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Modules Catalogue | 2025-2026 |

NORTHERN TECHNICAL UNIVERSITY

Bachelor's Degree (B.Sc.) Engineering Technology for Chemical and Petroleum Industries



Modules Catalogue Form

University Name: .Northern Technical University.....

Faculty/Institute: .Technical Engineering College Mosul.....

Scientific Department: Chemical and Petroleum Industries Technologies Engineering

Academic or Professional Program Name: Bachelor of Chemical and Petroleum Industries Technologies Engineering

Final Certificate Name: Bachelor of Chemical and Petroleum Industries Technologies Engineering

Academic System: Bologna Process.....

Description Preparation Date: 2/9/2025

File Completion Date: 2/9/2025

Signature:

Head of Department Name:

Haider Ismael Ibrahim

Date: 2/9/2025

Signature:

Scientific Associate Name:

Prof. Dr. Mohammed Sabah Jarjees

Date: 25/9/2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance

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Date:

Signature:

Approval of the Dean

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1. Overview

This catalog provides information about the courses (modules) offered by the Technological Engineering program for Chemical and Oil Industries, leading to the Bachelor of Technical Degree. The program consists of 40 modules, with a total student workload of 6000 hours and 240 total ECTS credits. The module delivery follows the principles of the Bologna Process.

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2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
NTU100	Human Rights and Democracy	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	32	2.9
Description			
The core ideas and concepts of democracy and human rights are examined in this subject. Students will learn about issues including equality, social justice, and civil liberties. The goal of the module is to help students comprehend the value of democracy and human rights in society.			

Module 2

Code	Course/Module Title	ECTS	Semester
NTU101	English Language	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	32	2.9
Description			
Define special knowledge and basic concepts in the English language, and review words, terms, and phrases commonly utilized, along with practical everyday language that students need. Explore the fundamental principles of grammar used in the English language, such as questions and answers, negatives, tail questions, singular and plural forms, numbers, nouns, pronouns, and the verbs 'to be,' 'to have,' and 'to do.' Additionally, cover adjectives, regular and irregular verbs, the usage of 'so' and 'neither,' adverbs, degrees of comparison, conjunctions, interjections, and types of letters (S) with general exercises.			

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Module 3

Code	Course/Module Title	ECTS	Semester
NTU102	Computer Principles	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	8.1
Description			
The Fundamentals of Computer Science course is designed to provide a comprehensive introduction to the key concepts and principles of computing. Its aim is to equip students with the fundamental knowledge and skills necessary to understand and engage with the world of computers and technology. The course will combine theoretical knowledge with practical exercises and projects to reinforce understanding and application. Students will gain hands-on experience with programming languages, development tools, and software applications relevant to the topics covered.			

Module4

Code	Course/Module Title	ECTS	Semester
TEMO100	Mathematics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	62	5.9
Description			
This module provides an introduction to functions, limits, special functions, derivatives, the chain rule, and their applications. It also introduces integral calculus and various methods of integration. Students will learn how to calculate derivatives and integrals of functions, along with their applications in fields such as physics, engineering, and economics. The module aims to develop students' analytical and problem-solving skills.			

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Module 5

Code	Course/Module Title	ECTS	Semester
ETCP100	Principles of Chemical Engineering	10	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	77	8.2
Description			
The objective of this course is to teach students the fundamental knowledge of chemical engineering and its application in solving material balances of chemical processes. Material balance is an essential tool in chemical engineering as it helps engineers optimize processes, identify sources of inefficiency, minimize waste generation, and ensure compliance with environmental regulations. It finds applications in various industries, including petroleum refining, chemical production, food processing, and wastewater treatment, among others, to maintain efficient and sustainable operations. The course will cover concepts ranging from basics such as units and dimensions and stoichiometry to the simultaneous application of material balances with and without chemical reactions for single and multi-processes			

Module 6

Code	Course/Module Title	ECTS	Semester
TEMO101	Engineering Drawing	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	3.8
Description			
The Engineering Drawing course is designed to provide students with the fundamental knowledge and skills required to create accurate technical drawings commonly used in engineering and design fields. The course focuses on developing proficiency in reading, interpreting, and creating engineering drawings using industry-standard practices and techniques. Additionally, it includes an introduction to AutoCAD 2D software for engineering drawing.			

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Module 7

Code	Course/Module Title	ECTS	Semester
TEMO104	Electrical Principles	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	4.8
Description			
The Electrical Principles course is designed to provide students with a foundational understanding of electrical concepts, principles, and applications. It covers the fundamental principles of electricity and electrical circuits, laying the groundwork for further study and practical application in electrical engineering and related fields. The course covers basic electrical engineering topics in detail, including examples and explanations of direct current circuits, AC circuit network calculations, standards and conventions, Ohm's law, resistance, resistivity, electromagnetism, generators, alternating current, transformers, motors, and instrumentation.			

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Module 8

Code	Course/Module Title	ECTS	Semester
TEMO103	Workshop	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	2.5
Description			
The Workshop course provides students with practical knowledge and skills related to various workshop processes and technologies commonly used in the manufacturing, construction, and engineering industries. Its aim is to develop hands-on skills, safety awareness, and an understanding of different tools, machines, and materials used in workshop settings. The course includes practical demonstrations, hands-on workshops, and projects to provide students with real-world experience. Emphasis is placed on safety precautions, proper use of tools and equipment, and adherence to industry standards throughout the course.			

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Module9

Code	Course/Module Title	ECTS	Semester
ETCP101	General Chemistry	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	5	138	4.1
Description			
The General Chemistry course provides students with a comprehensive understanding of the fundamental principles and concepts of chemistry. It serves as an introduction to the study of matter, including its properties, composition, transformations, and interactions. The course aims to develop students' critical thinking, problem-solving, and laboratory skills in the field of chemistry. It covers the fundamentals of atoms, molecules, quantitative analysis, environmental chemistry, transition metal chemistry, and spectroscopic techniques, which are extensively used in other chemical engineering courses.			

Module 10

Code	Course/Module Title	ECTS	Semester
ETCP102	Engineering Mechanics &Strength of Materials	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	3.8
Description			
The course covers the principles of statics, including the results of a force system, equilibrium of a force system, moment of a force, friction, centroid and center of gravity, moment of inertia, analysis of internal forces, strain, stress-strain diagram, Hook's law, shearing deformation, Poisson's ratio, volumetric strain, thin-walled cylinders, thermal stress, and shear and bending moment in beams.			

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Module 11

Code	Course/Module Title	ECTS	Semester
NTU201	Crimes of the Ba'ath Regime in Iraq	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	2.25
Description			
Understanding and documenting the history and legal context of the crimes committed by the Ba'ath regime in Iraq—in accordance with the 2005 Statute of the Iraqi High Criminal Court—as well as classifying and analyzing these crimes through an understanding of the concepts and categories of offenses, including international crimes.			

Module 12

Code	Course/Module Title	ECTS	Semester
ETCP200	Petroleum Chemistry	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	78	5.2
Description			
This course provides an introduction to organic compounds, their preparation, and reactions, including petroleum and heterocyclic compounds. It covers petroleum feedstock, refining processes, and products, as well as the properties of various petroleum fractions.			

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Module 13

Code	Course/Module Title	ECTS	Semester
ETCP201	Engineering Mathematics	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	62	4.5
Description			
The Engineering Mathematics course is designed to provide students with a solid mathematical foundation and equip them with the necessary tools and techniques to solve engineering problems. The course covers a wide range of mathematical concepts and their applications in engineering fields, emphasizing both theoretical understanding and practical problem-solving skills. Topics covered include the evaluation of double and triple integrals, definite integrals and their applications for finding areas, polar coordinates, vector analysis, determinants, and matrices. Through this course, students will develop the skills needed to apply these mathematical concepts to various chemical engineering applications in the future.			

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Module 14

Code	Course/Module Title	ECTS	Semester
ETCP202	Physical Chemistry	8	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	93	6.2
Description			
The Physical Chemistry course provides students with a comprehensive understanding of the principles and theories that govern the behavior of matter and chemical systems at the molecular and atomic levels. By combining concepts from physics and chemistry, this course explores the fundamental principles underlying chemical reactions, molecular structure, and the physical properties of substances. It covers the fundamentals of atoms and molecules, quantitative analysis, environmental chemistry, transition metal chemistry, and spectroscopic techniques, all of which are highly relevant to other chemical engineering courses.			

Module 15

Code	Course/Module Title	ECTS	Semester
ETCP203	Engineering Materials	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	75	5
Description			
Engineering Materials is a subject that studies different types of engineering materials and their properties, such as metals, polymers, ceramics, and composite materials. In chemical and petroleum industries, it helps engineers select suitable materials for pipes, tanks, heat exchangers, reactors, and other industrial equipment. The course focuses on important properties such as strength, hardness, corrosion resistance, thermal stability, and durability. It also explains how operating conditions such as temperature, pressure, and chemical exposure affect material performance.Overall, Engineering Materials helps engineers choose safe, economical, and reliable materials for industrial applications..			

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Module 16

Code	Course/Module Title	ECTS	Semester
NTU200	English Language	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	32	2.9
Description			
Define special knowledge and basic concepts in the English language, and review words, terms, and phrases commonly utilized, along with practical everyday language that students need. Explore the fundamental principles of grammar used in the English language, such as questions and answers, negatives, tail questions, singular and plural forms, numbers, nouns, pronouns, and the verbs 'to be,' 'to have,' and 'to do.' Additionally, cover adjectives, regular and irregular verbs, the usage of 'so' and 'neither,' adverbs, degrees of comparison, conjunctions, interjections, and types of letters (S) with general exercises.			

Module 17

Code	Course/Module Title	ECTS	Semester
NTU203	Arabic language	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	4.5
Description			
Instruction in the fundamentals of the Arabic language, encompassing the study of linguistic skills and their application in both daily and formal communication. The approach involves drawing upon existing sources—utilizing them as a basis for learning—to enhance the student's cognitive faculties. This includes fostering the student's mastery of the language and their ability to analyze linguistic phenomena, while encouraging scientific inquiry and refining their capacity for discussion and debate. Furthermore, the program aims to cultivate and develop creative and critical thinking skills, as well as the ability to analyze, comprehend, and derive insights within the realms of language and literature.			

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Module 18

Code	Course/Module Title	ECTS	Semester
ETCP202	Computer	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	4.2
Description			
The Computer Applications course provides an introduction to MATLAB, a powerful software tool used for programming, data analysis, and visualization in scientific and engineering fields. Through this course, students will gain a solid understanding of MATLAB programming, data analysis, and visualization techniques. They will learn how to develop algorithms, write MATLAB code, manipulate and analyze data, and create visualizations for various scientific and engineering applications. By the end of the course, students will have acquired the necessary skills to effectively utilize MATLAB for their computational and analytical needs.			

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Module 19

Code	Course/Module Title	ECTS	Semester
ETCP204	Fluid flow	8	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	123	7.3
Description			
Define fluid properties, stresses in fluids at rest and in motion, and types of fluid flows. Discuss the application of Newton's law of viscosity and the dimensional analysis method. Derive and define the governing equations of fluid flow, including the continuity, energy, and momentum equations, based on the principles of mass, energy, and momentum conservation. Define the terms of Bernoulli's equation, including major and minor losses, as well as the required energy for flow. Explain the different types of fluid pumping devices, their characteristics, and how to select the appropriate type and size for a given fluid pumping application. Lastly, discuss the calculations for pressure drop in these systems.			

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Module 20

Code	Course/Module Title	ECTS	Semester
ETCP205	Kinetics	5	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	3	108	2.8
Description			
The Kinetics course provides students with an in-depth understanding of chemical reaction rates and the factors that influence them. The course focuses on studying the speed at which chemical reactions occur and the mechanisms by which they proceed. It includes lectures, problem-solving exercises, laboratory experiments, and data analysis. Students will have the opportunity to apply kinetic principles to real-world chemical reactions, analyze reaction mechanisms, and make predictions about reaction rates based on experimental data. By the end of the course, students will have a solid understanding of kinetic principles and their applications in chemical reactions. They will be equipped with the skills to analyze reaction rates, determine rate laws, propose reaction mechanisms, and evaluate the factors influencing reaction kinetics.			

Module 21

Code	Course/Module Title	ECTS	Semester
ETCP206	Energy balance	8	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	4	78	8.1
Description			
The aims of the course are to introduce the concepts of energy balances in chemical processes, including calculations and applications, and to provide a deep understanding of the mechanisms involved in heat balance for closed and open systems, as well as steady and unsteady states. The course aims to provide students with a wide scope of knowledge and an improved understanding of energy balance. By the end of the course, students should be able to apply energy balance principles to solve engineering problems.			

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Module 22

Code	Course/Module Title	ECTS	Semester
ETCP207	Petroleum fluid properties	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	3.8
Description			
The objective of this course is to understand the physical and chemical properties of petroleum specialty products, which are valuable but often overlooked fuels. The course aims to provide a detailed explanation of all the properties associated with these products.			

Module 23

Code	Course/Module Title	ECTS	Semester
ETCP300	Mass Transfer 1	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
This course covers diffusion and mass transfer in binary and multi-component systems, including topics such as molecular diffusion in fluids, convective mass transfer, mass transfer coefficients, mass transfer correlations, interphase mass transfer, and mass transfer theories. It also includes discussions on gas absorption, stripping, and distillation for both binary and multi-component mixtures. The course aims to provide students with the necessary concepts to design mass transfer equipment			

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Module 24

Code	Course/Module Title	ECTS	Semester
ETCP301	Heat Transfer1	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
This course provides a comprehensive overview of heat transfer, covering topics such as modes of heat transfer, equations and analysis, hydrodynamics and thermal boundary layers, design procedures for heat transfer equipment, heat transfer in boiling and condensation processes, and furnace design. Students will gain a solid understanding of heat transfer principles and their practical application in engineering.			

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Module 25

Code	Course/Module Title	ECTS	Semester
ETCP302	Chemical Engineering Thermodynamics	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
The course on chemical engineering thermodynamics covers a wide range of topics essential to understanding thermodynamic principles in chemical engineering. Students will delve into the study of volumetric properties of pure fluids, entropy, and second law analysis of engineering systems, as well as thermodynamic properties of fluids. The application of thermodynamics to flow processes is explored, along with the discussion of power cycles, refrigeration and liquefaction processes. Solution thermodynamics, including the theory and application, vapor/liquid equilibrium in binary and multi-component systems, and ideal and non-ideal solutions using Raoult's and modified Raoult's law, are also covered. Additionally, the course delves into the concepts of fugacity and fugacity coefficient definitions, chemical reaction equilibrium, and thermodynamic analysis of processes. By the end of the course, students will have a comprehensive understanding of the key principles and applications of thermodynamics in chemical engineering			

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Module 26

Code	Course/Module Title	ECTS	Semester
ETCP303	Reactor Design 1	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	77	3.2
Description			
The reactor design course focuses on providing students with the theoretical foundation and design principles necessary for designing chemical reactors. The course covers topics such as the fundamentals of reactor design, mass conservation equations, and the design of ideal reactors. Students will learn about isothermal reactors for homogeneous reactions and non-isothermal reactors, as well as multiple reactor systems. By studying these concepts, students will develop a solid understanding of reactor design principles and gain the skills needed to design and analyze chemical reactors for various applications.			

Module 27

Code	Course/Module Title	ECTS	Semester
ETCP304	Instrumental of Chemical Analysis	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	92	1
Description			
The Instrumental Methods of Chemical Analysis course covers modern analytical techniques used in chemical analysis. Students learn about the principles, operations, and applications of various instrumental methods for both qualitative and quantitative analysis. The course focuses on equipping students with the skills to utilize advanced instruments and technologies for accurate and precise chemical measurements. By the end of the course, students will have a solid understanding of instrumental analysis and be able to apply their knowledge to solve analytical problems effectively.			

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Module 28

Code	Course/Module Title	ECTS	Semester
ETCP305	Automation in Chemical Industries	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	92	1
Description			
Automation in Chemical Industries is a subject that focuses on controlling and monitoring chemical and petroleum processes using automatic systems. It covers instruments, sensors, controllers, actuators, and control loops used to regulate variables such as temperature, pressure, flow rate, and level. In chemical and petroleum industries, automation improves process efficiency, product quality, safety, and operational reliability. The course also explains the use of PLC, SCADA, DCS, and process control strategies in industrial plants. Overall, this subject helps engineers operate chemical processes safely, accurately, and with minimum human intervention.			

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Module 29

Code	Course/Module Title	ECTS	Semester
ETCP306	Engineering Analysis	2	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	45	1
Description			
The Engineering Analysis course focuses on developing students' analytical and problem-solving skills in engineering. It covers mathematical and computational methods used in engineering disciplines, including mathematical modeling, data analysis, and problem-solving techniques. Students will learn how to apply these methods to solve complex engineering problems, interpret and analyze data using statistical techniques, evaluate software tools, and design and conduct simulations and experiments. They will also gain proficiency in communicating analysis results through reports, presentations, and visualizations. By the end of the course, students will have a solid understanding of engineering analysis principles and the ability to apply mathematical and computational methods effectively in various engineering scenarios.			

Module 30

Code	Course/Module Title	ECTS	Semester
ETCP307	Industrial Safety	3	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	45	3
Description			
The Industrial Safety course provides students with a comprehensive understanding of safety principles, practices, and regulations in industrial settings. The course focuses on identifying and mitigating workplace hazards, promoting a safety culture, and ensuring the well-being of workers. It includes lectures, case studies, group discussions, and practical exercises. Students will have the opportunity to apply safety principles and techniques to real-world industrial scenarios, analyze safety risks, and develop strategies for creating a safer work environment.			

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Module 31

Code	Course/Module Title	ECTS	Semester
ETCP308	Mass Transfer 2	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
This course covers diffusion and mass transfer in binary and multi-component systems, including topics such as molecular diffusion in fluids, convective mass transfer, mass transfer coefficients, mass transfer correlations, interphase mass transfer, and mass transfer theories. It also includes discussions on gas absorption, stripping, and distillation for both binary and multi-component mixtures. The course aims to provide students with the necessary concepts to design mass transfer equipment			

Module 32

Code	Course/Module Title	ECTS	Semester
ETCP309	Heat Transfer2	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
This course provides a comprehensive overview of heat transfer, covering topics such as modes of heat transfer, equations and analysis, hydrodynamics and thermal boundary layers, design procedures for heat transfer equipment, heat transfer in boiling and condensation processes, and furnace design. Students will gain a solid understanding of heat transfer principles and their practical application in engineering.			

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Module 33

Code	Course/Module Title	ECTS	Semester
ETCP310	Chemical Engineering Thermodynamics	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
The course on chemical engineering thermodynamics covers a wide range of topics essential to understanding thermodynamic principles in chemical engineering. Students will delve into the study of volumetric properties of pure fluids, entropy, and second law analysis of engineering systems, as well as thermodynamic properties of fluids. The application of thermodynamics to flow processes is explored, along with the discussion of power cycles, refrigeration and liquefaction processes. Solution thermodynamics, including the theory and application, vapor/liquid equilibrium in binary and multi-component systems, and ideal and non-ideal solutions using Raoult's and modified Raoult's law, are also covered. Additionally, the course delves into the concepts of fugacity and fugacity coefficient definitions, chemical reaction equilibrium, and thermodynamic analysis of processes. By the end of the course, students will have a comprehensive understanding of the key principles and applications of thermodynamics in chemical engineering			

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Module 34

Code	Course/Module Title	ECTS	Semester
ETCP311	Reactor Design 2	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4	1	77	3.2
Description			
The reactor design course focuses on providing students with the theoretical foundation and design principles necessary for designing chemical reactors. The course covers topics such as the fundamentals of reactor design, mass conservation equations, and the design of ideal reactors. Students will learn about isothermal reactors for homogeneous reactions and non-isothermal reactors, as well as multiple reactor systems. By studying these concepts, students will develop a solid understanding of reactor design principles and gain the skills needed to design and analyze chemical reactors for various applications.			

Module 35

Code	Course/Module Title	ECTS	Semester
ETCP312	Chemical Process Simulation	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	90	1
Description			
The objective of the process simulation course is to familiarize students with the concepts and techniques used in simulating chemical processes and plant design. The course aims to engage students in understanding the main components of plant design and teach them the procedures for designing different equipment using Aspen Hysys software. Through this course, students will gain practical experience in using simulation software to model and analyze chemical processes, optimize process conditions, and evaluate equipment performance. By the end of the course, students will have acquired the skills and knowledge necessary to simulate and design chemical processes effectively, contributing to their future roles in the field of chemical engineering.			

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Module 36

Code	Course/Module Title	ECTS	Semester
ETCP313	Renewable energies	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	5	63	1
Description			
The objective of the process simulation course is to familiarize students with the concepts and techniques used in simulating chemical processes and plant design. The course aims to engage students in understanding the main components of plant design and teach them the procedures for designing different equipment using Aspen Hysys software. Through this course, students will gain practical experience in using simulation software to model and analyze chemical processes, optimize process conditions, and evaluate equipment performance. By the end of the course, students will have acquired the skills and knowledge necessary to simulate and design chemical processes effectively, contributing to their future roles in the field of chemical engineering.			

Module 37

Code	Course/Module Title	ECTS	Semester
ETCP400	Petroleum Refinery	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	4	62	3.5
Description			
The main objective of this module is to provide an overview of petroleum feedstock, refining processes, and the various products derived from it. It aims to familiarize learners with the properties of different petroleum fractions and the methods used for their separation and purification. Additionally, the module will cover the design principles of atmospheric and vacuum columns for petroleum fractionation. Furthermore, refinery processes will be discussed in terms of their objectives, feedstock, products, and the catalysts employed.			

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Module 38

Code	Course/Module Title	ECTS	Semester
ETCP401	Equipment Design1	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		62	5.9
Description			
The content of the equipment design course includes various aspects such as process planning, designing piping and pump networks, gas-gas separation techniques, solid handling methods, and heat and mass transfer equipment. This course aims to provide knowledge and skills related to designing efficient and effective equipment for industrial processes. Students will learn about the principles and considerations involved in planning and designing processes, as well as the selection and sizing of piping systems and pumps. Additionally, the course covers the separation of gases, handling of solids, and the design of heat and mass transfer equipment.			

Module 39

Code	Course/Module Title	ECTS	Semester
ETCP402	Process Control	4	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	92	1
Description			
The aim of the process control course is two-fold. Firstly, it focuses on studying the dynamic characteristics of open-loop Chemical and Petroleum Refinery engineering processes. This involves formulating transfer functions and analyzing system responses in order to design and select appropriate closed-loop control schemes. The course provides insights into understanding the behavior of the system under different conditions and how it can be effectively controlled. Secondly, the course emphasizes the analysis of closed-loop Petroleum Refinery Engineering processes to design and select a control scheme that ensures stable operation of the plant. Students will learn techniques to maintain desired process conditions and optimize plant performance through effective control strategies.			

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Module 40

Code	Course/Module Title	ECTS	Semester
ETCP403	Chemical Industries	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	4	108	2.8
Description			
The Chemical Industries course offers students a comprehensive overview of the chemical manufacturing sector, encompassing a wide range of industries involved in the production of chemicals and related products. The course emphasizes the study of processes, technologies, and economic considerations within chemical industries. Students will gain a deep understanding of the various aspects involved in the production, operation, and management of chemical manufacturing processes. Through this course, students will develop knowledge and skills that are essential for success in the chemical industry.			

Module 41

Code	Course/Module Title	ECTS	Semester
ETCP404	Unit Operation1	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	4	108	2.8
Description			
The Unit Operations module provides students with a comprehensive understanding of the theory, design, and applications of various unit operations used in the chemical industry. Topics covered include drying, humidification, cooling towers, evaporation, crystallization, solid-liquid filtration, sedimentation, liquid-liquid extraction, leaching, and washing. Students will gain the necessary knowledge and skills to design and optimize these operations, contributing to the efficiency of chemical processes.			

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Module 42

Code	Course/Module Title	ECTS	Semester
ETCP405	Petrochemical Industries	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	2.1
Description			
The Petrochemical course provides students with a comprehensive understanding of the petrochemical industry, focusing on the production, processing, and applications of petrochemicals. The course covers the key aspects of petrochemicals, including their sources, production processes, product portfolio, and industrial significance.			

Module 43

Code	Course/Module Title	ECTS	Semester
ETCP406	Equipment Design2	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
4		62	5.9
Description			
The content of the equipment design course includes various aspects such as process planning, designing piping and pump networks, gas-gas separation techniques, solid handling methods, and heat and mass transfer equipment. This course aims to provide knowledge and skills related to designing efficient and effective equipment for industrial processes. Students will learn about the principles and considerations involved in planning and designing processes, as well as the selection and sizing of piping systems and pumps. Additionally, the course covers the separation of gases, handling of solids, and the design of heat and mass transfer equipment.			

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Module 44

Code	Course/Module Title	ECTS	Semester
ETCP407	Gas Technology	5	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	62	4.2
Description			
The objective of this module is to familiarize students with various aspects of natural gas. It covers essential topics such as the properties of natural gas, its applications, and the operation of gas power plants. The module also explores the different steps involved in gas treatment, including the processing of sour and sweet gas, as well as natural gas recovery techniques. Additionally, students will gain an understanding of the natural gas industry, including aspects such as natural gas pipelines and storage facilities. By the end of this module, students will have a comprehensive knowledge of the fundamental concepts and processes related to natural gas.			

Module 45

Code	Course/Module Title	ECTS	Semester
ETCP408	Environmental pollution	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	1
Description			
The Environmental Pollution course covers the definitions and classification of pollutants emitted from petroleum refineries. It discusses air pollution sources, types, and control equipment, including settling chambers and cyclones. Water pollution sources, pollutants, and wastewater treatment methods are explored. The course also addresses solid waste classification and disposal methods. Overall, it provides a comprehensive understanding of pollution issues in refineries and their mitigation.			

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Module 46

Code	Course/Module Title	ECTS	Semester
ETCP409	Unit Operation2	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	4	108	2.8
Description			
The Unit Operations module provides students with a comprehensive understanding of the theory, design, and applications of various unit operations used in the chemical industry. Topics covered include drying, humidification, cooling towers, evaporation, crystallization, solid-liquid filtration, sedimentation, liquid-liquid extraction, leaching, and washing. Students will gain the necessary knowledge and skills to design and optimize these operations, contributing to the efficiency of chemical processes.			

Module 47

Code	Course/Module Title	ECTS	Semester
ETCP410	Numerical Analysis	2	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	30	1.6
Description			
Numerical Analysis is a subject that focuses on using mathematical methods and computer-based techniques to solve engineering problems approximately. In chemical and petroleum industries, it is used to solve equations related to fluid flow, heat transfer, reaction engineering, and process modeling. The course covers topics such as interpolation, numerical integration, differentiation, solution of nonlinear equations, and systems of linear equations. It also helps engineers analyze complex problems that are difficult or impossible to solve exactly by analytical methods. Overall, Numerical Analysis provides important tools for simulation, optimization, and accurate decision-making in industrial processes.			

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