521101	Calculus (I)	B	3	-	-
50551103	General Chemistry	F	3	-	-
50551104	General Chemistry Practical	F	1	-	50551103
---	Compulsory/ Elective University Requirement	E	3	-	-
---	Compulsory / Elective University Requirement	E	3	-	-
Total			17		

Second Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
50211202	Calculus (2)	B	3	50521101	-
60221101	Engineering Drawing	F	2	-	-
50551201	General Physics (2)	B	3	50551101	-
50551202	General Physics Lab. (2)	F	1	-	50551201
60241201	Statics	F	3	50551101	-
60331204	Engineering Workshops	F	1	-	-
---	Compulsory / Elective University Requirement	E	3	-	-
Total			16		

33 Credit Hours



Second Year

First Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60222102	Introduction to Engineering	B	1	-	-
50212104	Linear Algebra (I)	B	3	50521101	-
60453107	Electric Circuits	F	3	50551201	-
60453108	Electric Circuits Lab.	F	1	-	60453107
60242203	Dynamics	B	3	60241201	-
60242102	Strength of Materials	F	3	60241201	-
---	Compulsory / Elective University Requirement	E	3	-	-
Total			17		

Second Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60372201	Communication Skills and Profession Ethics	B	3	50511105	-
50222209	Ordinary Differential Equations (I)	F	3	50211202	-
60243104	Fluid Mechanics	F	3	60242203	-
60264103	Fluid Lab.	F	1	-	60243104
60232204	Materials Science	B	3	50551103	-
---	Free Course	-	3	-	-
Total			16		

33 Credit Hours



Third Year

First Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
50223111	Numerical Analysis (I)	B	3	50521101	-
60453101	Measurement Devices	B	3	60243104	-
60453102	Measurement Devices Lab.	F	1	-	60453101
60453105	Electric Machines	F	3	60453107	-
60453106	Electric Machines Lab	F	1	-	60453105
60443101	Thermodynamics	B	3	50551101	-
60463101	Renewable Energy	B	3	50551210	-
Total			17		

Second Semester

Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60363206	Engineering Programming using Artificial Intelligence	F	3	50511113	-
50531100	Principles of Statistics and Probability	B	3	-	-
60443102	Heat Transfer	B	3	60443101	-
60443103	Heat Transfer Lab	F	1	-	60443102
60453103	Automatic Control	F	3	60243104	-
60453104	Automatic Control Lab.	F	1	-	60453103
60434105	Mechanical Design	F	3	60242102	-
Total			17		

34 Credit Hours



Fourth Year

First Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60474101	Power Electronics	F	3	60453107	-
60463102	Photovoltaic Solar Energy	F	3	60463101	-
60464103	Photovoltaic Solar Energy Lab.	F	1	-	60463102
60474202	Production and Conversion of Energy	F	3	60463101	-
60464104	Wind Energy	B	3	60463101	-
60464105	Wind Energy Lab.	F	1	-	60464104
---	Compulsory / Elective University Requirement	E	3	-	-
Total			17		

Second Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60224203	Engineering Economics	B	3	50521101	-
60482202	Environment and Energy	B	3	60463101	-
60475103	Energy Storage	B	3	60474202	-
60474204	Transmission and Distribution System Systems	F	3	60453105	-
---	Elective Department Requirement	B	3	-	-
Total			15		

32 Credit Hours



Fifth Year

Summer Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60494302	Renewable Energy Engineering Practical Training **	F	3	Completion of 115 Cr. Hrs.	-
Total			3		

**Practical training for eight consecutive weeks

First Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60375102	Project Management	B	3	60224203	-
60495102	Graduation Project (1) *	F	1	Completion of 118 Cr. Hrs.	-
60485103	Energy efficiency and economy	B	3	60482202	-
---	Elective Department Requirement	B	3	-	-
---	Compulsory / Elective University Requirement	E	3	-	-
Total			13		

* Finishes the Engineering Practical Training successfully

Second Semester					
Course No.	Course Title	Type of Learning	Credit Hours*	Prerequisite	Co-requisite
60495203	Graduation Project (2)	F	2	60495102	-
60485101	Energy Management and Protocols	B	3	60482202	-
---	Compulsory / Elective University Requirement	E	3	-	-
---	Compulsory / Elective University Requirement	E	3	-	-
---	Compulsory / Elective University Requirement	E	3	-	-
Total			14		

30 Credit Hours

Total Credit Hours = 162

E: 27 Hrs. / B: 70 Hrs. / F: 65 Hrs.

Courses Tree



كلية الهندسة
College of Engineering



جامعة عمان العربية
AMMAN ARAB UNIVERSITY

Courses Tree

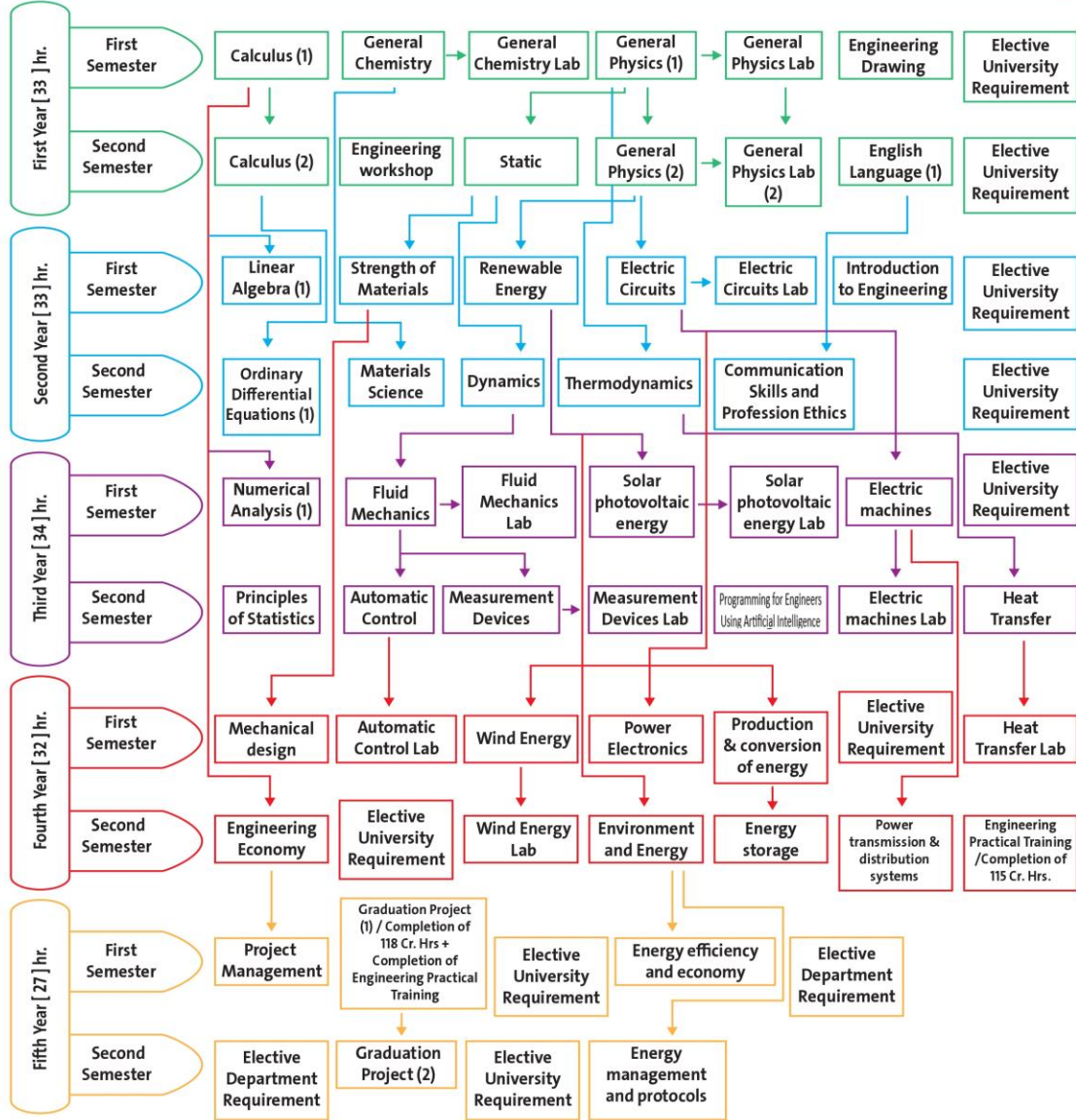
Collage: Engineering

Department: Renewable Energy Engineering

Specialty: Renewable Energy Engineering

Program: Bachelor

Issue Date: 2025/2026



F566, Rev. a
Ref.: Quality Assurance Council Session (08/2021-2022), Decision No.:01, Date:21/05/2022



F026-1, Rev. e
Ref.: Deans' Council Session (16/2025-2026), Decision No.: II, Date 23/12/2025





Course Description

Course Number	Course Title	Credit Hours	Learning Style	Prerequisite
50551101	General Physics (I)	3 Credit hrs.	B	None
Physics and Measurement, Vectors, Motion in one Dimension, Motion in Two Dimensions, The Laws of Motion Circular Motion, and other applications of Newton's Laws, Work and Energy, Linear Momentum and Collisions, Rotation of rigid object about a fixed axis, Rolling Motion and angular Momentum, Torque.				
50551102	General Physics Lab (I)	1 Credit hrs.	F	50551101* General Physics (I)
Collection and Analysis of Data, Measurements and Uncertainties, Vectors: Force Table, Kinematics of Rectilinear Motion, Force and Motion, Newton's laws, Collision in Two Dimensions, Rotational Motion & Simple Harmonic Motion: Simple Pendulum, The Behavior of Gases with Changes in Temperature and Pressure, Measuring the coefficient of viscosity of liquid, Specific Heat Capacity of Metals.				
50521101	Calculus (I)	3 Credit hrs.	B	None
Limits, continuity, and their applications: chain rule, Implicit differentiation, related rates, increase decrease, concavity. Extrema. Newton's method, Roll's theorem, Mean-Value Theorem, definite and indefinite integrations, fundamental theorem of calculus, Area and volume, inverse functions, Exponential and logarithmic functions with their derivatives, conic sections.				
50211202	Calculus (2)	3 Credit hrs.	B	50521101 Calculus (I)
Inverse trigonometric and hyperbolic functions. Techniques of integration, by parts, trigonometric integrals, trigonometric substitutions, partial fractions, quadratic expressions, general substitutions. Improper integrals. Infinite series, convergence and divergence, convergence tests, Maclaurin and Taylor series. Polar coordinates: definition, arc length, area, conic sections.				
50551103	General Chemistry	3 Credit hrs.	F	None
This course covers concepts and principles in general chemistry, chemical calculations, chemical reactions in aqueous solutions, periodic table and electron structure of the atom, chemical bonding types, physical properties of solutions, speed of chemical reactions, equilibrium in chemical solutions.				
50551104	General Chemistry Practical	1 Credit hrs.	F	50551103* General Chemistry
Physical properties, specifying the element and molecule form the molecule weight. Calculating water crystallization, calculating equilibrium heat and formation heat. Solution titration, Chemical reaction speed, chemical cell voltage.				
50551201	General Physics (2)	3 Credit hrs.	B	50551101 General Physics (I)



Continuation of University Physics I. Topics include mechanics of materials, basic thermodynamics, fundamentals of electricity and magnetism.				
50551202	General Physics Lab. (2)	1 Credit hrs.	F	50551201* General Physics (2)
Covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics.				
50212106	Linear Algebra (I)	3 Credit hrs.	B	50211202 Calculus (2)
Matrices and matrix operations, transpose and inverse of a matrix, determinants and their properties, vector spaces and subspaces, linearly independent and linearly dependent, row space and column space, null space of a matrix, inner product space, system of linear equations, methods of solving system of linear equations.				
50222218	Ordinary Differential Equations (I)	3 Credit hrs.	F	50211202 Calculus (2)
Solutions of first order differential equations with applications, solutions of second order differential equations with applications, systems of differential equations, series solutions, Laplace transform.				
50223121	Numerical Analysis (I)	3 Credit hrs.	B	50211202 Calculus (2)
Elementary introduction to numerical analysis, linear and nonlinear equations, numerical methods for linear problems which do not contain exact solutions or too difficult to solve analytically, error analysis, solutions of nonlinear problems: Fixed-point iteration, Taylor polynomial, Bisection method, Newton-Raphson method, etc.				
50531100	Principles of Statistics and Probability	3 Credit hrs.	B	None
Describing Statistical Data by tables, graphs and numerical Measures, Measures of Central Tendency and Deviation, counting methods, The Variance, binomial and Normal distribution, probabilities Laws, Random Variables, sampling distributions, testing of statistical hypotheses for two populations, correlation and regression, correlation coefficient.				
60221101	Engineering Drawings	2 Credit hrs.	F	None
Instruments of Drawing. Graphic geometry (Lines, Letters, Numbers, Tangency Construction). Intersections. Types of Projection. Dimensioning. Plane Sectioning.				
60222102	Introduction to Engineering	1 Credit hrs.	B	None
History of engineering. Difference between science and engineering. Development of engineering. Types of engineering. Functions of engineering. Jordanian Engineering Association. The effect of technology to engineering. Topics include goal setting and career assessment, ethics, public safety, the engineering method and design process.				
60331204	Engineering Workshops	1 Credit hrs.	F	None
It includes theoretical and practical topics covering four workshops: Welding workshop (including types of welding, general conditions to be provided, types of welding wires, qualification, prevention and public safety). Electrical workshop (including types of electrical circuits, household electrical wires, estimation of electric current and resistance). Blacksmithing workshop (tools and their types in perforating, filing and turning, leveling				



and sharpening metals). Carpentry workshop (including types of woods, machines and tools used in cutting, drilling, fixing and joining woods together).				
60372201	Communication Skills and Profession Ethics	3 Credit hrs.	B	5051105 Communication Skills - English Language (I)
General ideas about the writing styles and forms, writing in business, industry and government, adequacy and excellence. Analyzing the communication context, basic writing techniques, types of written communication, revising for excellence, college writing and professional writing, major types of on-job writing, writing categories, report writing procedures, preparing own resumes, practical experience on how to perform and attend interviews of work.				
60224203	Engineering Economy	3 Credit hrs.	B	5052101 Calculus (I)
Principles of engineering Economy. Types of economies. Demand & supply theory. Exclusive projects and alternatives. Cash flow diagram. Types of cash flows in any project. Simple & compound interest. Equivalence relations. Relation between present and future amounts. Present value analysis. Future value analysis. Annual value analysis. Capital cost analysis. Return on investment analysis. Selection of best projects. Major elements of feasibility studies.				
60363206	Engineering Programming using Artificial Intelligence	3 Credit hrs.	F	5051113 Remedial Course in Computer Science
This course provides students with foundational knowledge of computer systems and modern engineering software, and covers the core concepts of artificial intelligence and intelligent algorithms, along with their applications in analyzing, designing, and developing engineering solutions. The course also enhances students' skills in digital simulation, computational thinking, and the utilization of intelligent technologies to create more efficient and sustainable engineering solutions.				
60375102	Project Management	3 Credit hrs.	B	60224203 Engineering Economics
Definition of project, definition of management & definition of project management, Project lifecycle & main and secondary project management domains. The project manager nomination and responsibilities, Techniques for project planning and scheduling, Gantt Chart & CPM method. Project progress measurement and project tracking by using earned value techniques.				
60232204	Materials Science	3 Credit hrs.	B	5055103 General Chemistry
Historical Perspective. Classification of Materials. Atomic Structure and Interatomic Bonding. The Structure of Crystalline Solids. Imperfections in Solids. Mechanical Properties of Metals. Failure. Phase Diagrams. Polymer structures, mechanical behavior and thermal Properties.				
60241201	Static	3 Credit hrs.	F	5055101



				General Physics (I)
Introduction to static forces and Newton's laws, SI units. Statics of particles, resultant of forces in 2D (planar) and 3D (space) equilibrium and free-body concept. Statics of rigid bodies, moments, force couples and equivalent force systems. Equilibrium of rigid bodies. Centers of gravity and centroids. Analysis of statically determinate structures including trusses, beams, frames etc. Distributed forces. Axial force, shear force and bending moment diagrams, Moment of inertia of combined shapes.				
60242102	Strength of Materials	3 Credit hrs.	F	60241201 Static
Concepts and types of stresses and strains. Stress-Strain diagram, mechanical properties of materials (modulus of elasticity, Poisson's ratio, and shear modulus. Axial (stress, strain, deformation, and compatibility). Internal forces for beams (axial, shear, and bending moment diagrams). Bending and Shear stress and strain. Torsion stresses, strains, and deformations. Compound stresses and strains. Maximum and minimum stresses, strains, and Mohr circle. Buckling of compression members (Euler differential equation). Deflection of beams by double integration method.				
60242203	Dynamics	3 Credit hrs.	F	60241201 Static
Study the motion of translation and rotational bodies with and without acting forces, Newton's second law, and central movement of forces, the equation of energy, work, momentum, collision, conservation of energy and momentum, applications on the motion systems, acceleration and relative speed, nonlinear center.				
60243104	Fluid Mechanics	3 Credit hrs.	F	60242203 Dynamics
Main topics covered are; Introduction, fluid properties, basic units, fluid statics, pressure and its measurements, forces on plane and curved submerged surfaces, buoyancy & floatation, fluids in motion, flow kinematics and visualization, basic control volume approach, differential and integral continuity equation. Euler's and Bernoulli's equations, applications of Bernoulli equation, hydraulic and energy grade lines, momentum principle and its applications, Navier-Stokes equations, dimensional analysis and simulation, surface resistance and introduction to boundary layer theory. Flow in conduits, laminar and turbulent flows, frictional and minor losses and piping systems.				
60264103	Fluid Lab.	1 Credit hrs.	F	60243104 Fluid Mechanics
Center of pressure on a plane surface, stability of a floating body, Venturi and orifice meters, impact of jets, flow over a rectangular notch, flow over a weir, head loss through pipes, critical depth and specific energy, flow under a sluice gate, roughness of open channel, hydraulic jump, performance of impulse and reaction turbines, performance characteristics of a centrifugal pump.				
60443101	Thermodynamics	3 Credit hrs.	B	50551101 General Physics (I)
Properties and behavior of a pure substance, work and heat, first law and second law analysis of closed & open systems. Availability and Irreversibility. Vapor and air-standard power and refrigeration cycles. Thermodynamic relations. Ideal and real mixtures and solutions.				



60443102	Heat Transfer	3 Credit hrs.	B	60443101 Thermodynamics
Introduction to modes of heat transfer; one-dimensional steady state conduction; unsteady state conduction, lumped heat capacity system; introduction to convection, flow and thermal boundary layers. laminar and turbulent boundary layers; convection in internal and external flows.				
60443103	Heat Transfer Lab.	1 Credit hrs.	F	60443102 Heat Transfer
Heat transfer by radiation, the unsteady-state heat transfer by conduction and convection, Heat conduction along a simple bar, a composite bar, Effect of cross-section area, Radial heat conduction, Effect of surface contact, and Effect of insulation, heat transfer by free and forced convection, and melting and solidification of paraffin wax.				
60453101	Measurement Devices	1 Credit hrs.	B	60243104 Fluid Mechanics
Statistical concepts and calculations for theoretical and experimental data. The main basic circuit used to convert measured value to electrical signal and the measuring instrument needed to measure a main physical variable such as flow, pressure, temperature, linear and angular velocities, forces and torques.				
60453102	Measurement Devices Lab	1 Credit hrs.	F	60453101* Measurement Devices
This course covers the following topics: Linear measurements, Angular measurements, Screw thread measurements, electric resistance and current, Flow and pressure measurements.				
60453103	Automatic Control	3 Credit hrs.	F	60243104 Fluid Mechanics
Concept of Control Systems, Open-loop and Closed-loop Systems; Mathematical Modeling of Physical Systems; Transfer Function and System Modeling Diagrams; Response Characteristics of Control Systems; Specifications of System Performance; Stability Analysis of Linear Control Systems; Routh's Stability Criterion; Time-domain Analysis of Control Systems; Design of Controllers and Compensators.				
60453104	Automatic Control Lab.	1 Credit hrs.	F	60453103* Automatic Control
Experiments that are related to: First and second order system analysis control experiments. Servo systems. Stability of dynamical systems. System identification. Design and tuning of a PID controller in closed loop systems. Simulation of systems using Simulink/MATLAB.				
60453105	Electric Machines	3 Credit hrs.	F	60453107 Electric Circuits
Principles of Electromagnetic circuits; Single-phase transformers: ideal, practical transformer, equivalent circuit, auto-transformer; Three-Phase Transformer: Types and Connection; AC Machinery Fundamentals: Construction, rotating magnetic field; Three phase induction motors: Principle of working, starting, Equivalent				



Circuit, speed control; Synchronous Machines: Construction, Internal Generated Voltage, Equivalent Circuit; Operation Modes: Alone, Parallel; Synchronous Motors: Steady state operation, starting.				
60453106	Electric Machines Lab.	1 Credit hrs.	F	60453105* Electric Machines
DC transformers, generators and motors, single phase and three-phase synchronous generators and motors and AC series motors.				
60453107	Electric Circuits	3 Credit hrs.	F	50551201 General Physics (2)
Basic Components and Electric Circuits: Units and Scales, Current, Voltage, Power, Voltage and Current Sources, Ohm's Law; Voltage and Current Laws: Kirchhoff's Voltage, Kirchhoff's Current Laws; Mesh Analysis; Techniques of Circuit Analysis: Superposition, Source Transformations, Thevenin and Norton Equivalent Circuits, maximum Power Transfer; Energy Storage Elements: Capacitor, Inductor; Basic RL and RC Circuits: The Source Free RL Circuit, The Source Free RC Circuit, The RLC Circuit. , AC Circuits, The Phasor, Phasor Relationships for R, L, and C, Impedance, Admittance; AC Circuit Power Analysis: Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power and Power Factor, Complex Power; Three-phase circuits balanced and unbalanced. An introduction to electronics, semiconductors and electronic circuit components, operation of diodes, transistors, thyristors, and others.				
60453108	Electric Circuits Lab.	1 Credit hrs.	F	60453107 Electric Circuits
DC Circuits: Ohm's law, Kirchoff's Voltage and Current Laws, Network theorems, Maximum Power Transfer; Transient Circuits: RL, RC, RLC; Resonant Circuits.				
60434105	Mechanical Design	3 Credit hrs.	F	60242102 Strength of Materials
Introduction to design process, Design considerations, Tolerances, Fits and surface finish, Selection of materials, Mechanical properties of engineering materials, Stress analysis of machine elements, deflection equations, failure of machine elements under static loads, Fatigue analysis, design of nonpermanent and permanent joints.				
60463101	Renewable Energy	3 Credit hrs.	B	50551201 General Physics (2)
A comprehensive introduction to renewable energy. Basics of energy types, solar power, solar heating and cooling systems, and photovoltaic technologies, concentrating solar power, passive and active solar systems, and wind energy and bioenergy. Additionally, the geothermal energy and hydroelectric and ocean-based energy systems.				
60463102	Photovoltaic Solar energy	3 Credit hrs.	F	60463101 Renewable Energy
Introduction to solar energy, principles, resources, and applications. global energy challenges and the role of renewable energy solutions, emphasizing the significance of solar power. Topics include sun-earth geometric				



relationship, thermodynamics, heat transfer fundamentals, and solar thermal systems such as flat-plate and concentrating collectors. Photovoltaic technologies including cell physics, types, system sizing, factors affecting solar energy and diverse applications like water pumping, lighting, and off-grid systems. In addition to the economic considerations, emphasizing feasibility and life-cycle analysis.				
60464103	Photovoltaic Solar Energy Lab.	1 Credit hrs.	F	60463102* Photovoltaic Solar Energy
Sun Radiation Measurements. Properties of Photovoltaic Devices. Open Circuit Voltage and Short Circuit Current. Maximum Power Point (MPP). The Efficiency of Solar Cells. Parallel and Series Solar Cells. Shadow, Temperature and Dust Effect. Battery Charging and Control. Off-grid Connection. On-grid Connection.				
60464104	Wind Energy	3 Credit hrs.		60463101 Renewable Energy
Basic characteristics of wind, site characterization, Statistical methods of wind analysis, wind resources assessment, fundamental principles of wind energy utilization, aerodynamics, mechanical and electrical design aspects. Wind machine technologies and wind turbines performance analysis. Wind power integration into the power systems, environmental impact of wind power utilization.				
60464105	Wind Energy Lab.	1 Credit hrs.	F	60464104* Wind energy
Studying the effect of wind speed, wind direction, fin shape, fin inclination angle, and number of fins, on the energy generated from wind turbines by reading both current and voltage. Studying the mechanism of storing energy in batteries and converting current from direct to alternating.				
60474101	Power Electronics	3 Credit hrs.	F	60453107 Electric Circuits
Review of the operating principle of semiconductor diodes, features, characteristics, and classification of diodes, transistors, thyristors, and others. AC-DC converters: Single-phase half-wave rectifiers (uncontrolled, controlled). Single phase and bi-phase full-wave Rectifiers: Uncontrolled, fully controlled, half-controlled. Three-phase bridge rectifiers: Uncontrolled, fully controlled. DC-DC converters: Step-down, step-up, step-down/up. DC-AC converters: Single-phase inverters: PWM inverter; Three-phase inverter. AC-AC converters: Single-phase cycloconverter, single-phase transformer tap changer. The Applications of the different Converters.				
60474202	Production and Conversion of Energy	3 Credit hrs.	F	60463101 Renewable Energy
Fundamental concepts of energy, types, production, and conversions. Energy definitions, types, and energy balances, thermodynamic principles, and energy production cycles. Energy conversion, thermal efficiency, and storage methods such as thermal and chemical systems.				
60475103	Energy storage	3 Credit hrs.	B	60474202



				Production and Conversion of Energy
Energy storage systems for power systems, demand-supply trends and the role of storage units. Applications such as user-level storage, transport, and dynamic duties. Thermal energy storage, flywheel, pumped hydro, compressed air, hydrogen, electrochemical, capacitor banks, and superconducting magnetic energy storage systems, examining their principles and power extraction.				
60482202	Environment and Energy	3 Credit hrs.	B	60463101 Renewable Energy
Energy systems and their impact on the environment, focusing on pollution and sustainability. Fossil fuels, nuclear energy, and renewable sources like solar, wind, and geothermal. Environmental challenges such as air and water pollution, greenhouse gas emissions, and waste management, and sustainable energy solutions to reduce environmental harm.				
60485101	Energy Management and Protocols	3 Credit hrs.	B	60482202 Environment and Energy
General principles of energy management, Planning for energy management, Energy audit and surveys, energy analysis, analysis of typical applications such as heating cooling and lighting, Integrated building systems, Energy law and regulation in Jordan and worldwide.				
60485103	Energy Efficiency and Economy	3 Credit hrs.	B	60482202 Environment and Energy
Energy conservation, energy auditing; Analysis; Formulating energy management options; Economic Assessment and Energy Conservation Technologies - Energy Efficiency in Large Industries; Integrated resource planning; Demand management; Cogeneration; Total power schemes; Economic Assessment of Energy Conservation Technologies Energy production, investment, consumption and returns from it, And analysis of practical applications. Energy production, investment, consumption and returns from it.				
60494302	Renewable Energy Engineering Practical Training	3 Credit hrs.	F	Completion of 115 Cr. Hrs.
Practical training in a renewable energy engineering project or any other places approved by the department, and according to the regulations drafted by the college of Engineering Training Committee.				
60495102	Graduation Project (1)	1 Credit hrs.	F	Completion of 118 Cr. Hrs.
Directed readings in the literature of renewable energy engineering, Introduction to research methods, seminar discussions dealing with special engineering topics of current interest. It is the first phase of the entire project.				
60495203	Graduation Project (2)	2 Credit hrs.	F	60495102 Graduation Project (1)
The student or a group of students selects a theoretical or practical project related to the cognitive domains of the renewable energy engineering discipline. At the end of the project, the student should undertake a comprehensive examination and submit a technical report along with an illustrated presentation of the project.				



60464207	Fuel Cells and Hydrogen	3 Credit hrs.	B	60463101 Renewable Energy
Introduction to the major types of fuel cells, including phosphoric acid (PAFC), polymer electrolyte membrane (PEMFC), alkaline (AFC), molten carbonate (MCFC), and solid oxide fuel cells (SOFC). Operating principles, electrolytes, charge carriers, operating temperatures, catalysts, and applications. The advantages and limitations of each type, emphasizing their suitability for various applications such as transportation, stationary power generation, and portable devices.				
60464210	Design of Renewable Energy Systems	3 Credit hrs.	B	60463101 Renewable Energy
Design of various renewable energy systems, such as solar, wind, biomass and bioenergy system, geothermal, hydro-power systems, and their applications.				
60474204	Transmission and Distribution System systems	3 Credit hrs.	F	60453105 Electric Machines
Design transmission and distribution power systems, including the concept of single-line diagram drawings, conductor specifications, underground cable, circuit breakers, Mechanical structures of overhead line towers, and poles and their types. Cables, and fuses. The course also delves into electrical substation components and layouts, substation design, and substation configurations. Additionally, it addresses earthing and lightning systems, design criteria, substation earthing calculation methodology, and insulation coordination.				
60484206	Green Buildings	3 Credit hrs.	B	60463101 Renewable Energy
Introduction to the principles and practices of sustainable construction and green building design. An overview of sustainability in construction, including its roots, principles, and the rationale for high-performance buildings. The driving forces for sustainable construction, ecological design concepts, and green building assessment systems like LEED and Green Globes. The integrated green building design process, emphasizing sustainable site development and landscape practices, focusing on stormwater management, heat island mitigation, and ecosystem enhancement.				
60454201	Electric Power Systems	3 Credit hrs.	B	60453105 Electric Machines
Overview of the evaluation of electrical systems. The fundamental concepts in electric power systems, the single line diagram of power systems, and the concept of using per-unit in power systems, three-phase systems, both balanced and unbalanced. The determination of R, L, and C components of the transmission line. Transformers and generators roles in power system. Line voltage and two-port systems to determine the transmission line power capacity and the voltages at both ends. System modeling and analysis. Understanding the concept of fault types occurring in power systems and determining their values for balanced and unbalanced power systems.				
60464209	Solar Thermal Systems	3 Credit hrs.	B	60463102 Photovoltaic Solar Energy



Introduction of Solar Thermal Energy, Solar thermal energy conversion, Heat exchanger, Solar thermal collector, Solar photovoltaic thermal systems, Solar thermal power plant, Solar water desalination, and Economic assessment of solar thermal energy technologies.

60464213	Special Topics in Renewable Energy Engineering and Artificial Intelligence Application	3 Credit hrs.	B	Completion of 115 Cr. Hrs.
Advanced topics in renewable energy with the approval of the department on subjects and content.				