نموذج وصف البرنامج الأكاديمي

اسم الجامعة: تكريت

الكلية: الهندسة

القسم العلمي: هندسة الطاقة المستدامة

اسم البرنامج الأكاديمي أو المهني: بكالوريوس هندسة الطاقة المستدامة

اسم الشهادة النهائية: بكالوريوس علوم في هندسة الطاقة المستدامة

النظام الدراسي: فصول دراسية

تاريخ اعداد الوصف: 2025/9/1

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التوقيع

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التاريخ: ١٣ / ١٠ / ٢٠٢٥

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التاريخ: ١٣/١٠/٢٠٢٥

دقق الملف من قبل

شعبة ضمان الجودة والاداء الجامعي

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التاريخ: ١٣/١٠/٢٠٢٥

التوقيع:

١٢/١٠/٢٠٢٥

مصادقة السيد العميد

الاستاذ المساعد الدكتور

سعد رمضان احمد

عميد كلية الهندسة

Course Catalogue | 2025-2026 | دليل المواد الدراسية

TIKRIT UNIVERSITY
جامعة تكريت

Bachelor of Science – Sustainable Energy Engineering

بكالوريوس علوم - هندسة الطاقة المستدامة

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Sustainable Energy Engineering to earn the Bachelor of Science degree. The program delivers (48) Modules with (4500) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامة:

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة الطاقة المستدامة للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) مادة دراسية مع (4500) إجمالي ساعات حمل الطالب و 240 إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2025-2026

1

Code	Course/Module Title	ECTS	Semester
SE_ENG-101	Introduction to Sustainable Energy Engineering	6	1
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
3	3	87	63
Description			
This course will cover a range of energy sources and systems. The students will be introduced to some energy basics. The course also includes different energy sources and techniques, such as thermal and electrical solar energy systems, fuels and combustion, hydropower resources and turbines, wind energy, biofuels and biomass energy, and geothermal energy. The course also introduces energy storage.			

2

Code	Course/Module Title	ECTS	Semester
MATH-101	Calculus I	6	1
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
4	2	87	63
Description			
This course is based on the principles of Euclidean, plane, and solid geometries. Students will be introduced to the basic postulates and theorems of geometry and encouraged to extend these ideas to the topics of similarity, circles, area, volume, and proof. In addition, students are involved in a more technological, theoretical, and algebraic approach to geometry.			

3

Code	Course/Module Title	ECTS	Semester
SE_ENG-102	**Physics**	**6**	**1**
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL(hr/sem)**
3	**3**	**87**	**63**
Description			
This course covers classical mechanics (kinematics, dynamics, work, energy, momentum), fluid mechanics, gravitation, and basic electrical and electronic principles including Ohm's law, diodes, and transistors.			

4

Code	Course/Module Title	ECTS	Semester
UOT-003	Computer Sciences	3	1
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL(hr/sem)**
1	2	45	30
Description			
This course offers students a comprehensive exploration of the fundamental concepts and principles that underpin the field of computer science. By delving into various subjects including the historical development of computing, data representation, computer components, algorithms, programming languages, operating systems, applications, internet and networking, and cyber-security, students will develop a well-rounded understanding of the discipline. By examining the evolution of computer science over time, students will acquire a broad perspective on the field and its significance in contemporary society. Through a combination of theoretical knowledge and practical applications, this module equips students with the necessary foundation to pursue further studies or careers in computer science.			

5

Code	Course/Module Title	ECTS	Semester
ENG-106	Engineering Workshops	5	1
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2	3	73	52
Description			
The engineering workshops course focuses on identifying risks in the work environment and industrial safety guidelines. And training on how to measure and determine, and the use of filing tools and their work. Learn about the types of wood used in carpentry, the process of shaping it, and the use of carpentry tools and machines. Training in welding work, its types, and the process of joining metals by welding. Training on various casting works and training on mechanical operation, which includes turning, milling, and grinding. Training on pipe knowledge, how to connect, sanitary engineering works, and training on the basics of electrical workshops.			

6

Code	Course/Module Title	ECTS	Semester
UOT-002	English Language I	2	1
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2		31	19
Description			
This course is designed to provide engineering students with the necessary oral and written skills required for effective communication in academic and workplace contexts, both with experts in their field and lay persons. It begins by introducing them to the principles of good academic practice, which are also presented as a model for ethical workplace practice, and thus help them to avoid issues such as plagiarism. The main part then leads on to developing research and summarizing skills that form the basis for the later activities. Students next learn to apply these skills to conducting technical presentations, as well as in group discussions that culminate in project planning activities.			

7

Code	Course/Module Title	ECTS	Semester
UOT-004	Democracy and Human Rights	2	1
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2		31	19

Description

حقوق الانسان: هي حقوق يتمتع بها جميع مكونات البشر لمجرد اننا من ابناء البشر، وهذه الحقوق متأصلة في جميع البشر مهما كان عرقهم او جنسهم او قوميتهم او مذهبهم ولاتمنح من أي دولة، وتتضمن حقوق الانسان والطفل في الحضارات القديمة والاسلام، المواثيق الدولية، مصادر وضمانات حقوق الانسان، القوانين والدساتير، مجلس حقوق الانسان، العولمة، التقدم التكنولوجي وأثره على حقوق الانسان.

الديمقراطية: يرجع مصطلح الديمقراطية الى الحضارة اليونانية القديمة وهي عبارة عن مصطلح مكون من مقطعين هما: (Cratia) التي تعني حكم و (Demo) التي تعني الشعب ليصبح المفهوم حكم الشعب ، وتتضمن الديمقراطية التطرق الى مفهومها ومعرفة الجذور التاريخية لها، المكونات، الخصائص، المميزات، الضمانات، علاقة الديمقراطية ب (الدستور، مؤسسات المجتمع المدني، حقوق الانسان، الحكم الرشيد، الانتخابات)، الديمقراطية المعاصرة.

8

Code	Course/Module Title	ECTS	Semester
MATH-102	Calculus II	6	2
Lectures (hr/w)	**Lab./Prac./Tutor(hr/w)**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
4	2	87	63

Description

This course is based on the principles of Euclidean, plane, and solid geometries. Students will be introduced to the basic postulates and theorems of geometry and encouraged to extend these ideas to the topics of similarity, circles, area, volume, and proof. In addition, students are involved in a more technological, theoretical, and algebraic approach to geometry.

9

Code	Course/Module Title	ECTS	Semester
ENG-102	Engineering Mechanics	4	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
3	1	59	41
Description			
The course covers the following topics; statics of particles: forces in plane, forces in space, equilibrium, moment of a force, moment of a couple, equivalent systems of forces on rigid bodies, equilibrium in two dimensions, equilibrium in three dimensions, distributed forces: centroids and center of gravity, analysis of structures: trusses, frames and machines, internal forces in beams and cables, friction, moments of inertia of areas, moments of inertia of masses.			

10

Code	Course/Module Title	ECTS	Semester
SE_ENG-103	Basics of Electricity	5	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2	3	73	52
Description			
The electrical engineering course focus on basic electrical elements and fundamentals of electrical quantities such as voltage, current, resistor and electrical power then to series, parallel and how to analyze the electrical circuits in Mesh, Nodal for DC and AC circuits as well as bridge circuits then move to Alternating current AC circuits and students will able to get knowledge to time dependent signals, average and RMS values. Capacitance and inductance. Elements in series and parallel. Kirchhoff's laws and Ohm's law. Introduction to Mesh, Nodal analysis, and superposition, Thevenin, Norton and maximum power transfer theorems for AC circuits.			

11

Code	Course/Module Title	ECTS	Semester
SE_ENG-104	Environment Pollution	5	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2	3	73	52
Description			
This module offers a comprehensive foundation in environmental pollution, covering its nature, sources, and devastating impacts on natural ecosystems and human health. It focuses on the key aspects of air, water, and soil pollution, alongside thermal and sensory pollutants. The course emphasizes the crucial role of sustainable development and green energy in mitigating environmental degradation, while developing students' practical skills in environmental sampling and laboratory analysis.			

12

Code	Course/Module Title	ECTS	Semester
ENG-101	Engineering Drawing	3	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
1	2	45	30
Description			
An engineering drawing course focuses on usage of drawing instruments, lettering, construction of geometric shapes, etc. Student's study uses of dimensioning, shapes and angles or views of such drawings. Dimensions feature prominently, with focus on interpretation, importance and accurate reflection of dimensions in engineering drawing. Other areas of study in this course may include projected views and development of surfaces.			

13

Code	Course/Module Title	ECTS	Semester
SE_ENG-105	Chemistry	5	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/sem)**
2	3	73	52
Description			
This course aims to establish fundamental knowledge of this subject covers techniques to understand the significance of chemistry and classification the material to physical and chemical properties. Understanding atomic structure, electron configuration, chemical bonding, and molecular geometry. Applying gas laws and the principles of thermodynamics. Analyzing chemical equilibrium and reaction kinetics. Understanding the basic concepts of hydrocarbons and their reactions.			

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Code	Course/Module Title	ECTS	Semester
UOT-001	Arabic Language I	2	2
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2		31	19
Description			
تهدف هذه المادة إلى تعريف الطلبة باللغة العربية بوصفها لسان العرب، ولغة سامية حيّة تميزت بنظام صوتي وصرفي ونحوي وتركيبي دقيق، وهي اللغة التي نزل بها القرآن الكريم ولا يُفهم على وجهه الصحيح إلا من خلالها. ويركز المقرر على تنمية مهارات الطلبة الأساسية في القراءة السليمة، والكتابة الصحيحة، وضبط قواعد الإملاء وعلامات الترقيم، إلى جانب التذوق الأدبي للنصوص القرآنية والشعرية المختارة من التراث القديم والحديث. كما يسعى المقرر إلى ربط الطالب بهويته اللغوية والثقافية، وتمكينه من توظيف العربية في حياته الجامعية والمهنية على نحو فعّال.			

15

Code	Course/Module Title	ECTS	Semester
SE-ENG-201	FLUID MECHANICS	5	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
The course begins with the material properties of fluids. This is followed by studying fluid statics including pressure measurement, hydrostatics and buoyancy. Then study the principles of fluid motion including mass conservation (the continuity equation) and energy conservation (Bernoulli's equation). Next, this course description provides a necessary summary of the most important characteristics of the course and the learning outcomes expected of the student to achieve. Also, the demonstrates whether he has made the most of the available learning opportunities. Besides, it should be linked to the program description. In addition, this course is provided to engineering students with basic skills in fluid mechanics. It provides a clear and thorough demonstration of the theory and application of hydrodynamics equations. Among the main concepts that are covered in this course are pressure, velocity, discharge of flow, laminar, and turbulent flow.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG-202	THERMODYNAMICS I	5	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
Thermodynamics is an exciting and fascinating subject that deals with energy, which is essential for sustenance of life, and thermodynamics has long been an essential part of engineering curricula all of the world. It has a broad application area ranging from microscopic organisms to common household appliances, transportation vehicles, power generation systems, this course contains sufficient material for fundamental and principles of thermodynamics.			

17

Code	Course/Module Title	ECTS	Semester
SE-ENG-203	HEAT TRANSFER I	5	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
This is the first course in heat transfer, with an emphasis on understanding the fundamental physics underlying different heat transfer processes, making proper approximations for analytical heat transfer calculations and numerical methods for engineering heat transfer analysis. Topics include: introduction to three modes of heat transfer, thermal resistance network analysis, steady-state conduction, transient conduction, numerical methods for heat conduction.			

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Code	Course/Module Title	ECTS	Semester
MATH-201	ENGINEERING ANALYSIS I	6	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
4		87	63
Description			
This course will cover a range of engineering analysis techniques related to the first and second differential and then utilizes it to solve problems in mechanical engineering applications, methods for solving differential equations are discussed. The course also includes power series solutions, special functions, and Laplace transforms and utilizes it to solve the differential equation. Fourier series and separation of variables are also introduced.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG- 204	ENGINEERING MATERIALS	4	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	2	59	41
Description			
This course aims to establish fundamental knowledge of Engineering Materials. Presentation of the course starts with principles of bonding, structure, and structure/property relationships for metals and their alloys, ceramics, polymers and composites. Emphasis on properties and how processes change structure. Study deeply the phase diagrams, diffusion and materials failure.			

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Code	Course/Module Title	ECTS	Semester
ENG-105	COMPUTER PROGRAMMING	3	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
1	2	45	30
Description			
This module introduces students to the Python programming language, its syntax, and its use in solving programming problems. The module covers the basic programming concepts of condition statements and iteration statements, along with the design and implementation of functions. The module also covers the basic data structures of Python, including lists, tuples, dictionaries, and sets. The module concludes with an introduction to string manipulation and regular expressions in Python.			

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Code	Course/Module Title	ECTS	Semester
UOT0011	اللغة العربية 2	2	3
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2		31	19
Description			
تهدف هذه المادة إلى تعريف الطلبة باللغة العربية بوصفها لسان العرب، ولغة سامية حيّة تميزت بنظام صوتي وصرفي ونحوي وتركيبي دقيق، وهي اللغة التي نزل بها القرآن الكريم ولا يُفهم على وجهه الصحيح إلا من خلالها. ويركز المقرر على تنمية مهارات الطلبة الأساسية في القراءة السليمة، والكتابة الصحيحة، وضبط قواعد الإملاء وعلامات الترقيم، إلى جانب التذوق الأدبي للنصوص القرآنية والشعرية المختارة من التراث القديم والحديث. كما يسعى المقرر إلى ربط الطالب بهويته اللغوية والثقافية، وتمكينه من توظيف العربية في حياته الجامعية والمهنية على نحو فعّال.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG-205	THERMODYNAMICS II	6	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
Thermodynamics is an exciting and fascinating subject that deals with energy, which is essential for sustenance of life, and thermodynamics has long been an essential part of engineering curricula all of the world. It has a broad application area ranging from microscopic organisms to common household appliances, transportation vehicles, power generation systems, this course contains sufficient material for fundamental and principles of thermodynamics.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG-206	STRENGTH OF MATERIALS	5	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52

Description

The course begins with the distinguishing between rigid body mechanics (statics and dynamics) and non-rigid body mechanics (strength of materials). This is followed by studying the effect of internal forces on rigid bodies and their intensities (stresses). Then the study of multi-types of simple stresses i.e. tensile, compressive, shear, bearing, torsion, bending and how to distinguish between these types of stress. Next, this course description provides a necessary summary of the most important characteristics and the learning outcomes expected of the student to achieved. Also, the demonstrates whether has made the most of the available learning opportunities. Besides, it should be linked to the program description. In addition, this course is provided to engineering students with basic skills in engineering mechanics. It provides a clear and thorough demonstration of the theory and application of engineering mechanics equations. It's also important to learn the students how to predict the magnitude of deformation (either linear, lateral, or torsional), by using multi-techniques. stresses on an inclined surface, combined stresses, and their analyses using analytical and graphical (Mohr) methods. Finally, a special topic is covered such as, factor of safety and stress concentration effects to made a good introduction to machine design.

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Code	Course/Module Title	ECTS	Semester
SE-ENG-207	Economic Energy Management and Ethics	4	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	1	59	41
Description			
This course is designed to introduce undergraduate engineering students to the concepts, theory and practice of engineering ethics. It will allow students to explore the relationship between ethics and engineering and apply classical moral theory and decision making to engineering issues encountered in academic and professional careers. Also, this course provides students with the conceptual tools to make autonomous, informed, comprehensive and coherent judgments about personal, professional, and public ethical issues.			

25

Code	Course/Module Title	ECTS	Semester
SE-ENG-208	HEAT TRANSFER II	5	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
The course considers the analysis of heat transfer by convection using empirical and boundary layer approximations. Both forced and natural convection are considered. Force convection deals in two ways which are external and internal. Natural convection from the solid surfaces is taken into account. The Radiation heat transfer is considered with applications to multi-body radiation. In addition, the properties of thermal radiation, Radiation heat transfer between solids and shape factor is taken in consider.			

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Code	Course/Module Title	ECTS	Semester
MATH-202	ENGINEERING ANALYSIS II	6	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
4		87	63
Description			
This course will cover a range of engineering analysis techniques related to the first and second differential and then utilizes it to solve problems in mechanical engineering applications, methods for solving differential equations are discussed. The course also includes power series solutions, special functions, and Laplace transforms and utilizes it to solve the differential equation. Fourier series and separation of variables are also introduced.			

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Code	Course/Module Title	ECTS	Semester
UOT-021	ENGLISH LANGUAGE II	2	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2		31	19
Description			
You will also develop the business communication skills required for anyone in the global economy. This includes topics like delivering presentations, writing emails, or speaking in meetings. This gives you the ability to communicate across departments with a strong ability in reading, writing, speaking, and listening.			

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Code	Course/Module Title	ECTS	Semester
UOT-109	جرائم حزب البعث البائد	2	4
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2		31	19
Description			
جرائم حزب البعث: هي الجرائم التي ارتكبها الحزب بأبناء الشعب العراقي والتي ادت الى اثار سلبية على المستوى النفسي والاجتماعي والثقافي والاقتصادي والبيئي وعسكرة المجتمع.			

29

Code	Course/Module Title	ECTS	Semester
SE-ENG-301	Thermal Solar Energy Systems	6	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
This course provides knowledge to design of various thermal solar energy systems, the technology of thermal solar energy conversion, and the use of thermal solar energy in Iraq and worldwide.			

30

Code	Course/Module Title	ECTS	Semester
MATH-301	NUMERICAL METHODS	4	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	1	59	41
Description			
This course will cover a range of numerical analysis techniques related to matrix problems, solving systems of linear algebraic equations, solving nonlinear equations, Curve Fitting, polynomial approximation and interpolation, numerical integration and differentiation, and ordinary and partial differential equations. All of these numerical problems will be programmed, debugged, and executed.			

31

Code	Course/Module Title	ECTS	Semester
SE-ENG-302	Photovoltaic Energy Systems	5	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
A photovoltaic (PV) energy systems course provides knowledge on converting sunlight into electricity, covering fundamental principles of solar cells and the design, installation, and economics of both stand-alone and grid-connected PV systems. Topics often include solar resource assessment, PV module and system components, energy yield simulation, energy storage integration, and maintenance, with a focus on practical applications and technical skills for the renewable energy sector.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG-303	POWER PLANT	4	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	1	59	41
Description			
This Course provides a simple understanding of the power plant engineering. The course contains the details of steam and gas thermal power plants, hydro power plants, nuclear power plants, along with solar, wind and geothermal energy power systems in addition to the direct energy conversion. The economics of power generation and the environmental aspect of power generation are also being addressed in this course.			

33

Code	Course/Module Title	ECTS	Semester
SE-ENG-304	APPLIED ELECTRONICS	6	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	3	87	63
Description			
This course aims to establish fundamental knowledge of Field Effect Transistors (FET). FET: Junction field-effect transistor (JFET): physical operation and static characteristics. - Metal - Oxide semiconductor FET (MOSFET): depletion -type MOSFET, enhancement - type MOFET. DC analysis of FET, the FET as an amplifier, graphical (load line) analysis, small-single FET models, analysis of CS, CD and CG configurations, using FETs as switch, voltage variable resistor, and constant current source. Multistage Amplifiers: Analysis of multistage amplifiers (voltage gain, current gain. etc.). Types of multistage amplifiers (cascade ... etc.). RC-Coupled BJT Amplifier, Direct- Coupled BJT Amplifiers, Frequency Response, Multistage FET Amplifiers, Transformer Coupling. Introduction to four-layer Description and operation of silicon-controlled rectifier, DIAC, GTO and TRIAC.			

34

Code	Course/Module Title	ECTS	Semester
SE-ENG-305	ELECTRIC MACHINE	5	5
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
This course aims to introduce the student to establish fundamental knowledge of the main technologies for the generation and transformation of electrical power with an emphasis on their operating principles, their stability when interconnected and techniques for their control.			

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Code	Course/Module Title	ECTS	Semester
SE-ENG- 306	TURBOMACHINERY	6	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	3	87	63
Description			
This module introduces the theory, operation, and performance characteristics of turbomachines, focusing on energy transfer between fluids and rotating mechanical components. It covers both energy-producing and energy-absorbing machines used in hydraulic and thermal systems. Key topics include similarity laws for pumps and turbines, impulse turbines (Pelton wheel), reaction turbines (Francis and Kaplan types), centrifugal and axial pumps, axial and centrifugal compressors, and gas turbines. Emphasis is placed on performance analysis, efficiency, cavitation, and characteristic curves. By integrating theoretical principles with practical applications, students gain analytical skills essential for designing and evaluating turbomachines in power, propulsion, and industrial systems.			

36

Code	Course/Module Title	ECTS	Semester
SE-ENG-307	Principles of Combustion and Emissions	6	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
This course provides an understanding of the fundamental principles of combustion processes, the formation mechanisms of pollutants, and the technologies used to control and mitigate atmospheric emissions from various energy systems.			

37

Code	Course/Module Title	ECTS	Semester
SE-ENG-308	Energy Storage Systems	5	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	1	73	52
Description			
This course introduces students to energy storage systems and provides a broad understanding and appreciation of the scientific principles that underpin the operation of such systems. Energy storage systems are discussed for benchmarking and comparisons. Topics covered include electrical, chemical, thermal, mechanical, electrochemical, thermochemical and thermomechanical energy storage systems.			

38

Code	Course/Module Title	ECTS	Semester
SE-ENG-309	Computer Engineering Design	4	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	2	59	41
Description			
In SolidWorks course, you will learn the fundamental tools and concepts for the SolidWorks engineering and design software. You will learn how to use the SolidWorks software to build parametric models of parts and assemblies, and how to make drawings of those parts and assemblies.			

39

Code	Course/Module Title	ECTS	Semester
SE-ENG-310	Geothermal Energy	5	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	73	52
Description			
This course introduces students to geothermal energy and provides a broad understanding and appreciation of the scientific principles that underpin the operation of such energy. Applications of thermodynamics and heat transfer principles will explain how energy is transformed from geothermal energy to useable energy for large- and small-scale systems. Students will determine heating and cooling loads leading to the selection of the correct system installation to meet the demand.			

40

Code	Course/Module Title	ECTS	Semester
Math-302	Engineering Statistics	4	6
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	1	59	41
Description			
The course covers the following topics; statistics of applications: Data collection, Data representation, Central measurements, comparisons between central measurements, Variation measurements, comparisons between Variation measurements Sampling and Estimation, Principles of probability theory, Probability Distributions, Correlation and Regression, Hypotheses and Fitness tests, Test of variation, one-way test, Test of variation, two-way test, method of virtual work.			

41

Code	Course/Module Title	ECTS	Semester
SE-ENG-401	OPTIMIZATION	4	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	1	59	41
Description			
This course introduces the fundamental principles and mathematical techniques of optimization used in engineering analysis and design. It focuses on formulating real-world engineering problems as mathematical models and solving them using analytical and computational methods. Topics include linear and nonlinear programming, standard forms, simplex and two-phase methods, and the application of optimization to mechanical and energy systems. Emphasis is placed on developing problem-solving skills and understanding the role of optimization in improving engineering performance and efficiency.			

42

Code	Course/Module Title	ECTS	Semester
SE-ENG-402	Principle of Fuel Cell Technology	6	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
This course covers fuel cell technologies, systems, engine design, safety, and maintenance. It also presents the different types of fuel cells and hybrid electric vehicles.			

43

Code	Course/Module Title	ECTS	Semester
SE-ENG-403	Design of Sustainable Energy Systems	5	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	1	73	52
Description			
This course examines the production and consumption of energy from a systems perspective to accelerate sustainable energy transformations. Sustainability is examined by studying global and regional environmental impacts, economics, energy efficiency, consumption patterns and energy policy.			

44

Code	Course/Module Title	ECTS	Semester
SE-ENG-404	Mechanical Vibration	6	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	3	87	63
Description			
This course aims to establish fundamental knowledge of mechanical vibrations. Presentation of the course starts by applying Newton's second law to derive the equation of motion and then utilizes it to find the natural frequency and mode shapes if the system is two degree of freedom.			

45

Code	Course/Module Title	ECTS	Semester
SE-ENG-405	Automatic Control Systems	6	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
3	3	87	63
Description			
This course of Control Systems addresses dynamic systems, i.e., systems that involve with time. Typically, these systems have inputs and outputs; it is of interest to understand how the input affects the output (or, vice-versa, what inputs should be given to generate a desired output). In particular, it will be concentrated on systems that can be modeled by Ordinary Differential Equations (ODEs), and that satisfy certain linearity and time-invariance conditions.			

46

Code	Course/Module Title	ECTS	Semester
ENG-401	GRADUATION PROJECT I	3	7
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
1	2	44	31
Description			
Preparatory studies of the literature and data collection for the graduation project in a particular area of concentration and under the supervision of one of the faculty members. The course covers directed readings in the literature of civil engineering, introduction to research methods, seminar discussions dealing with special engineering topics of current interest. Planning, design, construction and management of an engineering project. Writing a technical report.			

47

Code	Course/Module Title	ECTS	Semester
SE-ENG-406	SUSTAINABLE BUILDING DESIGN	4	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	1	59	41
Description			
This course presents a comprehensive introduction to sustainable building design technology and options. Moreover, how building energy consumption affects global warming and consequent results (cost and pollution). Present the methods that achieve sustainable building and sustainability mathematically and numerically. Assessment of the performance of the existing building and study of the applicable options that lead to enhancing the performance and parts priority.			

48

Code	Course/Module Title	ECTS	Semester
SE-ENG-407	Wind Energy Systems	6	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
This course provides knowledge of wind energy fundamental, different components, cost, and environmental effects. Also, it introduces to wind power meteorology and wind turbine aerodynamics and design.			

49

Code	Course/Module Title	ECTS	Semester
SE-ENG-408	BIOMASS ENERGY SYSTEMS	6	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
This course introduces the principles and applications of bioenergy systems. Students will study various biomass resources and their conversion into biofuels through biological and thermochemical processes. Practical laboratory sessions cover biomass characterization, biofuel production, and energy efficiency assessment. The course also addresses environmental, economic, and sustainability aspects of bioenergy, supported by global case studies			

50

Code	Course/Module Title	ECTS	Semester
SE-ENG-409	Inelegant Network systems	6	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	3	87	63
Description			
Intelligent network systems are advanced communication networks that separate call control from the switching layer to provide enhanced, flexible services beyond basic voice and data. These systems use software and data to enable value-added services like caller ID, call waiting, and variable charging, allowing operators to manage networks more efficiently and offer more services to customers.			

51

Code	Course/Module Title	ECTS	Semester
SE-ENG-410	PRINCIPLES OF AIR CONDITIONING AND REFRIGERATION	4	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
2	2	59	41
Description			
This course aims to establish fundamental knowledge of Air-Conditioning design and engineering. To achieve this goal, fundamentals of thermodynamics, heat transfer, and transport physics applied to Air-Conditioning systems. Topics include design temperature and outdoor and indoor room temperatures, Introduction, governing equations of heating load calculation, heat loss through building structure, Infiltration and space heating, cooling load calculation, heat sources. Also, this course discusses Pressure drop of internal fluid flow through circular and rectangular			

duct and fittings. Design and selection of Air- Conditioning systems. All the numerical examples will be in SI units.

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Code	Course/Module Title	ECTS	Semester
ENG-402	GRADUATION PROJECT II	4	8
Lectures (hr/w)	**Lab./Prac./Tutor.**	**SSWL (hr/sem)**	**USSWL (hr/ sem)**
1	2	44	56
Description			
Preparatory studies of the literature and data collection for the graduation project in a particular area of concentration and under the supervision of one of the faculty members. The course covers directed readings in the literature of civil engineering, introduction to research methods, seminar discussions dealing with special engineering topics of current interest. Planning, design, construction and management of an engineering project. Writing a technical report.			