Northern Technical University
College of Oil & Gas Techniques Engineering/Kirkuk
Department of Renewable Energy Techniques Engineering

Modules Catalogue | 2026-2025 | دليل المواد الدراسية

Northern Technical University
الجامعة التقنية الشمالية

First Cycle – bachelor's degree (B.Sc.) – Renewable Energy Technologies Engineering

بكالوريوس –هندسة تقنيات الطاقة المتجددة

2023

Northern Technical University
College of Oil and Gas Techniques Engineering/ Kirkuk
Department of Renewable Energy Technologies Engineering



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1. Overview

This catalogue is about the courses (modules) given by the program of Renewable Energy Technologies Engineering to gain the Bachelor of Science degree. The program delivers (40) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة تقنيات الطاقة المتجددة للحصول على درجة بكالوريوس العلوم الهندسية في تخصص هندسة تقنيات الطاقات المتجددة. يقدم البرنامج (46) مادة دراسية، مع (6000) إجمالي ساعات حمل الطالب و240 إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية (مسار) بولونيا.

نموذج وصف البرنامج الأكاديمي

اسم الجامعة: الجامعة التقنية الشمالية

الكلية/ المعهد: هندسة تقنيات النفط والغاز/كركوك

القسم العلمي: قسم هندسة تقنيات الطاقة المتجددة

اسم البرنامج الأكاديمي او المهني: بكالوريوس قسم هندسة تقنيات الطاقة المتجددة

اسم الشهادة النهائية: بكالوريوس في هندسة تقنيات الطاقة المتجددة

النظام الدراسي: مسار بولونيا

تاريخ اعداد الوصف: 2026/03/05

تاريخ ملء الملف: 2026/03/05

التوقيع:

اسم رئيس القسم:أ.م.د نصير توفيق علوان

التاريخ: 2026/03/05

التوقيع:

اسم المعاون العلمي:أ.م.د شيروان مُحَمَّد نجم

التاريخ: 2026/03/05

دقق الملف من قبل شعبة ضمان الجودة والأداء الجامعي

اسم مسؤول شعبة ضمان الجودة والأداء الجامعي: م.د سعد سليم مرعي

الجامعة التقنية الشمالية
شعبة ضمان الجودة وتقويم الاداء الجامعي
كلية هندسة تقنيات النفط والغاز

التوقيع

التاريخ 2026/03/08

مصادقة السيد العميد : أ.م.د عبيد مجيد علي

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
NTU 101	English Language	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2		33	17
Description			
This module will be used to develop problem solving skills mainly speaking, reading, writing, and listening skills and to understand English language as a foreign language through the application of many techniques. It is also important to understand the general principles of English language. This course deals with the basic concepts of learning the main rules of English grammar and English vocabularies. It is mainly the basic subject for writing and speaking English well. The module is to understand how to build a correct English sentence. It contains various grammatical rules and different vocabularies with using typical examples to explain the structure and the meaning of any word or expression. The module is valid and reliable to deal with many recognizable situations and how to use English in different contexts associating with life experiences.			

Module 2

Code	Course/Module Title	ECTS	Semester
RETE 100	Mechanics Engineering / Static	7	1
Class (hr./w)	Lect/Lab./Prac. /Tutor	SSWL (hr./Sem)	USWL (hr./Sem)
3	2	78	97
Description			

Statics is a fundamental branch of Engineering Mechanics that deals with the analysis and prediction of the behavior of objects at rest or in equilibrium. It provides the foundation for understanding the principles of forces, moments, and their effects on structures and systems. This branch of engineering mechanics is primarily concerned with the study of particles and rigid bodies under the action of forces and moments.

One of the main objectives of Engineering Mechanics/Statics is to enable engineers to calculate and predict the behavior of structures and systems under different loading conditions. This includes understanding the concepts of force vectors, moments, and couples, as well as the methods for resolving and combining these forces to determine their resultant effects.

Through theoretical study, problem-solving, and practical applications, students of Engineering Mechanics/Statics develop critical skills in analyzing and solving engineering problems. They learn to apply mathematical principles, physics, and engineering concepts to determine the forces and moments in structures and systems, and to ensure their stability and safety.

Module 3

Code	Course/Module Title	ECTS	Semester
COGTEK 100	Mathematics Principles	7	1
Class (hr./w)	Lect/Lab./Prac. /Tutor	SSWL (hr./Sem)	USWL (hr./Sem)
3	2	78	97
Description			

Mathematics offers a potent and common language. When presenting mathematical ideas, arguments, and conclusions both orally and in writing, students are expected to employ acceptable mathematical terminology and a variety of representational techniques.

Students should be able to:

1. Employ proper mathematical language (notation, symbols, and terminology) in both spoken and written explanations in order to achieve the goals of mathematics.
2. Present information using the proper mathematical representations.
3. Choose between various mathematical representational styles.
4. Express thorough, clear, and simple mathematical arguments.
5. Utilizes a logical structure to arrange information.

Module 4

Code	Course/Module Title	ECTS	Semester
RETE 102	Electrical technology	6	1
Class (hr./w)	Lect/Lab./Prac. /Tutor	SSWL (hr./Sem)	USWL (hr./Sem)
2	3	78	72
Description			
Electrical technology encompasses the study of electrical systems, circuits, devices, and their applications. It focuses on understanding the principles and theories behind electricity, electrical power generation, transmission, and distribution. This field involves the design, installation, maintenance, and troubleshooting of electrical systems in various industries, such as power generation, manufacturing, telecommunications, and transportation. Electrical technology professionals work with electrical equipment, control systems, and renewable energy technologies. They are skilled in analyzing electrical circuits, performing measurements, and ensuring safety and compliance with electrical codes and standards. A strong foundation in electrical technology enables individuals to contribute to the development and advancement of electrical systems, energy efficiency, and the integration of new technologies in the field.			

Module 5

Code	Course/Module Title	ECTS	Semester
RETE 103	WORKSHOP	6	1
Class (hr./w)	Lect/Lab./Prac. /Tutor	SSWL (hr./Sem)	USWL (hr./Sem)
0	6	93	57
Description			
The workshop in an engineering college provides students with a valuable opportunity to acquire knowledge and practical skills in specific engineering fields. The workshop aims to enhance the application of theoretical concepts learned in classrooms and provides an interactive learning environment. It includes instructional sessions, hands-on exercises, problem-solving, and practical application projects. Students collaborate in teams to achieve specific goals and develop effective projects. The workshop promotes communication and collaboration among students, encourages critical thinking, and problem-solving in an engineering simulation environment. The workshop is a valuable chance for students to develop their technical and practical skills and enhance their engineering capabilities for the future.			

Module 6

Code	Course/Module Title	ECTS	Semester
NTU 100	Human Rights & Democracy	2	1
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
مادة حقوق الإنسان والديمقراطية تقدم فهمًا شاملاً للمفاهيم والمبادئ الأساسية لحقوق الإنسان والنظم الديمقراطية. تركز المادة على دراسة القيم والمبادئ التي تحكم حقوق الإنسان وحمايتها، بالإضافة إلى فهم أهمية الديمقراطية في تنظيم الحكم وضمان مشاركة المواطنين في صنع القرارات. يتناول المقرر مواضيع مثل المساواة، وحرية التعبير، وحقوق المرأة والطفل، وحقوق الأقليات، وحقوق العمال واللاجئين، وأسس ومؤسسات الديمقراطية. تهدف المادة إلى تعزيز الوعي القانوني والأخلاقي بين الطلاب، وتمكينهم من فهم أهمية حقوق الإنسان والمشاركة الديمقراطية في بناء مجتمع عادل ومتقدم.			

Module 7

Code	Course/Module Title	ECTS	Semester
RETE 104	Thermodynamics	9	2
Class (hr./w)	Lect/Lab./Prac. /Tutor	(SSWL (hr./Sem	(USWL (hr./Sem
3	4	108	117
Description			
In this thermodynamics module, students will explore the foundational concepts that form the basis of this field of study. They will examine energy interactions in thermal systems and measure relevant properties. Key concepts covered include force, energy, work, thermal equilibrium, and temperature. The workshop aims to develop a clear understanding of thermodynamics and its application in engineering. Students will also learn about the practical implications of thermodynamics, such as the laws of heat transfer and their applications in engine cycles. Additionally, they will explore the functioning of refrigerators and heat pumps based on the reversed Carnot cycle, which requires external work to transfer heat from a lower temperature body to a higher temperature body.			

Module 8

Code	Course/Module Title	ECTS	Semester
NTU 102	COMPUTER	3	2

Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/w)
1	1	33	42
Description			
Computer Principles is an introductory course that provides a comprehensive understanding of the fundamental concepts and principles of computer science. The course covers topics such as computer architecture, data representation, algorithms, programming languages, operating systems, and computer networks. Students will learn about the basic components of a computer system, how data is stored and processed, and the principles behind efficient and reliable computer operations. The course also explores the role of computers in society, ethical considerations in computing, and emerging trends in the field. Through this course, students will develop a solid foundation in computer principles and gain the necessary skills to pursue further studies or careers in computer science			

Module 9

Code	Course/Module Title	ECTS	Semester
RETE 101	Eng. Mechanics/ Dynamics	8	2
Class (hr/w)	Lect/Lab./Prac. /Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	122
Description			
Dynamics is a branch of Engineering Mechanics that focuses on the study of objects in motion and the forces that cause that motion. It builds upon the principles of statics and expands them to analyze the behavior of objects subjected to acceleration, velocity, and displacement. This field is concerned with understanding and predicting the motion of particles and rigid bodies, as well as the forces and energy associated with their motion. The primary goal of Engineering Mechanics/Dynamics is to provide engineers with a comprehensive understanding of how objects move and interact under the influence of forces and moments. By studying dynamics, engineers can design and analyze systems such as machines, vehicles, and structures to ensure their optimal performance, efficiency, and safety. In this subject, students explore various topics, including the kinematics and kinetics of particles and rigid bodies. Kinematics deals with the description of motion, focusing on concepts such as displacement, velocity, and acceleration. Kinetics, on the other hand, focuses on the forces and torques acting on objects, leading to their motion.			

Module 10

Code	Course/Module Title	ECTS	Semester

COGTEK 101	ENGINEERING DRAWING	8	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
1	3	63	137
Description			
This course description provides a necessary summary of the most important characteristics of the course as follows: Definition of engineering drawing orders and its uses - the concept of engineering programs in engineering drawing and their fields - engineering drawing tools. Types of engineering lines and their uses, exercises + function. Drawing geometric shapes on computer) rectangular, parallelepiped, square, the circle (exercises + function. Dimensions and how to put them on the drawing. Principles of projection in engineering drawing (simple shapes). Cartesian projection on three levels. uncomplicated shapes, medium complexity, Complex geometric shapes			

Module 11

Code	Course/Module Title	ECTS	Semester
NTU 103	Arabic language	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2		33	17
Description			
The description for the Arabic language is: Arabic is a rich and diverse language spoken by millions of people around the world. It is the official language of over 20 countries and holds great cultural and historical significance. With its unique alphabet, intricate grammar, and beautiful calligraphy, Arabic offers a fascinating linguistic journey. Whether you are interested in exploring the language for academic, professional, or personal reasons, learning Arabic opens doors to understanding Arab culture, literature, and society. From basic greetings to advanced conversational skills, mastering Arabic provides opportunities for communication, travel, and career prospects. Embrace the beauty of Arabic as you embark on a journey of language discovery and cultural immersion. الوصف االكاديمي لمادة اللغة العربية اللغة العربية هي لغة غنية ومتنوعة يتحدثها الماليين من ألشخاص حول العالم. إنها اللغة الرسمية في أكثر من 20 دولة وتحمل همية ثقافية وتاريخية كبيرة. بفضل أبجديتها الفريدة، وقواعدها المعقدة، والخط الجميل، تقدم اللغة العربية رحلة لغوية مثيرة. سواء كنت مهت ًما باستكشاف اللغة ألسباب أكاديمية، مهنية أو شخصية، فإن تعلم العربية يفتح أبوابا لفهم الثقافة العربية واألدب والمجتمع. من التحية ألساسية إلى مهارات المحادثة المتقدمة، يوفر اتقان العربية فرصة للتواصل والسفر وفرص العمل.			

Module 12

Code	Course/Module Title	ECTS	Semester
RETE 202	Strength of Materials	6	3
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	93	57
Description			
The strength of a material is its ability to resist external forces without breaking. Strength of Materials is the foundation for Engineering design courses. The course covers material behaviour, stresses, strains and deformations with simple applications in engineering designs. Topics to be chosen from: elastic and elastic-plastic behaviour; plane stress and strain; constitutive relationships, principal stress and strain; failure criteria; stresses in thin-walled pressure vessels; bending and shearing stresses in beams; Mohr's circle; deflections of beams; Euler buckling; short and long columns; torsion of solid and hollow circular sections; introduction to statistical indeterminacy and simple redundant structures; work and strain energy concepts.			

Module 13

Code	Course/Module Title	ECTS	Semester
COGTEK 201	Mathematics	7	3
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	2	78	97
Description			

The proficiencies of Understanding, Fluency, Problem Solving and Reasoning are fundamental to learning mathematics and working mathematically and are applied across all three strands Number and Algebra, Measurement and Geometry, and Statistics and Probability.

Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures. Students make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they:

- connect related ideas
- represent concepts in different ways
- identify commonalities and differences between aspects of content
- describe their thinking mathematically
- interpret mathematical information

Module 14

Code	Course/Module Title	ECTS	Semester
RETE 200	Electronics	7	3
Lectures (hr/w)	Lab./Prac./Tutor.	SSWL (hr/sem)	USSWL (hr/w)
2	3	78	97
Description			
This module introduces students to the principles and applications of electronics. Students will study electronic components, circuits, and systems. They will learn about topics such as analog and digital electronics, circuit design, and troubleshooting. The module provides a foundation for understanding electronic devices and their functions.			

Module 15

Code	Course/Module Title	ECTS	Semester
RETE 201	Mechanical Drawing	6	3
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
1	3	63	87
Description			
The course on Mechanical Drafting provides comprehensive training on various aspects of drafting and design in mechanical engineering. It covers topics such as the use of AutoCAD system for mechanical drafting, screw threads, bolts, nuts, keys, pin and cotter joints, riveting joints, welding symbols, gear drawings, assembly drawings, detail drawings, and coupling, bearing, and pipe joints. The course includes practical examples and exercises that allow students to gain hands-on experience in drawing each component. By completing this course, students can enhance their knowledge and skills in mechanical engineering drafting, enabling them to create accurate and detailed drawings for various mechanical components and systems.			

Module 16

Code	Course/Module Title	ECTS	Semester
NTU 200	جرائم حزب البعث	2	3

Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2		33	17
Description			
إن تدريس جرائم البعث في الكليات والمعاهد والمدارس الإعدادية أكثر من ضرورة لاعتبارات في مقدمتها: لكي لا تنسى الأجيال تلك الجرائم، ولكي يطلع عليها جيل مواليد ما بعد التسعين الذين لم يعيشوا تلك الحقبة السوداء، كما أن حضور جرائم البعث في المناهج الدراسية يمنح الذاكرة العراقية شيئا من الحصانة والتثقيف ، وهو ايضا جدار صد في وجه تكرار التجربة، لأن التاريخ كثيرا ما يتكرر في المشاهد والسلوكيات بأسماء وبمدعيات أخرى. أن إدراج جرائم البعث في المناهج الدراسية إلى جانب مادة حقوق الإنسان يعني أن تلك الجرائم وحظر البعث ليس فقط أخذ طابعا رسميا, وانما يصبح خزينا في وعي المواطن وجزءا من ثقافته			

Module 17

Code	Course/Module Title	ECTS	Semester
NTU 201	English Language	2	3
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2		33	17
Description			
The English Language Lecture module aims to provide students with a comprehensive understanding of the English language, including its structure, usage, and various linguistic aspects. The lecture aims to enhance students' language skills and improve their overall proficiency in English. Also, in this module, we will learn about the structure of the English language and explore answers to these questions. You will develop a sound grasp of a useful method for exploring English grammar and learning the relevant terminology. By the end of the module, you will be able to apply this descriptive framework to any text in English and understand the effect of grammar choices on your style of academic writing.			

Module 18

Code	Course/Module Title	ECTS	Semester
RETE 200	Fluid Mechanics	8	4
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
3	3	93	107

Description
Fluid Mechanics, the branch of science that deals with the study of fluids (liquids and gasses) in a state of rest or motion, is an important subject of Civil, Mechanical and Chemical Engineering. Its various branches are fluid statics, fluid kinematics and fluid dynamics. A substance that flows is called a fluid. All liquid and gaseous substances are considered to be fluids. Water, oil, and others are very important in our day-to-day life as they are used for various applications. For instance, water is used for generation of electricity in hydroelectric power plants and thermal power plants, water is also used as the coolant in nuclear power plants, oil is used for the lubrication of automobiles etc. Fluid Mechanics is the branch of science that studies the behavior of fluids when they are in state of motion or rest. Whether the fluid is at rest or motion, it is subjected to different forces and different climatic conditions and it behaves in these conditions as per its physical properties. Fluid mechanics deals with three aspects of the fluid: static, kinematics, and dynamics aspects.

Module 19

Code	Course/Module Title	ECTS	Semester
RETE 203	Electronics Circuits	6	4
Lectures (hr/w)	Lab./Prac./Tutor.	SSWL (hr/sem)	USSWL (hr/w)
2	3	78	72
Description			
This module covers the theory and applications of operational amplifiers (op-amps) in electronic circuits. Students will study op-amp characteristics, circuit configurations, and their applications in amplifiers, filters, and signal conditioning circuits. The module provides a solid foundation for understanding and designing analog electronic circuits using op-amps.			

Module 20

Code	Course/Module Title	ECTS	Semester
RETE 204	Refrigeration & Air Conditioning Principles	6	4
Class (hr/w)	Lect/lab./prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72
Description			

The Refrigeration and Air Conditioning Principles module provides students with a comprehensive understanding of the principles, components, and applications of refrigeration and air conditioning systems. This module combines theoretical knowledge with practical skills. Throughout the module, students delve into the fundamental principles of thermodynamics, heat transfer, and psychometrics', which form the basis of refrigeration and air conditioning processes. They learn about the various components involved in these systems, including compressors, condensers, evaporators, expansion devices, and controls, and understand their functions and interactions. Hands-on activities and laboratory sessions enable students to calculate and analyze different air conditioning processes and refrigeration systems. The module encourages the students to communicate effectively and work collaboratively in teams, simulating real-world scenarios they may encounter in the field.

Module 21

Code	Course/Module Title	ECTS	Semester
RETE 205	Electrical machines	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
In this curriculum, the student will learn the basics of connection in series, parallel, and mixed, and when the current is constant and the voltage is constant, and identify measuring devices, as measuring current differs from measuring voltage and resistance. And obtaining the same results, the student learns the amount of current and voltage entering the single loop in the case of two sources, as is the case in Kirchhoff's theory, and then the student experiences the maximum energy conversion, as it shows that there is a load that is drawn according to the source load.			

Module 22

Code	Course/Module Title	ECTS	Semester
NTU 202	Computer	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	1	42	75
Description			
Computer Applications is a foundational course intended to teach students the fundamentals and concepts involved in the use of common software applications. Upon completion of this course, students will gain basic proficiency in the MATLAB program and simulation. Students will have engaged in key critical thinking skills and will have practiced ethical and appropriate behavior required for the responsible use of technology.			

Module 23

Code	Course/Module Title	ECTS	Semester
NTU 203	Arabic Language	2	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
The description for the Arabic language is: Arabic is a rich and diverse language spoken by millions of people around the world. It is the official language of over 20 countries and holds great cultural and historical significance. With its unique alphabet, intricate grammar, and beautiful calligraphy, Arabic offers a fascinating linguistic journey. Whether you are interested in exploring the language for academic, professional, or personal reasons, learning Arabic opens doors to understanding Arab culture, literature, and society. From basic greetings to advanced conversational skills, mastering Arabic provides opportunities for communication, travel, and career prospects. Embrace the beauty of Arabic as you embark on a journey of language discovery and cultural immersion. الوصف الاكاديمي لمادة اللغة العربية اللغة العربية هي لغة غنية ومتنوعة يتحدثها الملايين من الأشخاص حول العالم .إنها اللغة الرسمية في أكثر من 20 دولة وتحمل أهمية ثقافية وتاريخية كبيرة .بفضل أبجديتها الفريدة، وقواعدها المعقدة، والخط الجميل، تقدم اللغة العربية رحلة لغوية مثيرة. سواء كنت مهتمًا باستكشاف اللغة لأسباب أكاديمية، مهنية أو شخصية، فإن تعلم العربية يفتح أبوابا لفهم الثقافة العربية والأدب والمجتمع .من التحية الأساسية إلى مهارات المحادثة المتقدمة، يوفر اتقان العربية فرصًا للتواصل والسفر وفرص العم ل			

Module 24

Code	Course/Module Title	ECTS	Semester
RETE 300	Conduction and radiation heat transfer	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	3	**78**	**72**
Description			
The conduction and radiation heat transfer module is a component of studies in thermal engineering or heat transfer that focuses on understanding and analyzing the transfer of heat through conduction and radiation mechanisms. Throughout the module, students typically engage in theoretical analysis, numerical calculations, and problem-solving exercises to apply the principles of conduction and radiation heat transfer to real-world engineering problems. They may use mathematical methods, computational tools, and software simulations to analyze heat transfer phenomena and design efficient thermal systems. Understanding conduction and radiation heat transfer is crucial in various engineering fields, such as HVAC systems, energy systems, thermal management of electronic devices, and industrial processes where heat transfer plays a significant role.			

Module 25

Code	Course/Module Title	ECTS	Semester
COGTEK 301	Engineering Analysis	**5**	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	**62**
Description			
The engineering analytics module is a component of engineering education that focuses on teaching students the principles and techniques of applying analytical methods and tools to solve complex engineering problems. It involves the use of mathematical and statistical analysis, data modeling, and computer simulations to extract insights and make informed decisions in engineering applications. Throughout the module, students typically engage in hands-on projects, case studies, and practical exercises that involve analyzing real engineering data, developing models, conducting simulations, and making data-driven recommendations or predictions. They may use software tools, programming languages, and data analysis platforms to perform the required analyses. The engineering analytics module equips students with the skills and knowledge to leverage data and analytical techniques to address complex engineering challenges. It is increasingly relevant in today's data-driven engineering fields, such as manufacturing, energy systems, transportation, and infrastructure, where informed decision-making and optimization are critical for achieving efficiency, reliability, and sustainability.			

Module 26

Code	Course/Module Title	ECTS	Semester
RETE 302	Renewable Energy systems	7	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	4	93	82
Description			
The module "Renewable Energy Systems" offers a comprehensive exploration of various renewable energy sources and their integration into contemporary energy systems. Students will delve into the principles, technologies, and applications of solar, wind, hydropower, biomass, and geothermal energy. This course goes beyond theoretical concepts, providing practical insights into the design, implementation, and management of renewable energy systems. Emphasis is placed on the environmental and socio-economic aspects of these technologies, addressing the global shift towards sustainable energy solutions. Through case studies and hands-on projects, students will gain a holistic understanding of the challenges and opportunities in the renewable energy sector. The module aims to equip students with the knowledge and skills to contribute effectively to the development and optimization of renewable energy projects, fostering a sustainable and resilient energy future. This foundational course sets the stage for further specialization in the dynamic field of renewable energy.			

Module 27

Code	Course/Module Title	ECTS	Semester
RETE 303	Power Electronics	6	5
Lectures (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USSWL (hr/w)
2	2	63	87
Description			
This module focuses on the study of electronic circuits and systems used for power conversion and control. Students will learn about power semiconductor devices, converter topologies, and control techniques for efficient power conversion. The module emphasizes the application of power electronics in areas such as renewable energy systems and motor drives.			

Module 28

Code	Course/Module Title	ECTS	Semester
RETE 304	Gas dynamics	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Gas Dynamics is a course that explores the behavior of gases in motion. It delves into the principles and theories governing the flow, compression, and expansion of gases. Students will learn about the fundamental concepts of thermodynamics, conservation laws, and the equations of motion in order to analyze and predict the behavior of gases in various scenarios. Topics covered include one-dimensional flow, shock waves, supersonic and hypersonic flows, and nozzle design. Gas Dynamics provides a foundation for understanding and designing propulsion systems, aerodynamics, and other applications related to fluid dynamics.			

Module 29

Code	Course/Module Title	ECTS	Semester
RETE 305	Solar Energy Engineering	7	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	4	93	82
DESCRIPTION			

Solar Energy Engineering Module: This comprehensive module in Solar Energy Engineering is designed to equip students with the knowledge and skills needed to harness the vast potential of solar power. The module begins with an exploration of the fundamental principles of solar energy, covering topics such as solar radiation, photovoltaic effect, and solar thermal technologies. Students delve into the design, installation, and maintenance of solar photovoltaic systems, gaining hands-on experience with the latest solar panels, inverters, and energy storage solutions. Special emphasis is placed on understanding the integration of solar energy into existing power grids and off-grid applications. Through a blend of theoretical lectures, practical laboratory sessions, and real-world case studies, students learn to assess site suitability, calculate energy yields, and design customized solar energy solutions for various applications, including residential, commercial, and industrial sectors. Additionally, the module explores sustainable practices, policy frameworks, and emerging innovations in the field, empowering students to contribute meaningfully to the global transition towards clean, renewable energy sources.

Module 30

Code	Course/Module Title	ECTS	Semester
RETE 306	Biofuel	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
The "Biofuels" module delves into the dynamic field of renewable energy derived from organic materials. Students explore the production, properties, and applications of biofuels, encompassing bioethanol, biodiesel, and advanced biofuels. The module covers feedstock selection, conversion technologies, and environmental implications. Students analyze the role of biofuels in mitigating climate change, energy security, and sustainable development. Emphasis is placed on the integration of biofuels into existing energy infrastructures and the exploration of emerging technologies. Through case studies and practical exercises, students gain insights into the economic, social, and ethical dimensions of biofuel production, preparing them for active participation in the evolving landscape of sustainable energy solutions.			

Module 31

Code	Course/Module Title	ECTS	Semester
RETE 301	Convection heat transfer and heat exchangers	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
The convection heat transfers and heat exchangers module is a component of studies in thermal engineering or heat transfer that focuses on understanding and analyzing the transfer of heat through convection mechanisms and the design and operation of heat exchangers. Throughout the module,			

students typically engage in theoretical analysis, numerical calculations, and problem-solving exercises to apply the principles of convection heat transfer and heat exchangers to real-world engineering problems. They may use mathematical methods, computational tools, and software simulations to analyze convective heat transfer and design efficient heat exchanger systems.
Understanding convection heat transfer and heat exchangers is crucial in various engineering fields, such as HVAC systems, power generation, chemical processes, and refrigeration systems, where efficient heat transfer and heat management are essential for system performance and energy efficiency.

Module 32

Code	Course/Module Title	ECTS	Semester
RETE 307	Hydropower	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	87
Description			
Hydropower is a course that introduces students to the principles of generating electricity from water resources. It covers hydrological fundamentals, hydraulic systems, turbines, generators, and hydropower plant design. Students learn about energy conversion, efficiency analysis, and environmental impacts of hydropower projects. The course also addresses small-scale and large-scale hydropower applications. It aims to develop the skills needed for the planning, operation, and assessment of sustainable hydropower systems.			

Module 33

Code	Course/Module Title	ECTS	Semester
COGTEK 30**2**	Numerical analytics	**5**	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	63	62
Description			
The numerical analysis module is a component of mathematics and engineering education that focuses on teaching students the principles, techniques, and algorithms for solving mathematical problems and approximating solutions using numerical methods. It involves the use of mathematical models and computational tools to perform calculations and simulations when analytical solutions are either impractical or unavailable. Throughout the module, students typically engage in theoretical analysis, problem-solving exercises, and computer-based simulations to apply numerical methods to real-world mathematical problems. They may also work on projects that involve modeling, simulation, and data analysis, where they apply numerical techniques to solve engineering or scientific problems. The numerical analysis module equips students with the skills to use numerical methods effectively, allowing them to solve complex mathematical problems, analyze engineering systems, and make informed decisions based on numerical simulations and computations. It is applicable across various disciplines, including engineering, physics, finance, computer science, and any field that requires mathematical			

modeling and analysis.

Module 34

Code	Course/Module Title	ECTS	Semester
RETE 400	Wind energy	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	62
Description			
Wind Energy module: This specialized Wind Energy module offers a comprehensive understanding of harnessing wind power as a sustainable energy resource. Students enrolled in this module explore the principles of wind energy, including meteorological factors, wind turbine technology, aerodynamics, and wind farm design. Through theoretical lectures and practical demonstrations, students learn to assess wind resources, analyze wind patterns, and select suitable sites for wind farm installations. The module delves into the engineering aspects of wind turbines, including rotor design, drivetrain systems, and power electronics. Additionally, students gain insights into grid integration, energy storage solutions, and the environmental impact assessment of wind energy projects. Hands-on experiences with modern wind turbine simulators and computational tools enable students to optimize turbine performance and maximize energy output. This module not only equips students with technical expertise but also provides a holistic understanding of policy frameworks, economic considerations, and global trends in wind energy, preparing them to tackle the challenges of the rapidly evolving renewable energy industry.			

Module 35

Code	Course/Module Title	ECTS	Semester
RETE 401	Solar Photovoltaic Conversion	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	62
Description			

Photovoltaic Energy Conversion module: This specialized module in Photovoltaic Energy Conversion delves deep into the intricate world of solar power generation. Students enrolled in this module explore the fundamental principles of photovoltaic (PV) technology, semiconductor physics, and the behavior of solar cells. Through a blend of theoretical learning and practical experiments, students gain hands-on experience in designing, fabricating, and characterizing solar cells and modules. The module covers various types of PV materials, such as silicon, thin-film, and emerging technologies, enabling students to analyze their efficiency, durability, and cost-effectiveness. Emphasis is placed on the optimization of PV systems, including module integration, power electronics, and grid connections. Additionally, students delve into topics like solar tracking, energy storage solutions, and the integration of PV systems into smart grids. Through real-world case studies and research projects, students develop the skills necessary to innovate in the field, addressing challenges related to energy conversion efficiency, environmental impact, and sustainable deployment of photovoltaic technologies in diverse applications, ranging from residential installations to large-scale solar farms.

Module 36

Code	Course/Module Title	ECTS	Semester
RETE 402	Simulation of renewable energy systems	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	3	78	72
Description			
This module provides an in-depth exploration of the pivotal role simulation plays in understanding, analyzing, and optimizing renewable energy technologies. Students will delve into the intricacies of mathematical modeling, utilizing simulation tools to accurately represent the dynamic behavior of various renewable sources such as solar, wind, hydropower, and biomass. Emphasis is placed on practical applications, enabling students to assess system performance, conduct scenario analyses, and optimize renewable energy solutions. The module aims to equip students with the proficiency to employ simulation software, integrate real-world data, and make informed decisions for enhancing the efficiency and reliability of renewable energy systems. Through hands-on projects and case studies, students will gain practical insights into the complexities of sustainable energy solutions, preparing them for impactful roles in addressing the global energy challenge. Effective communication of simulation findings and insights to diverse stakeholders is a key skill cultivated in this comprehensive module.			

Module 37

Code	Course/Module Title	ECTS	Semester
COGTEK 400	Engineering projects management and its risks	4	7

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	1	48	52
Description			
The module aims to encourage students' participation in the management exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials, and by considering types of simple assumptions involving some sampling activities that are interesting to the students. The results of this module study will lead to: 1. Enable the student to use knowledge to manage the different purposes of organizations. 2. Enable engineers to lay out the administrative and production organization of industrial enterprises. 3. Enable engineers to lay out the network planning for the different engineering processes and find the typical path of the minimum duration that offers the best quality of production. 4. Enable engineers to study the feasibility of the industrial processes which leads to successful of the production. 5. Enhance the student skills in management by giving the typical solution to the assumed problem.			

Module 38

Code	Course/Module Title	ECTS	Semester
RETE 404	Energy Economics and Feasibility Analysis	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	62
Description			
Energy Economics and Feasibility Analysis is a course that introduces students to the economic evaluation of energy projects and technologies. It covers energy markets, cost analysis, financial indicators, and economic decision-making methods. Students learn to assess the technical, economic, and environmental feasibility of renewable and conventional energy systems. The course includes topics such as life-cycle cost analysis, payback period, and investment appraisal. It aims to develop the skills required for planning and evaluating sustainable and cost-effective energy projects.			

Module 39

Code	Course/Module Title	ECTS	Semester
NTU 400	Methodology of Scientific Research	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2		33	92
Description			
The "Methodology of Scientific Research" module equips students with essential skills for designing, conducting, and evaluating scientific investigations. This module covers scientific methods, research question formulation, hypothesis development, experimental design, data collection, and statistical analysis. Emphasizing ethical considerations and effective communication of findings, students engage in hands-on exercises and case studies. Through this module, participants develop a robust foundation in research methodologies applicable across diverse scientific disciplines, fostering critical thinking and methodological rigor. By the module's conclusion, students are prepared to contribute meaningfully to the scientific community, demonstrating proficiency in the systematic pursuit of knowledge and evidence-based inquiry.			

Module 40

Code	Course/Module Title	ECTS	Semester
RETE 405	Design of solar renewable systems	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	87
Description			

Renewable Energy Design module: The Renewable Energy Design module is tailored for students aspiring to become proficient in creating sustainable energy solutions. This module integrates theoretical knowledge with practical skills, guiding students through the process of conceiving, planning, and executing renewable energy projects. Participants explore various renewable energy sources, including solar, wind, hydroelectric, and biomass, gaining a deep understanding of their technical, environmental, and economic aspects. Through hands-on projects, students learn to assess energy needs, analyze site suitability, and design customized renewable energy systems. Emphasis is placed on system integration, energy storage technologies, and grid compatibility, ensuring students grasp the complexities of real-world applications. Additionally, the module covers policy frameworks, financial modeling, and environmental impact assessments, providing students with a holistic perspective on renewable energy project development. By the end of the module, students are equipped with the expertise to design innovative, sustainable, and economically viable renewable energy solutions, contributing significantly to the global transition towards a greener and more sustainable future.

Module 41

Code	Course/Module Title	ECTS	Semester
RETE 406	Store and recover energies	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	62
Description			
The "Store and recover energies" module offers an in-depth exploration of systems crucial for sustainable energy practices. Students delve into a range of technologies such as batteries, pumped hydro storage, compressed air energy storage, and thermal energy storage. The module covers fundamental principles, efficiency considerations, and integration strategies with renewable energy sources. It highlights the importance of addressing the intermittent nature of renewables, ensuring grid stability, and managing peak energy demand. Through theoretical learning and practical applications, students gain a nuanced understanding of how energy storage contributes to overall efficiency, environmental impact reduction, and the development of resilient and adaptable energy infrastructures.			

Module 42

Code	Course/Module Title	ECTS	Semester
RETE 407	Control systems	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	2	63	62
Description			

Control systems involve the application of various techniques and technologies to measure, monitor, and control physical variables and processes in industrial, engineering, and scientific applications. This field encompasses the design, implementation, and optimization of systems that ensure accurate and reliable measurements, as well as effective control of processes. Measurement and Control Systems play a crucial role in industries such as manufacturing, power generation, automation, and instrumentation. They involve sensors, transducers, data acquisition systems, signal processing techniques, and control algorithms. These systems enable precise measurement of variables like temperature, pressure, flow rate, and level, and utilize control strategies to regulate and optimize processes. Understanding Measurement and Control Systems requires knowledge of sensors, data acquisition methods, signal conditioning, measurement principles, control theory, and instrumentation. Professionals in this field need to analyze system behavior, design control algorithms, implement hardware and software components, and troubleshoot issues. This field is constantly evolving with advancements in technology, such as the integration of Internet of Things (IoT), machine learning, and cloud computing. Measurement and Control Systems are vital for ensuring efficiency, safety, and reliability in various industries, making it a critical area of study for engineers and scientists.

Module 43

Code	Course/Module Title	ECTS	Semester
RETE 403	Computer-based modeling and simulation of renewable energy systems	8	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/sem)
2	4	93	107
Description			
This module delves into the advanced realm of "Computer-Based Modeling and Simulation of Renewable Energy Systems." Students will master the art of creating dynamic and precise computer models for diverse renewable energy sources, including solar, wind, hydropower, biomass, and geothermal. With a focus on real-world applications, students will learn to harness simulation tools, evaluating the performance and optimizing the efficiency of renewable energy technologies. The module emphasizes the integration of actual data into simulations, ensuring accuracy in representing system behaviors. By fostering skills in optimization techniques and scenario analysis, students will be equipped to enhance the economic viability and resilience of renewable energy systems. This comprehensive exploration aims to empower students to contribute meaningfully to the design, analysis, and optimization of practical renewable energy projects. Effective communication of simulation results to stakeholders will be a key outcome, preparing students for impactful roles in the evolving landscape of sustainable energy solutions.			

Module 44

Code	Course/Module Title	ECTS	Semester
COGTEK 401	Graduation Project	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

1	3	63	87
Description			
The Graduation Project module is an essential component of many academic programs, particularly in engineering and other technical disciplines. It is typically undertaken by students in their final year of study and serves as a culmination of their educational journey. The module provides students with an opportunity to apply the knowledge, skills, and concepts they have acquired throughout their program to address a real-world problem or complete a substantial research project. The Graduation Project module aims to develop students' problem-solving, research, project management, and presentation skills. It encourages independent thinking, self-directed learning, and the integration of theoretical knowledge with practical application. The project provides students with an opportunity to demonstrate their readiness to enter the professional world by applying their skills and knowledge to solve real-world problems or contribute to the existing body of knowledge in their field. The specific requirements and expectations of the Graduation Project module may vary depending on the educational institution, program, and discipline. Students are typically guided and supported by a project advisor or a supervisory committee throughout the duration of the project.			

3. Contact

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