قسم الهندسة الكيميائية

وزارة التعليم العالي
المعهد العالي للهندسة والتكنولوجيا
بدمياط الجديدة

وثيقة إعتماد
برنامج "الهندسة الكيميائية"
للفصول الدراسية

لائحة الفصول الدراسية قرار رقم 1328

بتاريخ 2019/4/14

مجلس القسم العلمي لإعتماد تقارير البرنامج والمقررات

بتاريخ 2025/7/27

المجلس الأكاديمي لإعتماد تقارير البرامج والمقررات

بتاريخ 2025/7/29

مجلس إدارة المعهد لإعتماد تقارير البرنامج والمقررات

بقرار رقم (120) بتاريخ 2025/7/30

Program Coordinator	Vice Dean for Education and Student Affairs
Hen	خالد
Assoc. Prof. Dr. Hend Elsayed Gadow	Prof. Dr. Khaled Samir

الفرقة الأولي

(2025-2026)

الفصل الدراسي الأول

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Mathematics 3				
Course Code	BAS111				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Associated professor / Samar Mohammed				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This course provides a comprehensive exploration of multivariable calculus and differential equations. It begins with the study of functions of several variables, covering their limits, continuity, and higher-order partial derivatives. It further examines techniques for finding extrema, and evaluates double and triple integrals in various coordinate systems. The course also introduces line and surface integrals, applying key theorems such as Green's, Gauss's, and Stokes's to vector fields. In the second part, the course shifts to differential equations, starting with basic types such as separable and exact equations. It covers linear and Bernoulli's equations, higher-order linear equations with constant coefficients, and both homogeneous and non-homogeneous forms. The final section focuses on the Laplace transform and its application in solving differential equations, emphasizing convergence, properties, and inverse transformations..

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	1	Describe the relevant mathematical principles and theories in the discipline.
		2	Use math ideas and theories that are applicable to the field.
		3	Identify complex engineering problems by applying the concepts and the theories of sciences, appropriate to the discipline.
A10	Acquire and apply new knowledge; and practice self, lifelong, and other learning strategies	1	Search for information to engage in lifelong self-learning discipline.
		2	Apply mathematical synthesis of engineering principles to enhance design, products, and/or services.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (self learning)
1	• Functions of several variables • Limits of functions of several variables.	8	2	2	----	4
2	• Continuity in multivariable functions	8	2	2	----	4
3	• Partial derivatives of higher order	8	2	2	----	4
4	• extreme for functions of two variables	8	2	2	----	4
5	• Double integral • Triple integral	8	2	2	----	4
6	• Line integral in space, Green's theorem	8	2	2	----	4
7	• Surface integral • Gauss and Stokes's theory	8	2	2	----	4
8	• Basic concepts Formation of the differential equations • Separable differential equations **Midterm Exam**	8	2	2	----	4
9	• Homogenous differential equations • Exact differential equation	8	2	2	----	4
10	• linear differential equation • Bernoulli's equation • the linear differential operator	8	2	2	----	4
11	• Second order homogeneous, differential equations with constant coefficients	8	2	2	----	4
12	• Non-homogeneous linear differential equations Convergence of la-place transform	8	2	2	----	4
13	• Important properties of la-place transform • Laplace transform of derivatives	8	2	2	----	4

14	• Inverse la-place transform Solve differential equation by Laplace transform	8	2	2	----	4
15	Final Writing Exam					

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

5. Methods of students' assessment

No.	Assessment Methods		Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams	Midterm	8th	60	40%
		Quizzes - Short Tests- Assignments	any week		
2	Final Written Exam		15	90	60%

6. Learning Resources and Supportive Facilities

Learning resources (Books, Scientific references, etc.)	**The main (essential) reference for the course**	vans, L. C. (2022). *Partial differential equations* (Vol. 19). American mathematical society.

	Other References	1-Strauss, W. A. (2007). *Partial differential equations: An introduction*. John Wiley & Sons. 2-Boyce, W. E., DiPrima, R. C., & Meade, D. B. (2021). *Elementary differential equations and boundary value problems*. John Wiley & Sons. 3-Coddington, E. A. (2012). *An introduction to ordinary differential equations*. Courier Corporation.
	Learning Platforms	Moodle 3.217.6.68 http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Associated professor / Samar Mohammed

Name and Signature
Program Coordinator

Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Electrical Engineering Fundamentals				
Course Code	BAS112				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	3	**-**	**2**	**5**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Rabab Reda				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This compulsory course introduces students to the fundamentals of electrical engineering, focusing on both theoretical and practical aspects of electric circuits and machines. The course begins with an overview of direct current (DC) and the foundational theory of electric circuits, including star-delta transformations and analysis of sinusoidal circuits in both DC and AC domains. Students learn to analyze time vector diagrams and explore power and power factor in AC circuits. The second part of the course focuses on three-phase systems and electrical machines. It covers the principles and applications of DC machines, transformers, induction motors, and synchronous machines, as well as fractional power machines. Through lectures and tutorials, students develop a strong understanding of electric power systems and machine operations, preparing them for advanced topics in electrical engineering.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Identify the key mathematical principles and theories relevant to analyzing electrical circuits, including DC, AC, and power calculations.
		2	Apply mathematical and scientific concepts to solve complex electrical engineering problems, such as circuit analysis, power factor determination, and machine operations.
		3	Solve complex engineering problems by applying fundamental electrical engineering principles in the analysis of circuits, and power systems.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective	1	Evaluate electrical systems (such as DC and AC circuits, transformers, and motors) by analyzing experimental data and applying engineering judgment to improve system performance.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
	engineering judgment to draw .conclusions		

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	**Tutorial**	**Practical**	**Student loads (Self-learning)**
1	Direct Current	9	3	2	----	4
2	Theory of electric circuits	9	3	2	----	4
3	cont., Theory of electric circuits	9	3	2	----	4
4	Delta and Star connections	9	3	2	----	4
5	Sine D.C circuits	9	3	2	----	4
6	Sine A.C circuits	9	3	2	----	4
7	Time vectors diagram	9	3	2	----	4
8	Electric power and power factor in A.C circuits **Midterm Exam**	9	3	2	----	4
9	3-Phase current	9	3	2	----	4
10	Electric machines	9	3	2	----	4
11	D.C machines	9	3	2	----	4
12	Transformers	9	3	2	----	4
13	Induction and synchronous machines	9	3	2	----	4
14	Fractional power machine	9	3	2	----	4
15	Final Writing Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Bishla, E. S., Neeraja, B., Chebiyyam, S., & Gautam, T. P. K. (2023). *Fundamental Of Electrical Engineering And Applications*. AG Publishing House
	Other References	Rauf, S. B. (2020). *Electrical engineering fundamentals*. CRC Press.
		Eccles, W. (2022). *Pragmatic electrical engineering: Fundamentals*. Springer Nature.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Dr. Rabab Reda	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Engineering Thermodynamics				
Course Code	BAS113				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	3	**-**	**2**	**5**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Moataz Mostafa				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This course introduces the fundamental concepts of thermodynamics, beginning with the properties of pure substances and equations of state that describe their behavior. It covers the classification of thermodynamic systems and explains the concepts of work and heat. The First Law of Thermodynamics is studied in depth, along with its applications to closed systems and control volumes. The Second Law is then introduced, including the Carnot cycle and its significance in defining the limits of heat engine efficiency. The course also explores practical systems such as heat engines, refrigerators, and heat pumps, emphasizing the principle of entropy increase. Additional topics include irreversibility, availability, and the analysis of power and refrigeration cycles in real-world applications.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Demonstrate the thermodynamics laws that apply to the engineering problems
		2	Explain the basic principles of engineering thermodynamics.
		3	Identify the concepts and theories of mathematical, science necessary for engineering thermodynamic properties for different types of systems.
		4	Use scientific concepts and thermodynamics laws that are relevant to the real life.

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (self-learning)
1	Fundamental concepts of thermodynamic	9	3	2	------	4
2	Properties of a pure substance	9	3	2	------	4
3	Equation of state - thermodynamic systems - Work and heat	9	3	2	------	4
4	First law of thermodynamics	9	3	2	------	4
5	First law of thermodynamics; Applications to Systems and Control Volumes	9	3	2	------	4
6	Second Law of Thermodynamics	9	3	2	------	4
7	Principle of Carnot cycles	9	3	2	------	4
8	Heat engines, Refrigerators and heat pumps **Midterm Exam**	9	3	2	------	4
9	Principle of the increase of entropy	9	3	2	------	4
10	Applications to systems	9	3	2	------	4
11	Applications to control volumes	9	3	2	------	4
12	Irreversibility and availability	9	3	2	------	4
13	Power cycles	9	3	2	------	4
14	Refrigeration cycles	9	3	2	------	4
15	Final Writing Exam					

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	32%
2	Final Oral Exam	14^{th}	10	8%
3	Final Written Exam	15^{th}	75	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Yan, C. Y. (2022). Introduction to Engineering Thermodynamics.
	Other References	Moses, Prof. V.T. Vijumon, & Xavier, F. (2024). Engineering Thermodynamics. RK Publication.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Dr. Moataz Mostafa	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Technical English Language 2</td></tr>
<tr><td>Course Code</td><td colspan="5">BAS114</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Basic Science and Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 1</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr.Doaa EL-Sherbiny</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course offers an integrated approach combining scientific knowledge about water with practical English language lab skills. Scientifically, it covers the chemical and physical properties of water, the water cycle, human uses of water, principles of heat transfer, energy, graphic language, and an introduction to automatic control systems. In parallel, students develop English language proficiency through a series of lab-based lessons. These include real-life scenarios such as Bob drives a hard bargain, Amber and Ted heat up the kitchen, and Nicole's close election, each accompanied by targeted grammar instruction. Through storytelling, dialogue, and grammar practice, students strengthen their communication skills while engaging with technical content, making the course both informative and linguistically enriching.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	1	Communicate effectively.
		2	Demonstrate efficient IT capabilities
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Professionally merge the language skills in self learning

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Flipped Classroom
4. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (Self-learning)
1	Water Lab skills in English: Bob drives a hard bargain	7	2	-----	2	3
2	Water Lab skills in English: Bob's big coolie order & grammar topics	7	2	-----	2	3
3	Chemical and physical properties. Lab skills in English : Amber comes over to bake cookies	7	2	-----	2	3
4	Chemical and physical properties. Lab skills in English : Amber and Ted heat up the kitchen & grammar topics	7	2	-----	2	3
5	Water cycle Lab skills in English: Nicole practices her election speech & grammar topics	7	2	-----	2	3
6	Human uses: Lab skills in English	7	2	-----	2	3
7	Grammar topics	7	2	-----	2	3
8	Heat transfer Lab skills in English: Bob brings the cookies to the village market **Midterm Exam**	7	2	-----	2	3
9	Carol tells Bob the good news & grammar topics	7	2	-----	2	3
10	Graphic language: Every one bakes cookies	7	2	-----	2	3
11	Nicole’s close election & grammar topics	7	2	-----	2	3
12	Energy Lab Skills in English	7	2	-----	2	3

13	Bob gets any angry call from Carol & Grammar topics Lab Skills in English	7	2	-----	2	3
14	Automatic Control Practical Exam	7	2	-----	2	3
15	Final Writing Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	40%
2	Practical examination	14^{th}	10	10%
3	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Lee, J. S., & Gu, M. M. (2024). Technology and English Language Teaching in a Changing World: A Practical Guide for Teachers and Teacher Educators. New Language Learning and Teaching Environments. New Language Learning and Teaching Environments.
	Other References	Heidenreich, S. (2023). English for Planning and Building Professionals.
		Pitarch, R. C., García, C. G., Sáez, C. H., & Osca, J. H. (2023). The Engineer: English Language for Industrial Engineering. Recursos educativos en abierto edUPV, 156-156.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill Labs	Computer lab

for teaching and learning		

Name and Signature	**Name and Signature**
Course Coordinator	**Program Coordinator**
Dr.Doaa EL-Sherbiny	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Computer Programming</td></tr>
<tr><td>Course Code</td><td colspan="5">BAS 115</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Basic science and Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 1</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Amira Elsonbaty</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course introduces students to the fundamentals of programming and problem-solving using Java, beginning with techniques such as flowcharts and algorithm design. Students analyze real-world problems, visualize solutions through flowcharts, and write pseudocode to structure their logic. Programming fundamentals are explored through structured programming principles and hands-on practice in Java. Core topics include classes, objects, and methods, as well as primitive data types, variables, and operators. Students gain experience in handling user input and output using Scanner and JOptionPane, and develop decision-making and iterative applications using conditional and loop structures. The course also introduces graphical user interface (GUI) development using Java Swing components, followed by advanced GUI concepts such as event handling and layout management. Additionally, students explore the use of APIs, learning how to connect to and retrieve data from external sources to enhance Java applications. Through lectures and practical exercises, the course builds a solid foundation in both problem-solving and programming in a real-world context.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Apply fundamental programming concepts in Java to analyze and develop solutions for basic computational problems.
		2	Implement basic algorithms in Java to solve computational challenges
		3	Identify and debug errors in Java programs programming techniques. using structured
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	1	Develop simple Java applications with graphical user interfaces (GUI) to enhance user interaction.
		2	Write clear and well-structured Java code that demonstrates logical problem-solving.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (self learning)
1	• **Lecture:** Problem-solving techniques, flowcharts, and introduction to algorithms • **Practical:** Analyzing real-world problems, designing flowcharts, and writing pseudocode for basic algorithms	8	2	-----	2	4
2	• **Lecture:** Introduction to programming fundamentals: Basic concepts, programming paradigms, and structured programming principles • **Practical:** Problem analysis, flowchart development, and hands-on practice with structured programming in Java	8	2	-----	2	4
3	• **Lecture:** Introduction to classes, objects, and methods in Java • **Practical:** Designing and implementing basic Java classes and methods	8	2	-----	2	4
4	• **Lecture:** Primitive data types, variables, and operators in Java • **Practical:** Declaring/initializing variables, applying arithmetic/logical operators, and debugging syntax errors	8	2	-----	2	4
5	• **Lecture:** User input/output handling using Scanner and JOptionPane classes • **Practical:** Creating simple interactive Java programs to gather and display user input	8	2	-----	2	4

6	• **Lecture:** Control flow I – Conditional statements (if, if-else, nested if, switch) • **Practical:** Building decision-based applications such as calculators and menu-driven programs	8	2	-----	2	4
7	• **Lecture:** Control flow II – Iterative structures (for, while, do-while loops) • **Practical:** Writing loop-based programs (e.g., summation, factorial, pattern generation)	8	2	-----	2	4
8	• **Lecture:** Midterm Review and Practice • **Practical:** Solving integrated problems using control structures and previously learned concepts Midterm Exam	8	2	-----	2	4
9	• **Lecture:** Introduction to Graphical User Interfaces (GUI) in Java • **Practical:** Designing basic GUI applications using Swing components (buttons, labels, text fields)	8	2	-----	2	4
10	• **Lecture:** Introduction to APIs – Definition, types, and uses in engineering applications • **Practical:** Connecting to a public API (e.g., weather data) and displaying results in Java	8	2	-----	2	4
11	• **Lecture:** Advanced GUI concepts – Event handling, panels, and layout managers • **Practical:** Building interactive GUI applications with event handling features	8	2	-----	2	4
12	• **Lecture:** Project Planning and Code Modularity – Functions, reuse, and best practices	8	2	-----	2	4

	• **Practical:** Beginning work on a small-scale Java project applying all previous skills					
13	• **Lecture:** Project Development and Testing – Debugging, validation, and user interaction • **Practical:** Finalizing and testing the Java project	8	2	-----	2	4
14	• **Lecture:** Project presentation, course summary, and final review **Practical Exam**	8	2	-----	2	4
15	Final Writing Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	40%
2	Practical examination	14^{th}	10	10%
3	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	C. Brown and D. Lee, *Java GUI Development with Swing and JavaFX*, 2nd ed. San Francisco, CA, USA: CodeMasters, 2024.
	Other References	A. Smith and B. Johnson, *Modern Java Programming: From Basics to Advanced Concepts*, 1st ed. New York, NY, USA: TechPress, 2023.
		E. Taylor and F. White, *APIs in Action: Building and Consuming Web Services with Java*, 1st ed. London, UK: WebTech Publications, 2023.

		G. Harris and H. Clark, *Problem Solving with Java: Algorithms and Data Structures*, 3rd ed. Boston, MA, USA: AlgoBooks, 2024.
		I. Martinez and J. Adams, *Object-Oriented Programming in Java: Principles and Practices*, 2nd ed. Berlin, Germany: OOPWorld, 2023.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill Labs	Computer Lab

Name and Signature **Course Coordinator** Dr. Amira Elsonbaty	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Inorganic Chemistry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE111</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>5</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 1</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Dr. Ramadan El kateb</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course explores fundamental concepts in inorganic chemistry, beginning with atomic structure-examining electrons, protons, neutrons, and their arrangement in atoms. The periodic table is studied in depth, highlighting trends in atomic radius, ionization energy, electronegativity, and reactivity across groups and periods. Selected topics in inorganic chemistry delve into key reactions, properties, and applications of major elements. Chemical bonding is analyzed through ionic, covalent, and metallic interactions, along with molecular geometry and hybridization. The course systematically covers group-wise characteristics: alkali metals (Group 1A) and alkaline earth metals (Group 2A) with their high reactivity; Groups 3A (boron group) and 4A (carbon group) focusing on metalloids and covalent bonding trends; Groups 5A (nitrogen group) and 6A (sulfur group) emphasizing nitrogen's versatility and oxygen family chalcogens; and halogens (Group 7A) known for high electronegativity. Transition metals (d-block) are examined for variable oxidation states, colored complexes, and catalytic properties, while f-block elements (lanthanides and actinides) are discussed for their magnetic behavior and nuclear applications.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Define the principles, basic properties, and features of inorganic reactions, as well as their use in chemical process industries such as petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc
		2	Conduct basic experiments to learn about the basic properties and features of inorganic reactions, as well as their applications in chemical process industries such as petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.
		3	Develop suitable experimentation and/or simulation.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	1	Work in stressful environment

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	**Atomic Structure** **Practical** Introduction in investigation for Acidic and Radicals in sample salts	9	2	2	5	-
2	**Atomic Structure** **Practical** CO_3^{-2},HCO_3^{-1},S^{-2}	9	2	2	5	-
3	**Periodic table** **Practical** SO_3^{-2},$S_2O_3^{-2}$,NO_2^{-}	9	2	2	5	-
4	**Periodic table** **Practical** Concentrated H_2SO_4	9	2	2	5	-
5	**Selected topic in inorganic chemistry** **Practical** Investigation for Acidic and Radicals in sample Miscellaneous group	9	2	2	5	-

6	**Selected topic in inorganic chemistry** **Practical** Scheme of identification of acidic radical	9	2	2	5	-
7	**Chemical bonding** **Practical** Investigation for Basic Radicals in sample salts group Dil. HCl	9	2	2	5	-
8	**Group 1A (Alkali Metals)** **Practical** Investigation for Basic Radicals in sample Dil. HCl + H_2S group **Midterm Exam**	9	2	2	5	-
9	**Group 2A (Alkaline Earth Metals)** **Practical** Investigation for Basic Radicals in sample NH_4OH + NH_4Cl group	9	2	2	5	-
10	**Group 3A (Boron group) to Group 4A (Carbon group)** **Practical** Investigation for Basic Radicals in sample NH_4OH + NH_4Cl + H_2S group	9	2	2	5	-
11	**Group 5A (Nitrogen group) & Group 6A (Sulfur group)** **Practical** Investigation for Basic Radicals in sample NH_4OH + NH_4Cl + H_2S group	9	2	2	5	-
12	**Group 7A (Halogens)** **Practical** NH_4OH + NH_4Cl + $(NH_4)_2CO_3$ group Scheme of identification of basic Radical	9	2	2	5	-

13	**Transition metals (d Block)** **Practical** $NH_4OH + NH_4Cl + (NH_4)_2$ CO_3 group Scheme of identification of basic Radical	9	2	2	5	-
14	**F-Block elements** **Practical Exam**	9	2	2	5	-
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	32%
2	Practical Examination	14^{th}	10	8%
3	Final Written Exam	15^{th}	75	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Das, A. K. (2022). Fundamental concepts of inorganic chemistry: Volume 2 (3rd ed.). McGraw Hill Education.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill labs	Chemistry lab

and learning		

Name and Signature **Course Coordinator** Assoc. Prof. Dr. Ramadan El kateb		**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

الفصل الدراسي الثاني

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Mathematics 4				
Course Code	BAS121				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**5**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Associated professor / Samar Madian				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This course introduces students to advanced mathematical concepts essential for engineering applications, with a focus on special functions, Fourier analysis, and complex variables. The course begins with Fourier series, periodic functions, Euler's laws, and both discrete and continuous forms of Fourier integration. It then explores solutions to ordinary and partial differential equations using power series and variable separation techniques. The second part of the course focuses on complex analysis. Topics include complex algebra, multi-valued functions, analytic functions, and Cauchy's theorem. Students also study complex series, including Taylor and Laurent series, and investigate zeros, singularities, and the behavior of infinite series. The course equips students with strong analytical tools for solving engineering and physical science problems involving waveforms, heat transfer, and signal processing.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	**Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.**	1	Describe the relevant mathematical principles and theories in the discipline.
		2	Use math ideas and theories that are applicable to the field.
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Incorporate mathematical principles solving engineering problems
		2	Apply mathematical concepts to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (self learning)
1	Special functions	9	2	2	-----	5
2	Fourier series	9	2	2	-----	5
3	periodic functions and Euler's laws	9	2	2	-----	5
4	Fourier's integrations	9	2	2	-----	5
5	Fourier's integrations	9	2	2	-----	5
6	solutions of the differential equations by series	9	2	2	-----	5
7	solving the partial differential equations using variables separation	9	2	2	-----	5
8	Functions with complex variables-complex quantities algebra **Midterm Exam**	9	2	2	-----	5
9	Multiple values functions	9	2	2	-----	5
10	The analytical functions and Koshi'stheorem	9	2	2	-----	5
11	the complex series	9	2	2	-----	5
12	Taylor and Lorant series	9	2	2	-----	5
13	the zeros, unique points and the rest	9	2	2	-----	5
14	the infinite series	9	2	2	-----	5
15	Final Writing Exam					

Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, and reports)	Midterm (8^{th}) and others in any week	60	40%
2	Final Written Exam	15^{th}	90	60%

5. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Ladeinde, F. (2024). *Applications of Complex Variables: Asymptotics and Integral Transforms*. Walter de Gruyter GmbH & Co KG.
	Other References	Duoandikoetxea, J. (2024). *Fourier analysis* (Vol. 29). American Mathematical Society.
		Pinsky, M. A. (2023). *Introduction to Fourier analysis and wavelets* (Vol. 102). American Mathematical SocietyS
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Associated professor / Samar Madian	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Technical Report Writing				
Course Code	BAS122				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**2**	**-**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr / Mohamed El-Bindary				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview (Brief summary of course overview)

Writing the scientific reports by English language: The principles of report preparation - types of reports – formatting the reports – skills of figures and shapes – importing text – chart drawings – optical scanning for the pictures and documents – the border and notes operations in the reports. Saving and indexing the reports – searching for text – coping and safety of information – using the different computer programs packages for writing and demonstrating *the reports.*

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning	1	Define technical language and report writing
		2	Assess different ideas, views, and knowledge from a range of sources.
		3	Prepare technical reports
		4	Search for information to engage in lifelong self-learning discipline.
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	1	Communicate effectively.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Flipped Classroom

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (Self learning)
1	**Lecture:** Introduction to Technical Report Writing- **Practical:** Microsoft Word: Interface and basic tools	8	2	----	2	4
2	**Lecture:** Importance of reports, types, and structure **Practical:** Microsoft Word: basic tools	8	2	----	2	4
3	**Lecture:** Principles of Report Preparation **Practical:** Formatting text	8	2	----	2	4
4	**Lecture:** Stages of preparing a technical report **Practical:** Formatting paragraphs	8	2	----	2	4
5	**Lecture:** Use Visual aids in report writing: Figures and shapes. **Practical:** Page setup, margins, headers, and footers	8	2	----	2	4
6	**Lecture** Use Visual aids in report writing: Charts and drawing. **Practical:** Applying and customizing styles	8	2	----	2	4
7	**Lecture:** Use Visual aids in report writing: Optical scanning for the pictures and documents **Practical:** Inserting and formatting tables and charts	8	2	----	2	4
8	**Lecture:** Importing Text and External Content - Embedding external documents and data **Practical:** Importing and linking external content **Midterm Exam**	8	2	----	2	4
9	**Lecture:** Formatting of reprts **Practical:** Inserting and adjusting images	8	2	----	2	4
10	**Lecture:** Borders, Notes, and Annotations	8	2	----	2	4

	Footnotes, endnotes, and comments **Practical:** Adding footnotes, comments, and annotations					
11	**Lecture:** Saving and Indexing Reports Proper file management and version control **Practical:** Creating an automatic table of contents	8	2	----	2	4
12	**Lecture:** Searching and Retrieving Information Advanced search techniques **Practical:** Using Word's search and navigation tools	8	2	----	2	4
13	**Lecture:** Information Security and Backup Protecting and backing up documents **Practical:** Applying passwords and document protection	8	2	----	2	4
14	**Lecture:** Finalizing and Presenting Reports Reviewing, proofreading, and final checks **Practical Exam**	8	2	----	2	4
15	Final Writing Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8th) and others in any week	40	40%
2	Practical Examination	14th	10	10%
3	Final Written Exam	15th	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Hering, H., Hering, H., & Baumann. (2019). *How to write technical reports*. Berlin, Germany: Springer Berlin Heidelberg.
	Other References	Baer, K. (2021). Information Design Workbook, Revised and Updated: Graphic Approaches, Solutions, and Inspiration+ 30 Case Studies. Quarry Books Editions.
		Gerald J. Alred, Walter E. Oliu, Charles T. Brusaw "The Handbook of Technical Writing" Bedford; 12th Ed, (2020).
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Electronic Programs	Microsoft office
	Skill Labs/ Simulators	Computer lab

Name and Signature **Course Coordinator** Dr / Mohamed El-Bindary	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification
(2025-2026)

1. Basic Information

Course Title	Introductions to Information Technology				
Course Code	BAS123				
Department/s participating in delivery of the course	Basic Science and Engineering				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Amira Elsonbaty				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This course offers a foundational understanding of information systems and their integration with emerging technologies. It introduces key concepts such as the structure and applications of information systems, smart devices, modern hardware (IoT, edge computing), and communication technologies (5G, satellite). Students also explore software trends including open-source tools, internet evolution (Web 3.0), system analysis and design principles, and the roles of AI, cloud computing, and cyber security in modern IT environments. The practical component complements the theoretical knowledge through hands-on web development using HTML and introductory CSS. Students learn to build and style responsive web pages, incorporating text, images, links, tables, forms, and basic layouts. By the end of the course, students present individual HTML projects, demonstrating their ability to apply both information systems concepts and web development skills in real-world scenarios.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Apply design principles to create web applications that meet user needs while ensuring cost-effectiveness, usability, and accessibility
		2	Integrate modern technologies, such as AI, cloud computing, and IoT, to develop functional and secure information systems
		3	Design sustainable web solutions considering security measures, data protection, and long-term environmental impacts
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental	1	Incorporate environmental considerations and risk management principles in the design and development of sustainable web applications and information systems

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	issues, and risk management principles	2	Apply current technologies and standards to design secure and efficient web applications that meet industry best practices

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Self-learning and Research
3. Discussion
4. Problem solving
5. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student loads (Self-learning)
1	**Lecture**: Introduction to Information Systems	8	2	2	-	4
2	**Lecture**: Introduction Emerging Technologies (AI and Cloud Computing).	8	2	2	-	4
3	**Lecture**: Applications of Information Systems in Modern Fields (e.g., healthcare, smart cities).	8	2	2	-	4
4	**Lecture**: **Modern Hardware in Information Systems** (IoT devices, edge computing).	8	2	2	-	4
5	**Lecture**: **Smart Devices and Their Role in Information Systems.**	8	2	2	-	4
6	**Lecture**: **Software in Information Systems** (emphasizing open-source and SaaS).	8	2	2	-	4
7	**Lecture**: **Modern Data Communication Systems** (5G, fiber optics, and satellite communication).	8	2	2	-	4
8	**Lecture**: **Computer Networking Basics** (Wireless networks, network security, and 5G applications). **Midterm Exam**	8	2	2	-	4
9	**Lecture**: **The Internet Evolution** (Web 3.0, and decentralized networks).	8	2	2	-	4
10	**Lecture**: **Cybersecurity and Privacy in Information Systems** (threats, measures, and ethical considerations).	8	2	2	-	4
11	**Lecture**: **System Analysis and Design** (databases,	8	2	2	-	4

	decision tables, and workflow diagrams).					
12	**Lecture**: **Artificial Intelligence and Data Analysis** (AI integration with IT systems).	8	2	2	-	4
13	**Lecture**: **Cloud Computing Advances**	8	2	2	-	4
14	**Lecture**: **revision**	8	2	2	-	4
15	Final Writing Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	40%
2	Final Oral Exam	14^{th}	10	10%
3	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	E. Frick, *Information Technology Essentials: A Practical Guide*. New York, NY: TechPress, 2023
	Other References	J. Smith and S. Johnson, *Modern Information Systems: From Theory to Practice*. London, UK: InfoSystems Publishing, 2023.
		M. Walker, *Cybersecurity and Privacy in the Digital Age*. San Francisco, CA: CyberSecure Press, 2024.
		D. Brown, *Artificial Intelligence in Information Systems*. Boston, MA: AI Tech Publications, 2023.

	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill Labs/ Simulators	Computer lab

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Dr. Amira Elsonbaty	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Strength of Materials				
Course Code	BAS124				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 1				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Nesreen Elawadly				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Simple states of stress and strain - Torsion stresses - Bending and shearing stresses in beams - Compound stresses - Analysis of plane stress - Combined stresses - Analysis of thin-walled pressure vessels - Deflection of beams.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	1	Define the concepts and theories of mathematics, necessary for engineering system analysis, general concepts of strength of material, normal stress, direct shear stress, mohr`s cycle.
		2	Use math ideas and theories that are applicable to solutions for engineering problems and system design, normal stress, direct shear, stresses in beams, torsional stresses.
		3	Practice the neatness and aesthetics in design to approach stresses in beams, torsional stresses, and pressure vessels
		4	Apply engineering knowledge to improve design, products and/or services, normal stress, direct shear stress, stresses in beams, torsional stresses, pressure vessels,mohr`s cycle.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Simple states of stress and strain1	8	2	-	4	2
2	Simple states of stress and strain2	8	2	-	4	2
3	Tension and compression stress1	8	2	-	4	2
4	Tension and compression stress2	8	2	-	4	2
5	Shear stress in bolts1	8	2	-	4	2
6	Shear stress in bolts2	8	2	-	4	2
7	Bending and shearing stresses in beams1	8	2	-	4	2
8	Bending and shearing stresses in beams2 **Midterm Exam**	8	2	-	4	2
9	Torsion stresses1	8	2	-	4	2
10	Torsion stresses2	8	2	-	4	2
11	Deflection of Beams	8	2	-	4	2
12	Analysis of thin-walled pressure vessels1	8	2	-	4	2
13	Analysis of thin-walled pressure vessels2	8	2	-	4	2
14	Analysis of plane stress	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	40	40%
2	Final Written Exam	15^{th}	60	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Hibbeler, R. C. (2023). Mechanics of Materials, eBook, SI Edition. Pearson Higher Ed.
	Other References	Beer, F. P., Johnston, E. R., DeWolf, J. T., & Mazurek, D. F. (2023). Mechanics of materials (9th ed.). McGraw-Hill Education.
		Gere, J. M., & Goodno, B. J. (2024). Mechanics of materials (10th ed.). Cengage Learning.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Dr. Nesreen Elawadly	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title:</td><td colspan="5">Organic Chemistry</td></tr>
<tr><td>Course Code:</td><td colspan="5">CHE121</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of points of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>5</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory اجباري</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level: 1</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering program</td></tr>
<tr><td>Institute</td><td colspan="5">Higher Institute for Engineering and Technology-New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Prof. Dr Khaled Samir Mohamed</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/20255</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview (Brief summary of scientific content)

Organic chemistry course include basic concepts of organic chemistry that contain preparation, properties and reactions of different organic classes such as alkane, alkene , alkynes, aromatic compounds, alcohols, ethers and alkyl halide, aldehydes, ketones, carboxylic acids, amines and polyfunctional compounds

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	**1**	Define organic reactions' principles, basic characteristics, and properties, as well as their applications in chemical process industries like petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.
		2	Conduct basic experiments to learn about the basic characteristics and features of organic reactions, for applying in chemical process industries such as petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, among others.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	**1**	Interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	**1**	Collaborate effectively within multidisciplinary team.
		2	Work in stressful environment and within constraints.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design	**1**	Illustrate the organic chemical reactions that utilize a full range of thermodynamics and kinetics of chemical reactions.
		2	Design new processes or products through utilization organic chemical reactions
		3	Apply the practical organic chemistry to identify the different classes of organic chemistry.

4. Teaching and Learning Methods

1- Face to Face lectures.
2. Discussion
3. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Exercise	Practical	Student load (Self-learning)
1	Organic Chemistry: basic concepts **Practical**: Identification of hydrocarbons	9	2	-	2	5
2	alkanes **Practical** Identification of alcohols	9	2	-	2	5
3	Stereochemistry **Practical:** Identification of phenols	9	2	-	2	5
4	Stereochemistry **Practical:** Identification of phenols	9	2	-	2	5
5	Alkenes **Practical:** Identification of aldehydes and ketones	9	2	-	2	5
6	Alkenes **Practical:** Identification of aldehydes and ketones	9	2	-	2	5
7	Alkynes **Practical:** Identification of aliphatic acids	9	2	-	2	5
8	Aromatic Compounds **Practical:** Identification of aromatic acids **Midterm Exam**	9	2	-	2	5
9	Aromatic Compounds **Practical:** Identification of aromatic acids	9	2	-	2	5
10	Alcohols **Practical:** Identification of salt of acids	9	2	-	2	5
11	Ethers and alkyl halide	9	2	-	2	5

	Practical: Identification of amines					
12	Aldehydes and Ketones **Practical**: Identification of carbohydrates	9	2	-	2	5
13	Carboxylic Acids and Their Derivatives **Practical:** Scheme for identification of unknown organic compounds	9	2	-	2	5
14	Amines and polyfunctional compounds **Practical:** Practical Exam	9	2	-	2	5
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	60	40%
2	Final Practical/Exam	14^{th}	15	10%
3	Final Written Exam	15^{th}	75	50%

6. Learning Resources and Supportive Facilities -

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course**	McMurry, J. (2023). Organic Chemistry. OpenStax.
	Other References	1- SOLOMONS, Fryhle, C. B., & Snyder, S. A. (2022). Organic Chemistry. John Wiley & Sons. 2- Horne, B. (2021). Organic Chemistry: The Basics. Willford Press.
	Learning Platforms	MOODLE http://www-.ees.ndeti.edu.eg/

Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show system, sound system
	Supplies	White board, lecture class room
	Skill Labs/ Simulators	Chemistry lab

Name and Signature **Course Coordinator** Prof. Dr Khaled Samir Mohammed	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Physical Chemistry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE122</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 1</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Dr./ Ramadan Abdelghany Elkateb</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course covers fundamental concepts in physical chemistry, beginning with gases, including the gas laws (Boyle's, Charles's, Avogadro's), the ideal gas equation, and deviations explained by the kinetic molecular theory and real gas behavior (van der Waals equation). The study of solutions explores concentration units, colligative properties, and solubility principles. Chemical kinetics investigates reaction rates, rate laws, and reaction order, followed by the collision theory, reaction mechanisms, and the role of catalysts in altering reaction pathways. Chemical equilibrium is analyzed in terms of dynamic balance, Le Chatelier's principle, and equilibrium constants for both homogeneous and heterogeneous reactions. Ionic equilibrium focuses on water dissociation (Kw), pH/pOH calculations, weak acid/base ionization, buffer systems, hydrolysis, and the common ion effect. Lastly, surface chemistry examines adsorption (physical vs. chemical, factors influencing adsorbents, and adsorption isotherms like Langmuir and Freundlich), distinguishing it from absorption and exploring its applications in catalysis and purification processes.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Define technical language and report writing.
		2	Prepare technical reports
		3	Search for information to engage in lifelong self-learning discipline.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	Interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	1	Collaborate effectively within multidisciplinary team.
		2	Work in stressful environment and within constraints.
B1	Design a practical chemical engineering system, component or process utilizing a full range of	1	Identify the principles of physical chemistry including chemical reaction equilibrium, chemical kinetic reactions and thermodynamics.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
	chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	2	Summarize the appropriate techniques relevant to physical chemistry

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Gases (the gas laws- ideal gas equations) **Practical** Introduction Laboratory safety -Glassware-Laboratory techniques.	7	2	2	3	-
2	kinetic molecular theory- real gases **Practical** The nature of Copper Complex in aqueous Solution	7	2	2	3	-
3	Solutions	7	2	2	3	-

	Practical The nature of Ammonia Complex in aqueous Solution					
4	Solutions (continues) **Practical** Study of Homogeneous Catalytic Decomposition of H_2O_2 by Initial Rate Method	7	2	2	3	-
5	Chemical kinetics; rate equation - order of reaction **Practical** Study of Homogeneous Catalytic Decomposition of H_2O_2 by Initial Rate Method	7	2	2	3	-
6	Chemical kinetics: collision theory- reaction mechanism- catalysts **Practical** Catalytic decomposition H_2O_2	7	2	2	3	-
7	Chemical equilibrium; equilibrium state- factors affecting chemical equilibrium **Practical** Determination of the order of the reaction between H_2O_2 and HI	7	2	2	3	-
8	Chemical reaction equilibrium for homogeneous and heterogeneous reactions **Practical** Determination of the order of the reaction between H_2O_2 and HI **Midterm Exam**	7	2	2	3	-
9	Ionic equilibrium: Kw, pH, pOH **Practical** **Revision**	7	2	2	3	-
10	Ionization of weak acids and bases- salt effect- common ion effect **Practical**	7	2	2	3	-

	Determination of the reaction order with respect to KI					
11	Ionic equilibrium: buffer solution hydrolysis. **Practical** Determination of the reaction order with respect to KI	7	2	2	3	-
12	Surface chemistry (Adsorption-physical properties of adsorbent, classes of adsorbent) **Practical** Adsorption of Oxalic Acid on Charcoal	7	2	2	3	-
13	Difference between absorption& adsorption, physical and chemical adsorption, factors effect on the performance of adsorbent. **Practical** Adsorption of Oxalic Acid on Charcoal	7	2	2	3	-
14	Adsorption isotherm **Practical:** Practical Exam	7	2	2	3	-
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and presentation)	Midterm (8^{th}) and others in any week	60	40%
2	Practical Examination	14^{th}	15	10%
3	Final Written Exam	15^{th}	75	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Silbey, R. J., Alberty, R. A., Papadantonakis, G. A., & Moungi Gabriel Bawendi. (2021). Physical chemistry. Hoboken Wiley.
	Other References	Khedr, A. M., Elwakiel, N., Halawia, S. E., & Mansour, R. A. (2024). Adsorption characteristics and applications of andesite in removing some pollutants from wastewater. Scientific Reports, 14(1). https://doi.org/10.1038/s41598-024-65043-y
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill Labs/ Simulators	Chemistry lab

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Assoc. Prof. Dr./ Ramadan Abdelghany Elkateb	Assoc.prof. Hend Elsayed Gadow

الفرقة الثانية

(2025-2026)

الفصل الدراسي الأول

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Engineering Probability and Statistics				
Course Code	BAS211				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Assoc. Prof. Dr./ Samar Mohammed				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course covers fundamental statistical and probability concepts applied in engineering. It begins with Probability Theory, including Conditional Probability and the analysis of Discrete and Continuous Random Variables, along with their associated Probability Distributions. The course then explores the use of Statistics in Engineering, focusing on Descriptive Statistics, Sampling Distributions, and methods for Estimation and Confidence Intervals. It also covers Hypothesis Testing for decision-making and concludes with an introduction to Simple Regression analysis for modeling relationships between variables.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Describe the relevant statistical mathematical principles and theories in the discipline.
		2	solve complex engineering problems by applying the concepts and the theories of Statistics , appropriate to the discipline.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Applying statistical analyses and objective .engineering judgment to draw conclusions
		2	Analyze data to interpret it.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Tutorial	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)
1	Probability Theory	8	2	2	-	4
2	Probability Theory	8	2	2	-	4
3	Conditional Probability	8	2	2	-	4
4	Discrete Random Variables	8	2	2	-	4
5	Continuous Random Variables	8	2	2	-	4
6	Probability Distributions on continuous random variables	8	2	2	-	4
7	Exercise on Discrete and Continuous Random Variables	8	2	2	-	4
8	Probability Distributions on discrete random variables *Midterm exam	8	2	2	-	4
9	Descriptive Statistics & Statistics in Engineering	8	2	2	-	4
10	Descriptive Statistics & Statistics in Engineering	8	2	2	-	4
11	Estimation & Confidence Intervals	8	2	2	-	4
12	Practice & Review	8	2	2	-	4
13	Hypothesis Testing	8	2	2	-	4
14	Simple Regression	8	2	2	-	4
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods		Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1		Midterm	8th	40	40%

	Periodic exams	Quizzes - Short Tests- Assignments	any week		
2	Final Written Exam		15th	60	60%

6. Learning Resources and Supportive Facilities

Learning resources (Books, Scientific references, etc.)	**The main (essential) reference for the course**	Sahu, S. K. (2024). *Introduction to Probability, Statistics & R: Foundations for Data-Based Sciences*. Springer Nature
	Other References	Hinton, P. R. (2024). *Statistics explained.* Routledge.
		Stroud, K. A., & Booth, D. J. (2024). *Advanced Engineering Mathematics*. Palgrave Macmillan.
		Pestman, W. R. (2021). *Mathematical statistics: an introduction.* Walter de Gruyter GmbH & Co KG..
	Learning Platforms	Moodle 3.217.6.68 http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Assoc. Prof. Dr./ Samar Mohammed

Name and Signature
Program Coordinator

Assoc. prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Fluid Mechanics				
Course Code	BAS212				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**1**	**1**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Prof. Dr. Osami Rageh				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course provides a foundational understanding of Fluid properties, fluid statics, kinematics, fluid dynamics including energy and momentum equations, dimensional analysis, laminar flow, turbulent flow and its applications, forces on immersed bodies, introduction to compressible flow, applications to filtration and fluidization. Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes, center of pressure, flow measuring apparatus, multipump test (Pump characteristics) and losses in piping systems.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Define key concepts of fluid mechanics, including fluid properties, energy and momentum equations, dimensional analysis, and flow types (compressible, laminar, and turbulent).
		2	Analyze different forces acting on immersed bodies and their implications in real-world engineering applications.
		3	Apply scientific theories and concepts relevant to fluid mechanics and fluid flow in piping systems.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Apply Bernoulli's equation and continuity equation in practical experiments, such as measuring flow rates using Venturi meters and analyzing friction losses in pipes.
		2	Analyze experimental data related to fluid behavior in laboratory settings and field applications involving piping and pumping systems.
		3	Conduct basic experiments to explore the static and dynamic characteristics of fluids, and assess their impact on engineering systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Projects
6. Modeling

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Tutorial	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)
1	**Fluid Properties** Lab: Measure the density of various liquids (water, oil, alcohol) using a hydrometer and compare the results.	8	2	1	1	4
2	**Fluid Statics** Lab: Create a U-tube manometer and measure the pressure difference between two fluid columns using different fluid heights.	8	2	1	1	4
3	**Forces on Immersed Bodies** Lab: Submerge various shapes (sphere, cube, cylinder) in water and measure the buoyant force using a spring scale.	8	2	1	1	4
4	**Center of Pressure** Lab: Center of Pressure.	8	2	1	1	4
5	**Fluid Kinematics** Lab: Use dye to visualize flow patterns in a water tank.	8	2	1	1	4
6	**Fluid Dynamics (Part 1) Introduction + Bernoulli Equation** Lab: Set up a Venturi meter, measure the flow rate, and validate Bernoulli’s principle by relating pressure differences to velocity changes.	8	2	1	1	4
7	**Fluid Dynamics (Part 2) Energy and Momentum Equations**	8	2	1	1	4

	Lab: Utilize a pipe with varying diameters and measure velocities and pressures at different points to demonstrate conservation of energy and momentum.					
8	**Flow Measurement Techniques** Lab: Flow Measuring Apparatus. *Midterm exam	8	2	1	1	4
9	**Dimensional Analysis and Similarity** Lab: Create scaled models of an object (like a boat) and test it in a small water tank to explore the concept of similarity and dimensionless numbers (e.g., Reynolds number).	8	2	1	1	4
10	**Laminar and Turbulent Flow** Lab: Use a simple setup of water flowing through a transparent pipe. Change the flow rate and observe the transition between laminar and turbulent flow.	8	2	1	1	4
11	**Applications of Laminar/Turbulent Flow** Lab: Friction Losses in Pipes	8	2	1	1	4
12	**Introduction to Compressible Flow** Lab: Use a balloon to demonstrate the principles of compressible flow by inflating it and measuring the pressure changes with a pressure gauge.	8	2	1	1	4
13	**Pipe Flow and Pumping Systems** Lab: Multi-Pump Test (Pump Characteristics).	8	2	1	1	4
14	**Course Review and Applied Problem Solving**	8	2	1	1	4
14	Practical Exam					
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Practical/Oral	14^{th}	15	%10
3	Final Written Exam	15^{th}	75	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Young, D. F., Munson, B. R., Okiishi, T. H., & Huebsch, W. W. (2021). A brief introduction to fluid mechanics. John Wiley & Sons.
	Other References	- Yunus A. Cengel, John M. Cimbala, "Fluid Mechanics: Fundamentals and Applications". 4th Ed., McGraw Hill, 2020. - Gerhart, Philip M., Andrew L. Gerhart, and John I. Hochstein. Munson, Young and Okiishi's Fundamentals of Fluid Mechanics. John Wiley & Sons, 2021. - Potter, M.C. and Ramadan, B.H., 2025. An Introduction to Fluid Mechanics. Springer International Publishing, Imprint: Springer.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill lab	Fluid lab

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Prof. Dr. Osami Rageh	Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Engineering Economy</td></tr>
<tr><td>Course Code</td><td colspan="5">BAS213</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Basic Science and Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>1</td><td>3</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Rania Hamdy Elabd</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course provides a comprehensive introduction to engineering economy principles, focusing on evaluating economic factors in engineering decision-making. It begins with the fundamental concept of Time Value of Money, covering present value and future value, along with analysis techniques for determining the minimum attractive rate of return and comparing different investment scenarios through annual, present, and future analysis. The course then explores Economic and Cost Concepts, including Break-Even Analysis to determine minimum production levels, and Cost-Benefit Analysis for evaluating project viability. Further topics include methods for Calculating Economic Equivalence and comparing alternatives using present worth and annual worth methods, as well as analyzing projects through Rate of Return and Payback Period.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

<table>
<tr><th colspan="2">Program Outcomes (NARS 2018)</th><th colspan="2">Course Learning Outcomes</th></tr>
<tr><th>Code</th><th>Text</th><th>Code</th><th>Text</th></tr>
<tr><td rowspan="2">A1</td><td rowspan="2">Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.</td><td>1</td><td>Explain the concepts of engineering economy.</td></tr>
<tr><td>2</td><td>Use math ideas and theories that are applicable to engineering economy.</td></tr>
<tr><td rowspan="2">A3</td><td rowspan="2">Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.</td><td>1</td><td>Judge engineering decisions considering balanced cost, benefits, safety, quality, reliability, and environmental impact.</td></tr>
<tr><td>2</td><td>Incorporate economic, societal, global, environmental, and risk management factors into design.</td></tr>
</table>

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving

4. Brain storming
5. Modeling

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Overview, importance and basic concepts	6	2	-	3	1
2	Continued discussion, examples	6	2	-	3	1
3	Fundamentals, calculations	6	2	-	3	1
4	Applications in decision making	6	2	-	3	1
5	MARR, equivalent and comparative analysis	6	2	-	3	1
6	Further applications and case studies	6	2	-	3	1
7	Break-even point, graphical and analytical methods	6	2	-	3	1
8	Evaluating projects, net benefits * Midterm Exam	6	2	-	3	1
9	Cost comparisons, replacement and economic life	6	2	-	3	1
10	Decision-making tools, applications	6	2	-	3	1
11	Investment analysis, decision criteria	6	2	-	3	1
12	Cost estimation, optimization methods	6	2	-	3	1
13	Evaluating risks, sensitivity analysis	6	2	-	3	1
14	Case studies, review, and exam preparation	6	2	-	3	1
15	Final Written Exam					

5. Methods of students’ assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Blank, L., & Tarquin, A. (2024). Engineering economy (9th ed.). McGraw-Hill.
	Other References	-Sullivan, W. G. (2025). Engineering economy (14th ed.). Pearson. -Newnan, D. G., Lavelle, J. P., & Eschenbach, T. G. (2023). Engineering economic analysis (12th ed.). Oxford University Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom, Institute library

Name and Signature **Course Coordinator** Dr. Rania Hamdy Elabd	**Name and Signature** **Program Coordinator** Assoc. prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Heritage of Egyptian Literature</td></tr>
<tr><td>Course Code</td><td colspan="5">BAS214</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Basic Science and Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>-</td><td>2</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Mohamed El-Bindary</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

تهدف هذه المادة إلى تعريف الطالب بالتميّز الإقليمي لمصر عبر العصور القديمة والوسطى والحديثة، واستكشاف أثر عبقرية المكان في تشكيل الفكر والوعي المصري، وانعكاس ذلك في التراث الأدبي شعرًا ونثرًا. تُدرس المادة التراث الأدبي المصري من منظور حضاري وإبداعي، مع التركيز على المكتبة التراثية المصرية كمرآة تاريخية متجددة. كما تتناول الفروق بين وضعية العصور الوسطى في مصر وأوروبا، إلى جانب التراث الجغرافي وأدب الرحلات في الكتابات المصرية. وتشمل الموضوعات التأليف الموسوعي والصياغة الأدبية، والظواهر الأدبية السائدة، ومناهج دراسة التراث ودلالاته، ومدارس التأليف في الفكر المصري. يُسلّط الضوء على مجالات الإبداع في الشعر، مثل الطبيعة، أدب الحروب، والبيئة المصرية، مع دراسة مدارس الكتابة الرسمية وغير الرسمية. وتُختتم المادة بتحليل نصوص مختارة لأبرز الشعراء والكتّاب مثل ابن نباته المصري وابن سناء الملك، مرورًا بدراسات الدكتور محمد كامل حسين، والأستاذ أمين الخولي، والدكتور جمال حمدان حول عبقرية المكان في التراث الأدبي المصري.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Refer to relevant literatures.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	التميز الإقليمي لمصر في العصور القديمة والوسطى والحديثة	5	2	-	3	-
2	أثر عبقرية المكان على الفكر والوعي المصري وتجلياته في التراث الأدبي	5	2	-	3	-

3	التراث الأدبي لمصر من منظور حضاري وإبداعي	5	2	-	3	-
4	المكتبة التراثية المصرية من منظور تاريخي متجدد	5	2	-	3	-
5	دراسة مفهوم وضعية العصور الوسطى في مصر والفرق بينها وبين العصور الوسطى في أوروبا	5	2	-	3	-
6	التراث الجغرافي المصري وأدب الرحلة في كتابات مصرية.	5	2	-	3	-
7	التأليف الموسوعي في مصر والصياغة الأدبية في فن الموسوعات	5	2	-	3	-
8	الظواهر الأدبية الغالبة على الأدب المصري *Midterm exam	5	2	-	3	-
9	مناهج دراسة التراث الأدبي المصري ودلالاته	5	2	-	3	-
10	مدارس التأليف والإبداع في تاريخ الفكر المصري	5	2	-	3	-
11	مجالات الإبداع في الشعر المصري	5	2	-	3	-
12	مدارس الكتابة الفنية على المستوى الرسمي وغيرها	5	2	-	3	-
13	تتبع التطبيق على النص والتحليل من خلال أبرز شعراء وكتاب التراث المصري	5	2	-	3	-
14	تناول التراث الأدبي المصري بالتحليل والدراسة المنهجية حول عبقرية المكان.	5	2	-	3	-
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	20	%40
2	Final Written Exam	15^{th}	30	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Ismail, A. H. (2024). Thematic Approaches and Storytelling Techniques in Documentary Films Depicting Egypt's Cultural Heritage. أبيدوس, 6(6), 120-137.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom

Name and Signature **Course Coordinator** Dr. Mohamed El-Bindary	**Name and Signature** **Program Coordinator** Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Chemical Engineering Principles I				
Course Code	CHE211				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**5**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. /Sohier Abo Bakr				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course introduces the fundamentals of material and energy balances in chemical engineering. It begins with dimensions and units, followed by basic concepts of material and energy balances. Students learn to perform balances on both non-reactive and reactive processes and apply these principles to various unit operations, forming the foundation for process analysis and design.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Describe the relevant mathematical principles and theories in the discipline.
		2	Use scientific concepts and theories that are relevant to the profession.
		3	Apply engineering basics that are relevant to the subject.
		4	Solve complex engineering problems by applying engineering fundamentals.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Units and dimensions	9	2	-	5	2
2	Units and dimensions (continue)	9	2	-	5	2
3	Basic concepts of material balance	9	2	-	5	2
4	Basic concepts of material balance (continue)	9	2	-	5	2
5	Basic concepts of energy balance	9	2	-	5	2
6	Basic concepts of energy balance (continue)	9	2	-	5	2
7	Combined material and energy balances	9	2	-	5	2
8	Combined material and energy balances (continue) *Midterm exam	9	2	-	5	2
9	Balances on non-reactive and reactive processes	9	2	-	5	2
10	Balances on non-reactive and reactive processes (continue)	9	2	-	5	2
11	Application of material balance on unit operations.	9	2	-	5	2
12	Application of material balance on unit operations. (continue)	9	2	-	5	2
13	Application of energy balance on unit operations.	9	2	-	5	2
14	Application of energy balance on unit operations. (continue)	9	2	-	5	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Felder, R. M., Rousseau, R. W., & Bullard, L. G. (2020). Elementary principles of chemical processes (4th ed.). Wiley.
	Other references	-Himmelblau, D. M., & Riggs, J. B. (2022). Basic principles and calculations in chemical engineering (9th ed.). Pearson. -Towler, G., & Sinnott, R. (2021). Chemical engineering design: Principles, practice and economics of plant and process design (3rd ed.). Butterworth-Heinemann.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom

Name and Signature
Course Coordinator

Dr. /Sohier Abo Bakr

Name and Signature
Program Coordinator

Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Material Science and Metallurgy				
Course Code	CHE212				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. Nada Mohamed Aboeleneen				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course provides a comprehensive overview of materials science, covering the classification and structure of metals, alloys, ceramics, polymers, and composites. It explores solid-state and crystalline structures, crystal systems, symmetry, and defects at the point, line, planar, and volume levels. Students learn about ceramic structures, glasses, and glass ceramics, along with polymer chemistry, crystallinity, and composite classifications. The course also examines the physical, mechanical, electrical, thermal, magnetic, and optical properties of materials, including stress-strain behavior and testing methods. Thermodynamic principles are applied to understand phase diagrams of unary and binary systems, with a focus on metals, alloys, and the iron-carbon system. Additional topics include phase transformations, heat treatment, and metal fabrication techniques such as forming, casting, and melting.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Analyze data related to material science and metallurgy to interpret it.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve design, or products.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to material science and metallurgy to respond to the challenging role and responsibilities of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Site visits
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Classification of materials, Structure of metals and alloys (solid state- crystalline structure of metals- Crystal Formation- solidification curve)	7	2	-	3	2
2	Crystal systems- steno's law- symmetry- crystal locations, planes, and directions (miller indices, planar density, interplanar spacing, x-ray diffraction) - crystal forms- crystal twining.	7	2	-	3	2
3	Crystal systems- steno's law- symmetry- crystal locations, planes, and directions (miller indices, planar density, interplanar spacing, x-ray diffraction) - crystal forms- crystal twining.	7	2	-	3	2
4	Crystal defects- Point defects (Hume–Rothery rules, Vacancy, Schottky, Interstitial, Frenkel, Substitution defects)- Line Defects and Dislocations (edge, screw, mixed dislocation, Burger vector)-	7	2	-	3	2

	Planar Defects (Stacking Faults, Grain Boundary defects)- Volume defects.					
5	Crystal defects- Point defects (Hume–Rothery rules, Vacancy, Schottky, Interstitial, Frenkel, Substitution defects)- Line Defects and Dislocations (edge, screw, mixed dislocation, Burger vector)- Planar Defects (Stacking Faults, Grain Boundary defects)- Volume defects.	7	2	-	3	2
6	The scope of ceramics- Pauling's Rules- Structure of ceramics (Rock Salt, Diamond, Spinel, perovskite, and Silicate structures)- glasses structure (Zachariasen Rules, Stanworth Rules, Oxide Glass Cations)- Glass Ceramics (properties and applications)	7	2	-	3	2
7	Polymer Classification (according to their chain chemistry, macroscopic structure, formability)- branching and polymer properties- Polymer Tacticity- Copolymers- Degree of Polymerization- Average Molecular Weight- Polymer Crystallinity- Structure of composites- Composite Classification- Advanced materials.	7	2	-	3	2
8	Properties of different material classes (Physical, Mechanical, Electrical, Thermal, Magnetic, Optical) – stresses- stress strain curve – destructive tests for mechanical properties- Non-destructive testing.	7	2	-	3	2

	* Midterm exam					
9	Properties of different material classes (Physical, Mechanical, Electrical, Thermal, Magnetic, Optical) – stresses- stress strain curve – destructive tests for mechanical properties- Non-destructive testing.	7	2	-	3	2
10	Thermodynamic of metals and alloys- Phase Rule- Microstructure- Unary phase diagram (Polymorphism in Metals (Allotropy), iron phase diagram, sulfur phase diagram, carbon phase diagram.	7	2	-	3	2
11	Thermodynamics of binary mixture- equilibrium phase diagrams of binary systems (Tie Line and Lever Arm Principles, Completely Soluble in Liquid State and Completely Soluble in Solid State, Three-Phase Transformations in Binary, Miscibility in liquid state and incomplete solubility in solid state (Eutectic system), Binary Peritectic Alloy Systems)- the iron carbon phase diagram- Intermediate Phases- Ceramic and cement Phases.	7	2	-	3	2
12	Thermodynamics of binary mixture- equilibrium phase diagrams of binary systems (Tie Line and Lever Arm Principles, Completely Soluble in Liquid State and Completely Soluble in Solid State, Three-Phase Transformations in Binary, Miscibility in liquid state and incomplete solubility in solid state (Eutectic system),	7	2	-	3	2

	Binary Peritectic Alloy Systems)- the iron carbon phase diagram- Intermediate Phases- Ceramic and cement Phases.					
13	Thermodynamics of binary mixture- equilibrium phase diagrams of binary systems (Tie Line and Lever Arm Principles, Completely Soluble in Liquid State and Completely Soluble in Solid State, Three-Phase Transformations in Binary, Miscibility in liquid state and incomplete solubility in solid state (Eutectic system), Binary Peritectic Alloy Systems)- the iron carbon phase diagram- Intermediate Phases- Ceramic and cement Phases.	7	2	-	3	2
14	Pure metals and alloys (Solidification and its zones, heat treatment and phase transformations of ferrous alloys)- metal fabrication techniques (forming, Casting, Melting Operations)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Callister, W. D., & Rethwisch, D. G. (2022). Fundamentals of materials science and engineering: SI version. John Wiley & Sons.
	Other references	-Yadav, S. S., Dhiman, R., & Anklekar, R. M. (2024). Materials science and engineering. Cambridge Scholars Publishing. -Seetharaman, S. (2024). Treatise on process metallurgy: Volume 3: Industrial processes. Elsevier. - Lecture notes prepared by Prof. Dr. / Magdi Abader -Lecture notes prepared by Ass. Prof. Dr. / Hend Gadow
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom, Institute library

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Dr. Nada Mohamed Aboeleneen	Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Principles of Engineering Design</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE213</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr / Yasser Tawfik</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
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2. Course Overview

This course provides a comprehensive overview of machine design, beginning with its definitions, classifications, and general considerations. It covers the design and analysis of mechanical elements and components, including stresses (normal, shear, torsional, bending, and bearing), material properties, and failure modes such as buckling and impact. Emphasis is placed on threaded fasteners, locking devices, keys, splines, and power screws, including the design of screw jacks and torque requirements. The course also explores motion and power transmission elements such as belt drives, pulleys, gear drives, and bearings (sliding and rolling contact), along with pipe connections and flexible drives. Additionally, it introduces dimensioning standards, welding and riveting conventions, and applications of robotics technology and basic machining processes in mechanical design.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Assess different ideas, views, and knowledge from a range of sources.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve the problems of design creatively.
		2	Manage effectively for tasks, time and resources..
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped classroom
3. Discussion
4. Problem solving
5. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	-Design definition -Classifications of machine design. -Mechanical Elements Design. -Mechanical components -General considerations in Machine design	7	2	-	3	2
2	- Common Dimensioning Terminology Standards and Codes -Forces and Stress Analysis -Stresses and Strains Definition	7	2	-	3	2
3	-Stresses and strains Analysis -Material properties -Principal Stresses and Shear Stresses	7	2	-	3	2
4	- Hoop Stress (Pressure vessels, and Pipelines) -Bearing and Impact Stress -Torsional Shear Stress	7	2	-	3	2
5	-Bending Stress in Straight Beams, Buckling of Columns -Stress on riveted lap joints - Welding and riveting conventions	7	2	-	3	2
6	- Threads, fasteners, and Multiple Threaded Screws -Locking devices - keys and splines	7	2	-	3	2
7	-Power Screw and Terminology of Power Screw -Design of Screw and Nut	7	2	-	3	2

8	-Design of Screw Jack -Torque Requirement for lifting and lowering *Midterm exam	7	2	-	3	2
9	- Motion and power transmission elements - Pipe connections	7	2	-	3	2
10	-Flexible Drives -Belt Drives	7	2	-	3	2
11	-Flat Belt Pulleys -Types of Pulleys for Flat Belts	7	2	-	3	2
12	-Rolling-Contact Bearings -Sliding Contact Bearings -Journal Bearings	7	2	-	3	2
13	- Gear Drives	7	2	-	3	2
14	- Basic machining processes -Applications of robotics technology.	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	40	%40
2	Final Written Exam	15th	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Jack, H. (2021). Engineering design, planning, and management (2nd ed.).
	Other reference	Towler, G., & Sinnott, R. (2021). *Chemical engineering design: principles, practice and economics of plant and process design*. Butterworth-Heinemann.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/

Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom

Name and Signature Course Coordinator Dr / Yasser Tawfik	**Name and Signature Program Coordinator** Assoc. Prof. Dr. Hend Gadow

الفصل الدراسي الثاني

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Numerical Methods in Engineering				
Course Code	BAS221				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Assoc. Prof. Samar Madian				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course delves into Numerical Methods for solving mathematical problems that arise in engineering, science, and applied mathematics. It begins with Curve Fitting techniques, including linear and nonlinear curve approximation, enabling the modeling of data and functions. The course covers Numerical Solutions of Linear Equations, utilizing methods such as Jacobi, Gauss-Seidel (Gauss), and Successive Over-Relaxation (SOR), coupled with solving Initial Value Problems (ODEs) and Partial Differential Equations (PDEs) for complex systems modeling. Students learn approaches for solving Nonlinear Equations (Roots) through iterative methods, including Bisection and Newton-Raphson techniques. The course emphasizes Interpolation and Polynomial Approximation, with methods such as Lagrange and Newton Divided Difference for function approximation based on discrete data points. Additional topics include advanced Numerical Differentiation and Integration, crucial for approximating derivatives and integrals when analytical solutions are difficult. The course concludes with methods for handling Initial Conditions and Boundary Value Problems, essential in solving differential equations in physical and engineering applications

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Choose relevant mathematical and computer-based methodologies for problem modeling and analysis
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Apply Numerical Techniques to Engineering Problems
		2	Evaluate Research and Case Studies

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Tutorial	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)
1	Curve Fitting for Straight Line	8	2	2	-	4
2	Curve Fitting for Curves	8	2	2	-	4
3	Numerical Solution of Linear Equations (Jacobi & Gauss)	8	2	2	-	4
4	Numerical Solution of Linear Equations (SOR) &	8	2	2	-	4
5	Numerical Solution of Partial Differential Equations (PDEs)	8	2	2	-	4
6	Numerical Solution of Nonlinear Equations (Roots)	8	2	2	-	4
7	Interpolation and Polynomial Approximation: Lagrange Method	8	2	2	-	4
8	Interpolation and Polynomial Approximation: Newton Divided Difference ***Midterm Exam**	8	2	2	-	4
9	Newton Backward, Gauss Forward, Gauss Backward, and Stirling's Approximation	8	2	2	-	4
10	Numerical Differentiation & Numerical Integrations	8	2	2	-	4
11	Initial Value Problems (ODEs)	8	2	2	-	4

12	Application of Numerical Methods in Real-World Problems	8	2	2	-	4
13	Numerical Differentiation & Numerical Integrations	8	2	2	-	4
14	Initial Condition and Boundary Value Problems	8	2	2	-	4
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods *		Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams	Midterm	8^{th}	40	40%
		Quizzes - Short Tests- Assignments	Any week		
2	Final Written Exam		15^{th}	60	60%

Learning Resources and Supportive Facilities

Learning resources (Books, Scientific references, etc.)	**The main (essential) reference for the course**	Singh, H., Singh, J., Purohit, S. D., & Kumar, D. (Eds.). (2021). *Advanced numerical methods for differential equations: Applications in science and engineering*. CRC Press.
		Leader, J. J. (2022). *Numerical analysis and scientific computation*. Chapman and Hall/CRC.
		Vuik, K., Vermolen, F., van Gijzen, M., & Vuik, T. (2023). *Numerical methods for ordinay*

	Other References	*differential equations*. TU Delft Open Publishing. Boehm, W. (2021). *Numerical methods*. CRC Press. Botelho, F. S. (2021). *Functional analysis, calculus of variations and numerical methods for models in physics and engineering*. CRC Press, Taylor & Francis Group.
	Learning Platforms	Moodle 3.217.6.68 http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc. Prof. Samar Madian	**Name and Signature** **Program Coordinator** Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Chemical Engineering Principles II</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE221</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>3</td><td>-</td><td>2</td><td>5</td><td>5</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Sohier Abo Bakr</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course offers a foundational understanding of thermodynamics and process analysis in chemical engineering. It covers key concepts such as energy forms, system classifications, and state properties, along with steady and unsteady flow systems. Students will apply the first law of thermodynamics to closed and open systems, including work-producing and consuming devices like turbines and compressors. The course also explores enthalpy and internal energy changes using equations, charts, and tables, and examines chemical reaction energetics through heats of formation, Hess's Law, and combustion analysis. Practical applications include adiabatic flame temperature calculations, binary distillation, extraction, and humidification. The course concludes with an introduction to simultaneous material and energy balances and computer-aided process design methods

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Describe the types of energy associated with energy balances , concepts , and units.
		2	Use scientific concepts and theories that are relevant to the enthalpy, heat of solution and mixing.
		3	Apply engineering basics that are relevant to energy balances for processes with chemical reaction and without chemical reaction.
		4	Solve material and energy balances.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	**-Equation-based approach** **- Degrees of freedom analysis** **- Conceptual design of chemical processes**	10	3	-	5	2
2	**Fundamental concepts & definitions** - Definitions: - Energy, system, closed system, open system. - Flow vs. Non-flow systems (steady vs. Unsteady mass flow).	10	3	-	5	2
3	**Fundamental concepts & definitions** - Surroundings, property (measurable characteristic). - Extensive vs. Intensive - State, heat, work.	10	3	-	5	2
3	**Energy forms & state variables** - Kinetic energy, potential energy, internal energy. - Enthalpy, state variables. - Path functions. - Initial & final states.	10	3	-	5	2
4	-Calculate enthalpy and internal energy changes from heat capacity equations, graphs and charts, and tables given the initial and final states of the material.	10	3	-	5	2
5	-Calculate enthalpy and internal energy changes from heat capacity equations, graphs and charts, and tables given the initial and final states of the material. (continue)	10	3	-	5	2
6	**Energy balance for closed systems** - first law for closed systems: $\delta u = q - w$. - Applications: Piston-cylinder Expansion/compression.	10	3	-	5	2
7	**Energy balance for open systems (steady-state)**	10	3	-	5	2

	- First law for open systems: $\delta h + \delta k.e. + \delta p.e. = q - w$□. - Nozzles, turbines, compressors (work-producing/consuming devices).					
8	**Standard heat of formation & reaction** **-S**tandard heat of formation (δh°_f, energy to form 1 mole from elements). - Heat of reaction (δh_{rx}□, energy change in a reaction). *Midterm exam	10	3	-	5	2
9	**Standard heat of formation & reaction** - Hess's law (calculating δh_{rx}□ from δh°_f values). **Energy balances with chemical reactions** **-** Combustion reactions (δh_{rx}□ from heats of formation).	10	3	-	5	2
10	**Energy balances with chemical reactions** - Adiabatic flame temperature (no heat loss). **Introduction to basic chemical engineering processes** **-**Humidification, binary distillation	10	3	-	5	2
11	**Introduction to basic chemical engineering processes** **-**Binary distillation and extraction -**Simultaneous material and energy balances of complete process flow sheets.**	10	3	-	5	2
12	Simultaneous material and energy balances of complete process flow sheets.(continue)	10	3	-	5	2
13	Introduction of computer methods to solve chemical engineering problems	10	3	-	5	2
14	Computer-aided process design.	10	3	-	5	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Himmelblau, D. M., & Riggs, J. B. (2022). Basic principles and calculations in chemical engineering (9th ed.).
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom

Name and Signature **Course Coordinator** Dr. Sohier Abo Bakr	**Name and Signature** **Program Coordinator** Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Chemical Engineering Thermodynamics				
Course Code	CHE222				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**1**	**2**	**5**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. Mohamed Elbindary				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course explores the thermodynamic properties of homogeneous mixtures, focusing on concepts such as partial molal properties, the Gibbs-Duhem equations, phase equilibria in ideal and non-ideal systems, fugacity, activity coefficients, excess properties, and chemical reaction equilibria. It also examines the heat effects of mixing and solution behavior. Practical sessions reinforce theoretical understanding through experiments including calorimeter calibration, determination of specific heat capacity, heat of fusion, heat of solution, heat of neutralization, and the calculation of various thermodynamic functions. The course concludes with a comprehensive revision of key concepts and applications.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Apply engineering basics that are relevant to the subject.
		2	Identify complex engineering problems by applying engineering fundamentals
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance.
		2	Summarize the appropriate techniques relevant to chemical engineering thermodynamics.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Thermodynamic properties of homogeneous mixtures **Practical:** • Calibration of the Calorimeter	9	2	1	4	2
2	Thermodynamic properties of homogeneous mixtures **Practical:** • Specific Heat Capacity of an Unknown Metal	9	2	1	4	2
3	Partial Molal Properties solutions - Gibbs-Duhem Equations. **Practical:** Heat of Fusion	9	2	1	4	2
4	Partial Molal Properties solutions - Gibbs-Duhem Equations. **Practical:** Heat of Fusion (continue)	9	2	1	4	2
5	Partial Molal Properties solutions - Gibbs-Duhem Equations. **Practical:** Heat of Fusion (continue)	9	2	1	4	2
6	Ideal and non-ideal - Phase equilibria; miscible systems **Practical** Heat of Solution	9	2	1	4	2
7	Ideal and non-ideal - Phase equilibria; miscible systems **Practical** Heat of Solution (continue)	9	2	1	4	2
8	Ideal and non-ideal - Phase equilibria; miscible systems **Practical** Heat of Solution (continue)	9	2	1	4	2

	*Midterm exam					
9	Fugacity - activity coefficient **Practical** Heat of Neutralization	9	2	1	4	2
10	Fugacity - activity coefficient **Practical** Heat of Neutralization (continue)	9	2	1	4	2
11	Excess properties - Chemical reaction equilibria **Practical** Calculation of different thermodynamic functions.	9	2	1	4	2
12	Excess properties - Chemical reaction equilibria **Practical** Calculation of different thermodynamic functions. (continue)	9	2	1	4	2
13	Heat effect of mixing **Practical** Revision	9	2	1	4	2
14	*Practical Examination					
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%32
2	Practical Examination	14^{th}	10	%8
3	Final Written Exam	15^{th}	75	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Whitman, A. M. (2023). Thermodynamics: Basic principles and engineering applications (2nd ed.). Springer.
	Other references	-Smith, J. M., Van Ness, H. C., & Abbott, M. M. (2022). Introduction to chemical engineering thermodynamics (9th ed.). McGraw-Hill Education. -DeWitt, D. P., Blevins, R. E., & Scott, M. (2021). Applied chemical engineering thermodynamics. Wiley.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Skill Labs	lab
	Supplies	White board, Lecture classroom

Name and Signature Course Coordinator	**Name and Signature Program Coordinator**
Dr. Mohamed Elbindary	Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Analytical Chemistry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE223</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Nada Mohamed Aboeleneen</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course provides a comprehensive foundation in analytical chemistry, beginning with essential tools such as solution types, concentration units, mass and charge conservation, and the preparation of standard solutions. It explores the principles and applications of various titrimetric methods, including neutralization, precipitation, complexometric, and redox titrations, along with titration curves and factors affecting method selection. Gravimetric analysis is also covered, emphasizing precipitation techniques, impurity control, and precipitate handling. Students learn to evaluate analytical data through statistical tools and error analysis, including confidence intervals and distribution models. The course further introduces advanced instrumental techniques such as HPLC, GC, UV-Vis, IR, XRD, XRF, EDX/EDS, and zeta potential analysis, alongside electrical and optical methods like potentiometry, conductimetry, and atomic absorption. Practical sessions reinforce theoretical knowledge through hands-on experiments involving titration, gravimetry, pH measurement, conductivity, and spectrophotometry.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Use scientific concepts and theories that are relevant to analytical chemistry.
		2	Solve complex engineering problems by applying the concepts and the theories of analytical chemistry, appropriate to the chemical engineering.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Analyze data to interpret it.
		2	Apply statistical analyses and objective engineering judgment to draw conclusions.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and	1	Engage in the recent technological changes and emerging fields relevant to analytical chemistry to respond to the challenging role and responsibilities of a professional chemical engineer.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
	responsibilities of a professional chemical engineer.		
B3	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.	1	Apply computational techniques appropriate to analytical chemistry.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Site visits
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Basic tools in analytical chemistry (solution types- concentration Expressing methods- Converting between concentration units). **Practical** • Preparation of Standard Solution of solid salt	8	2	2	4	-
2	Basic tools in analytical chemistry (Conservation of Mass- Conservation of charge- analytical apparatus-solutions preparation). **Practical** • Preparation of a Standard Solution of concentrated Acid	8	2	2	4	-
3	Factors affecting the choice of analytical method, Equivalence	8	2	2	4	-

	Points and End Points, Back titration. **<u>Practical</u>** • Mohr's method for determining chloride					
4	Displacement titration, direct titration, indirect titration **<u>Practical</u>** • Volhard's method	8	2	2	4	-
5	Titrimetric Methods of Analysis (Neutralization- Precipitation) **<u>Practical</u>** • EDTA standardization against metallic magnesium	8	2	2	4	-
6	Titrimetric Methods of Analysis (Complexmetric- Oxidation – Reduction), Titration curves. **<u>Practical</u>** • Determination of magnesium using eriochrome black T indicator	8	2	2	4	-
7	Gravimetric Methods of Analysis- Separation of the element or of the compound- Precipitation Gravimetry. **<u>Practical</u>** • Determination of aluminum using EBT as indicator (back – titration)	8	2	2	4	-
8	precipitate properties- precipitation mechanism- digestion- Avoiding Impurities- Types of impurities- Filtering, Rinsing, and drying the Precipitate. **<u>Practical</u>** • Determination of aluminum using EBT as indicator (back – titration) *Midterm exam	8	2	2	4	-
9	Evaluating Analytical Data- Measures of Central Tendency (Mean, Median, mode) **<u>Practical</u>** • Redox reaction between oxalic acid and potassium permanganate	8	2	2	4	-

10	Measures of spread (range, standard deviation, variance)- Characterizing Experimental Errors (Accuracy, determinate error, Indeterminate errors) **Practical** • Gravimetric Analysis	8	2	2	4	-
11	Uncertainty- Distribution of Measurements (Binomial Distribution, Normal Distribution) **Practical** • Conductimetry	8	2	2	4	-
12	Confidence Intervals for Samples (t critical value, F-test, comparison of variances, Comparing Two Sample Means) **Practical** • PH meters	8	2	2	4	-
13	Instrumental chemical analysis (High-performance Liquid Chromatography HPLC- Gas Chromatography GC- X-ray Diffraction- Infrared (IR) spectroscopy- X-ray fluorescence- Ultraviolet(UV)-visible spectrophotometer- energy dispersiv x-ray **Practical** • Spectrophotometer	8	2	2	4	-
14	Spectroscopy (EDX&EDS)- Zeta potential Analyzer) , Electrical analysis (Potentiometry- Conductimetry- Voltammetry- Coulometry), Optical methods of analysis (Atomic absorption spectroscopy- Infrared (IR)- Visible- Ultraviolet (UV)- fluorimetry- flame photometry- emission spectroscopy).	8	2	2	4	-
14	Practical Examination					
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	30	%30
2	Practical Examination	14^{th}	10	%10
3	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. (2021). Fundamentals of analytical chemistry (10th ed.).
	Other references	Otto, M. (2023). Chemometrics: statistics and computer application in analytical chemistry. John Wiley & Sons.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Skill Labs	Chemistry lab
	Supplies	White board, Lecture classroom, Institute library

Name and Signature **Course Coordinator** Dr. Nada Mohamed Aboeleneen	**Name and Signature** **Program Coordinator** Assoc. prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Process Dynamics and Control</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE224</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Prof. Dr.Taha Farag</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course introduces the fundamental concepts and advantages of automatic control systems, highlighting their basic features and classifications, including open-loop and closed-loop systems, as well as feedback, feed-forward, process, and position control. It covers essential mathematical tools such as linearization, Laplace transforms, and block diagram algebra. Students explore process dynamics across first, second, and higher-order systems, and study measuring and actuating components. The course also examines control strategies, including two-position and three-term (PID) controllers, along with their mechanisms and optimal tuning. System stability is analyzed using both algebraic and graphical methods.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation. Analyze and interpret data.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Choose relevant mathematical and computer-based methodologies for problem modeling and analysis.
B3	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.	1	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.

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4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Presentation and movies
3. Problem solving

4. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Automatic control merits and basic features	8	2	-	4	2
2	Classification of control action (openloop and closed-loop, feed-back)	8	2	-	4	2
3	Classification of control action (feed-forward, process and position control)	8	2	-	4	2
4	Mathematical tools (Linearization, Laplace transforms and block diagram algebra)	8	2	-	4	2
5	Mathematical tools (Linearization, Laplace transforms and block diagram algebra)	8	2	-	4	2
6	Process dynamics (first, second and higher orders)	8	2	-	4	2
7	Measuring and actuating elements	8	2	-	4	2
8	Measuring and actuating elements *Midterm exam	8	2	-	4	2
9	Two-position controller and Three-term controller	8	2	-	4	2
10	Two-position controller and Three-term controller	8	2	-	4	2
11	Controller mechanism and optimum setting	8	2	-	4	2
12	Controller mechanism and optimum setting	8	2	-	4	2
13	System stability (algebraic and graphical methods).	8	2	-	4	2
14	System stability (algebraic and graphical methods).	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Bequette, B. W. (2023). Process control: Modeling, design, and simulation (2nd ed.).
	Other references	-Rice, R. G., Do, D. D., & Maneval, J. E. (2023). Applied mathematics and modeling for chemical engineers. John Wiley & Sons. -Romagnoli, J. A. (2020). Introduction to process control (3rd ed.). CRC Press. -Rengaswamy, R., Srinivasan, B., & Bhatt, N. P. (2020). Process control fundamentals: Analysis, design, assessment, and diagnosis (1st ed.). CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, Lecture classroom

Name and Signature Course Coordinator	**Name and Signature Program Coordinator**
Prof. Dr.Taha Farag	Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Heat Transfer				
Course Code	CHE225				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**1**	**2**	**5**	**3**
Course Type	Compulsory				
Academic level at which the course is taught	Level 2				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr / Riham Atef				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course introduces the fundamentals of heat transfer, covering the three main modes: conduction, convection, and thermal radiation. It includes the heat diffusion equation in Cartesian, cylindrical, and spherical coordinates, with emphasis on one-dimensional steady-state conduction. The course explores both external and internal flow convection and the principles and design of heat exchangers. Practical sessions reinforce theoretical concepts through experiments on conduction, convection, radiation, condensation (dropwise and film), nucleate boiling, and heat exchanger performance.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Use scientific concepts and theories that are relevant to heat transfer.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Analyze and interpret data
		2	Develop suitable experimentation and/or simulation.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Identify the principles of chemical engineering including heat transfer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Problem solving
3. Discussion
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to heat transfer: conduction, convection, thermal radiation **Practical** -Investigate how different materials conduct heat.	8	2	1	3	2
2	Introduction to heat transfer: conduction, convection, thermal radiation **Practical** -Observe convection currents in water.	8	2	1	3	2
3	Introduction to heat transfer: conduction, convection, thermal radiation **Practical** - Study the effect of color on thermal radiation.	8	2	1	3	2
4	The heat diffusion equation: Cartesian **Practical** Study heat diffusion in different geometries	8	2	1	3	2
5	The heat diffusion equation: Cylindrical **Practical** Study heat diffusion in different geometries	8	2	1	3	2
6	The heat diffusion equation: Spherical coordinates	8	2	1	3	2

	Practical Study heat diffusion in different geometries					
7	One dimensional St.St conduction **Practical** study one-dimensional steady-state heat conduction by measuring temperature distribution along a solid rod.	8	2	1	3	2
8	One dimensional St.St conduction **Practical** study one-dimensional steady-state heat conduction by measuring temperature distribution along a solid rod. *Midterm exam	8	2	1	3	2
9	External, internal flow convection **Practical** -Observe the effects of convection in a fluid (air) around a heated object.	8	2	1	3	2
10	External, internal flow convection **Practical** - Demonstrate internal convection within a fluid in a confined space (like a liquid in a container).	8	2	1	3	2
11	Heat exchangers **Practical** Film condensation	8	2	1	3	2
12	Heat exchangers **Practical** Nucleate film boil	8	2	1	3	2
13	Heat exchangers **Practical** Heat exchanger.	8	2	1	3	2
14	Heat exchangers **Practical** Revision	8	2	1	3	2
14	Practical Examination					
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	40	%32
2	Practical Examination	14th	10	%8
3	Final Written Exam	15th	75	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Krane, M. J. M., & Gaskell, D. R. (2024). Introduction to transport phenomena in materials engineering (3rd ed.). Taylor & Francis Group.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Skill Lab	lab
	Supplies	White board, Lecture classroom

Name and Signature **Course Coordinator** Dr / Riham Atef	**Name and Signature** **Program Coordinator** Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Training 1</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE226</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 2</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

In field training, chemical engineering students are expected to apply design principles to solve real-world problems. Emphasis is placed not only on technical content but also on developing strong presentation and communication skills.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Define technical language and report writing.
		2	Assess different ideas, views, and knowledge from a range of sources.
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	1	Collaborate effectively within multidisciplinary team.
		2	Work in stressful environment and within constraints.
A8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	1	Communicate effectively.
		2	Demonstrate efficient IT capabilities.

4. Teaching and Learning Methods

1. projects
2. Site visits
3. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1-3	Students in the field training of chemical engineering they will be expected to apply design to solve a given real world problem	-	-	-	-	-
4	Guidelines for creating and presenting professional presentations and drafting organized, accurate technical reports.	-	-	-	-	-

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Oral Examination	5th week from training initiation	30	%60
2	Final work (presentation, Report)	6th week from training initiation	20	%40

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Subject studies
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Assoc.Prof. Hend Elsayed Gadow	Assoc.Prof. Hend Elsayed Gadow

الفرقة الثالثة

(2025-2026)

الفصل الدراسي الأول

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Environmental Management				
Course Code	BAS311				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**1**	**3**	**3**
Course Type	Compulsory				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Assoc. Prof. Dr./ Ramadan Elkateb				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

Studying environmental science is essential for understanding the complex interactions between human activities and the natural world, particularly in the context of modern technology, which has significantly contributed to environmental degradation through pollution and resource depletion. The course explores how technological advancement, while beneficial, poses challenges to environmental sustainability. It also examines the quality of the environment as a key component of development, emphasizing the need to balance economic growth with ecological preservation. Major sources of environmental pollution, such as air and water contamination, are analyzed along with effective control methods to mitigate their impact. Additionally, the course addresses issues related to solid waste and noise pollution, the economic considerations in managing environmental harm, and the importance of legislation in enforcing environmental protection and promoting sustainable practices.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
		2	Incorporate economic, societal, global, environmental, and risk management factors into design.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	1	Describe quality assurance systems, codes of practice, and standards, as well as health and safety regulations and environmental concerns.
		2	Apply safe systems at work by taking the necessary precautions to manage hazards.
		3	Utilize modern technologies.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction: Importance of studying environmental science.	6	2	-	3	1
2	Modern technology and its effect on the environment.	6	2	-	3	1
3	Continuation: Technology and environment – real-world examples	6	2	-	3	1
4	Environmental quality and elements of sustainable development.	6	2	-	3	1
5	Environmental quality (continued): Indicators and assessment tools	6	2	-	3	1
6	Sources of air pollution: Types, causes, and effects.	6	2	-	3	1
7	Air pollution control methods and technologies	6	2	-	3	1
8	Sources of water pollution: Industrial, agricultural, and domestic sources. * **Midterm Exam**	6	2	-	3	1
9	Water pollution control: Treatment techniques and prevention strategies	6	2	-	3	1
10	Solid waste pollution: Types, impacts, and management practices.	6	2	-	3	1
11	Noise pollution: Sources, health impacts, and mitigation.	6	2	-	3	1
12	Economics of environmental pollution control.	6	2	-	3	1
13	Environmental legislation and policies for environmental protection.	6	2	-	3	1

14	Course review and student presentations.	6	2	-	3	1
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	- Lame, M., & Marcantonio, R. (2022). Environmental management: concepts and practical skills. Cambridge University Press.
	Other References	-Dathe, T., Dathe, R., Dathe, I., & Helmold, M. (2022). Corporate social responsibility (CSR), sustainability and environmental social governance (ESG): Approaches to ethical management. Springer Nature. -Khedr, A. M., Elwakiel, N., Halawia, S. E., & Mansour, R. A. (2024). Adsorption characteristics and applications of andesite in removing some pollutants from wastewater. Scientific Reports.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc. Prof. Dr./ Ramadan Elkateb	**Name and Signature** **Program Coordinator** Assoc. Prof. Dr. Hend Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Reactor Design</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE311</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Prof. Dr. Taha Farrag</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Chemical reaction engineering combines thermodynamics and kinetics to evaluate reaction feasibility and rates. It involves analyzing various reactor types—batch, plug flow (PFR), and continuous stirred tank reactors (CSTR)—under different reaction conditions. Non-ideal reactor behavior is studied using models such as residence time distribution (RTD), back mixing, and dispersion. Isothermal and non-isothermal reactors require different kinetic analyses due to heat effects. Heterogeneous and catalytic reactions introduce complexities like mass and energy transfer limitations, which influence catalyst effectiveness and overall performance. Reactor design—catalytic or non-catalytic—must consider these factors, along with stability, sensitivity to operating conditions, and safety. Optimization focuses on maximizing conversion, yield, or selectivity while factoring in reaction kinetics, thermodynamics, and economic or practical constraints when selecting the most suitable reactor type.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

<table>
<tr><th colspan="2">Program Outcomes (NARS 2018)</th><th colspan="2">Course Learning Outcomes</th></tr>
<tr><th>Code</th><th>Text</th><th>Code</th><th>Text</th></tr>
<tr><td rowspan="3">A6</td><td rowspan="3">Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.</td><td>1</td><td>Demonstrate how to conduct a reactor design and characterization of typical reactor design materials and components using standard methodologies.</td></tr>
<tr><td>2</td><td>Interpret data acquired from laboratory observation using graphs and curves</td></tr>
<tr><td>3</td><td>Acquire entrepreneurial skills</td></tr>
<tr><td rowspan="2">B1</td><td rowspan="2">Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.</td><td>1</td><td>Define the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations and process control.</td></tr>
<tr><td>2</td><td>Create a process, component or system to carry out specialized engineering designs.</td></tr>
</table>

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Fundamentals of thermodynamics and kinetics of chemical reactions	8	2	-	4	2
2	Analysis of batch reactors for different types of reactions	8	2	-	4	2
3	Analysis of plug-flow and continuous stirred tank reactors for different types of reactions	8	2	-	4	2
4	Non ideal reactor analysis, including residence time distribution, back mixing and dispersion models	8	2	-	4	2
5	Kinetics of isothermal and nonisothermal ideal reactors.	8	2	-	4	2
6	Kinetics of heterogeneous reactions	8	2	-	4	2
7	Kinetics of catalytic reactions	8	2	-	4	2
8	Design of different types of catalytic and non-catalytic reactors *Midterm exam	8	2	-	4	2
9	Mass and energy transfer limitations in heterogeneous reaction systems	8	2	-	4	2
10	Catalyst effectiveness	8	2	-	4	2
11	Catalyst effectiveness (continue)	8	2	-	4	2
12	Reactor stability and sensitivity to operating parameters	8	2	-	4	2
13	Optimization of reactor design	8	2	-	4	2

14	Factors affecting choice of reactors	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%40
2	Final Written Exam	15^{th}	75	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Conesa, J. A. (2020). Chemical reactor design: Mathematical modeling and applications. Wiley.
	Other References	- Keszei, E. (2021). Reaction Kinetics. Springer Nature Switzerland AG. -Roussel, M. R. (2023). Foundations of chemical kinetics: A hands-on approach. IOP Publishing.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

prof. Dr. Taha Farrag

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Operations Research</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE312</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Sohir Abo Bakr</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Operations research applies mathematical models and analytical methods to solve engineering and management problems efficiently. The course covers linear programming, including the simplex method, duality, and sensitivity analysis, along with transportation, assignment, and transshipment models. It also explores network flow models, integer programming, and probabilistic approaches. Key decision-making tools such as queuing theory, Markov chains, decision analysis, Markov decision processes, and utility functions are introduced to support optimal choices under uncertainty.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Define operations research principles, basic characteristics, and properties, as well as their applications in chemical process industries like petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.
		2	Analyze data and apply it on operations research
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	1	List the engineering operation research management principles
		2	Use essential project management related to operation research.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	Interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.
		2	Acquire entrepreneurial skills.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Models and methods of operations research in solving engineering and management problems.	8	2	-	4	2
2	Models and methods of operations research in solving engineering and management problems. (continue)	8	2	-	4	2
3	Linear programming, simplex method, duality, sensitivity analysis	8	2	-	4	2
4	Linear programming, simplex method, duality, sensitivity analysis. (continue)	8	2	-	4	2
5	Transportation, assignment and transshipment models	8	2	-	4	2
6	Transportation, assignment and transshipment models. (continue)	8	2	-	4	2
7	Network flows models and integer programming	8	2	-	4	2
8	Network flows models and integer programming. (continue) *Midterm exam	8	2	-	4	2
9	Probabilistic models in operations research problems	8	2	-	4	2
10	Probabilistic models in operations research problems. (continue)	8	2	-	4	2
11	Queuing theory, Markov chain and decision analysis	8	2	-	4	2
12	Queuing theory, Markov chain and decision analysis. (continue)	8	2	-	4	2

13	Marko vain decision process and utility functions	8	2	-	4	2
14	Marko vain decision process and utility functions. (continue)	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Weber, G.-W., Farnoudkia, H., & Purutçuoğlu, V. (2022). Operations research: New paradigms and emerging applications (1st ed.). CRC Press.
	Other References	Taha, H. A. (2022). Operations research: An introduction (11th ed.). Pearson Education.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. Sohir Abo Bakr	**Name and Signature** **Program Coordinator** Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Mass Transfer Operations I</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE313</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. / Riham Atef</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Mass transfer is the movement of substances driven by concentration differences and includes both molecular diffusion and convective transport. It occurs in gases, liquids, solids, gels, and biological solutions, with varying rates. Key concepts include mass transfer coefficients, dimensionless numbers, and analogies with heat and momentum transfer. When two phases interact, mass transfer across the interface is described by overall transfer coefficients. These principles are applied in processes like distillation and liquid-liquid extraction for separating components. Distillation is a separation process based on differences in component volatilities, using vaporization and condensation to separate mixtures. It is commonly carried out in tray or packed columns and is essential in chemical, petrochemical, and beverage industries.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

<table>
<tr><th colspan="2">Program Outcomes (NARS 2018)</th><th colspan="2">Course Learning Outcomes</th></tr>
<tr><th>Code</th><th>Text</th><th>Code</th><th>Text</th></tr>
<tr><td>A7</td><td>Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.</td><td>1</td><td>Collaborate effectively within multidisciplinary team.</td></tr>
<tr><td rowspan="3">B1</td><td rowspan="3">Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design..</td><td>1</td><td>Illustrate the principles of chemical engineering including Mass Transfer</td></tr>
<tr><td>2</td><td>Summarize the appropriate techniques relevant to mass transfer</td></tr>
<tr><td>3</td><td>Create a process, component or system to carry out specialized engineering designs</td></tr>
</table>

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to mass transfer and diffusion.	8	2	-	4	2
2	-Basic definitions (velocity concentration - flux) - Molecular diffusion in gases.	8	2	-	4	2
3	Molecular diffusion in liquids.	8	2	-	4	2
4	Molecular diffusion in gels and biological solutions.	8	2	-	4	2
5	Molecular diffusion in solids	8	2	-	4	2
6	Molecular diffusion in solids. (continue)	8	2	-	4	2
7	Convective mass transfer- types of mass transfer coefficients - dimensionless groups in mass transfer	8	2	-	4	2
8	Theories of mass transfer- momentum, heat, and mass transfer analogies *Midterm exam	8	2	-	4	2
9	Theories of mass transfer- momentum, heat, and mass transfer analogies. (continue)	8	2	-	4	2
10	Equilibrium between two phases.	8	2	-	4	2
11	Interphase mass transfer- overall mass transfer coefficients.	8	2	-	4	2
12	Vapor-liquid equilibria (VLE), binary system distillation (plate and packed columns)	8	2	-	4	2

13	Vapor-liquid equilibria (VLE), binary system distillation (plate and packed columns). (continue)	8	2	-	4	2
14	Liquid-liquid extraction.	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%40
2	Final Written Exam	15^{th}	75	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Wankat, P. C. (2022). Separation process engineering (5th ed.). Pearson Education.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Dr. / Riham Atef

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title :</td><td colspan="5">Bio Chemistry</td></tr>
<tr><td>Course Code:</td><td colspan="5">CHE314</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of points of the course</td><td>Lectures</td><td>Tutorial</td><td>Practical</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>2</td><td>-</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering program</td></tr>
<tr><td>Institute</td><td colspan="5">Higher Institute for Engineering and Technology-New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Prof. Dr Khaled Samir Mohamed</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview (Brief summary of scientific content)

Biochemistry course deals with study different biomolecules (structure, properties and applications) comprising carbohydrate, Amino acids, Proteins, enzymes- fatty acids, oil and fats and Pharmaceutical compounds

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	**1**	Define the bioorganic compounds that utilize a full range of thermodynamics and kinetics of chemical reactions.
		2	Design new processes or products through utilization bioorganic chemical reactions.
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	**1**	Define bioorganic reactions' principles, basic characteristics, and properties, as well as their applications in chemical process industries like petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	**1**	Define contemporary engineering technologies and their applications in relation to disciplines.
A5	Practice research techniques and methods of investigation as an inherent part of learning.	**1**	Assess different ideas, views, and knowledge from a range of sources.
		2	Search for information to engage in lifelong self-learning discipline.

4. Teaching and Learning Methods

1- Face to Face lectures.
2. discussion
3. Problem solving
4. Self learning

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	**Principles of biochemistry:** Applications of biochemistry	8	2	-	4	2
2	**Principles of biochemistry:** Types of biomolecules	8	2	-	4	2
3	**Carbohydrate:** Structure and classifications	8	2	-	4	2
4	**Carbohydrate:** Mono and disaccharides	8	2	-	4	2
5	**Carbohydrate:** poly saccharides and their applications	8	2	-	4	2
6	**Amino acids:** Structure and classifications	8	2	-	4	2
7	**Amino acids:** formation of polypeptides and determination of amino acids sequence in polypeptides	8	2	-	4	2
8	**Protein:** Structure of proteins. *Midterm exam	8	2	-	4	2
9	**Protein:** Classes of proteins	8	2	-	4	2
10	**Enzymes**	8	2	-	4	2
11	**Fatty acids**	8	2	-	4	2
12	**Oils**	8	2	-	4	2
13	**Fats and its applications**	8	2	-	4	2
14	**Pharmaceutical compounds**	8	2	-	4	2
15	**Final Exam**					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	40%
2	Final Written Exam	15^{th}	60	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Voet, D., Pratt, C. W., Voet, J. G., Heilman, D., & Woski, S. (2024). Fundamentals of biochemistry. Wiley.
	Other References	Cox, M. M., & Nelson, D. L. (2021). Lehninger principles of biochemistry (8th ed.). W. H. Freeman & Company.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data show system, sound system
	Supplies	White board, lecture class room

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Prof. Dr Khaled Samir Mohammed	Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Electrochemistry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE315</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>1</td><td>1</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course explores the principles of electrochemistry and their practical applications. It begins with the concepts of electro-neutrality, potential differences at interfaces, and the formation of the electrical double layer. The structure and function of electrochemical cells are examined, including charge transport, electrode reactions, and cell notation. Standard half-cell potentials, reference electrodes, and the prediction of cell potentials are discussed in relation to free energy and the electromotive series. The Nernst equation is introduced with its use in concentration cells and analytical applications. Additional topics include electroplating, Faraday's laws of electrolysis, electrical and molar conductivity, and the operation of batteries and fuel cells, particularly the fuel cell.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Analyze data to interpret it
		2	Evaluate components, systems, and processes for their characteristics and performance in electrochemistry.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to electrochemistry topics
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to electrochemistry to respond to the challenging role and responsibilities of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Brain storming
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Chemistry and electricity [Electro neutrality - Potential differences at interfaces] – double layer **Experiments:** • **Observing the Double Layer with a Simple Capacitor.**	7	2	1	3	1
2	Chemistry and electricity [Electro neutrality - Potential differences at interfaces] – double layer **Experiments:** • **Lemon Battery.**	7	2	1	3	1
3	Electrochemical cells [Transport of charge within the cell-Cell description conventions -Electrodes and electrode reactions] **Experiments:** • **Zinc-Copper Galvanic Cell**	7	2	1	3	1
4	Electrochemical cells [Transport of charge within the cell-Cell description conventions -Electrodes and electrode reactions] **Experiments:**	7	2	1	3	1

	• **Observing Ion Migration in a U-Tube**					
5	Standard half-cell potentials [Reference electrodes- Prediction of cell potentials Cell potentials and the electromotive series] **Experiments:** • **Comparing Different Half-Cells**	7	2	1	3	1
6	Standard half-cell potentials [Cell potentials and free energy - The fall of the electron] **Experiments:** • **Comparing Strong & Weak Electrolytes**	7	2	1	3	1
7	The Nernst equation - Concentration cells- Analytical applications of the Nernst equation **Experiments:** • **Concentration Cell**	7	2	1	3	1
8	The Nernst equation - Concentration cells- Analytical applications of the Nernst equation **Experiments:** • **DIY pH Electrode** *Midterm exam	7	2	1	3	1
9	The Nernst equation - Concentration cells- Analytical applications of the Nernst equation **Experiments:** • **DIY pH Electrode (continue)**	7	2	1	3	1
10	Electroplating (Electrolysis involving water) **Experiments:** • **Copper Electroplating**	7	2	1	3	1
11	Electroplating (Faraday's laws of electrolysis) **Experiments:**	7	2	1	3	1

	• **Hoffman Apparatus or Simple Water Electrolysis**					
12	Conductivity (Electrical Conductivity) **Experiments:** • **Testing Conductivity of Solution**	7	2	1	3	1
13	Conductivity (Molar conductivity, Equivalent conductance) **Experiments:** • **Effect of Concentration on Conductivity**	7	2	1	3	1
14	Batteries and fuel cells [The fuel cell] **Experiment:** • **Constructing a Simple Battery** • **Simple PEM Fuel Cell Demonstration**	7	2	1	3	1
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and oral)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific	The main (essential) reference for the course	Hussain, C. M., Verma, C., Aslam, J., Aslam, R., & Zehra, S. (2023). Handbook of corrosion engineering: Modern theory, fundamentals, practical applications. Elsevier.

references, etc.)	**Other References**	- Gamburg, Y. D. (2023). The fundamentals of electrochemistry. Cambridge Scholars Publishing. -Clarke, T., Renault, C., & Dick, J. E. (2023). Electrochemistry fundamentals. ACS in Focus.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Skill lab	Chemistry lab (1)
	Supplies	White board, lecture classroom

Name and Signature Course Coordinator	**Name and Signature Program Coordinator**
Assoc.Prof. Hend Elsayed Gadow	Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Liquefied Natural Gas</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE316A</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Riham Atef</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course covers key aspects of refrigeration and liquefied natural gas (LNG) systems. It begins with an overview of refrigeration systems and progresses to the preparation and liquefaction of natural gas. Thermodynamic principles of gas liquefaction are explored, along with the design and operation of liquefaction plants. The course also examines the physical properties of LNG, vaporization losses during storage and transport, and the procedures involved in custody transfer to ensure accurate measurement and handling.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to natural gas liquefaction.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of liquefied natural gas process design creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different liquified natural gas processes.
		3	Create a process to carry out liquified natural gas processes.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in recent technical advancements and developing disciplines related to liquefied natural gas in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Refrigeration systems	7	2	-	3	2
2	Refrigeration systems (continue)	7	2	-	3	2
3	Natural gas preparation	7	2	-	3	2
4	Natural gas preparation (continue)	7	2	-	3	2
5	Natural gas liquefaction	7	2	-	3	2
6	Thermodynamic aspects of liquefaction	7	2	-	3	2
7	Thermodynamic aspects of liquefaction (continue)	7	2	-	3	2
8	liquefaction plants *Midterm exam	7	2	-	3	2
9	liquefaction plants (continue)	7	2	-	3	2
10	liquefaction plants (continue)	7	2	-	3	2
11	Properties of LNG	7	2	-	3	2
12	Properties of LNG (continue)	7	2	-	3	2

13	Vaporization losses and custody transfer.	7	2	-	3	2
14	Vaporization losses and custody transfer. (continue)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	50	%50
2	Final Written Exam	15th	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Kidnay, A. J., Parrish, W. R., & McCartney, D. G. (2020). Fundamentals of natural gas processing (3rd ed.). CRC Press.
	Other References	Al-Kuwari, O. (2024). The Future of Liquified Natural Gas in a Decarbonising World. Routledge.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Dr. Riham Atef

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Gas Sweetening				
Course Code	CHE316B				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	Theoretical	Practical	Exercise	Total contact hours	Student load
	2	-	2	4	3
Course Type	Elective				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. Riham Atef				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course provides a foundational overview of natural gas processing, starting with the characterization and properties of natural gas systems, including composition and physical behavior. It covers essential product specifications required for market delivery, followed by basic process principles and an understanding of natural gas phase behavior. The course explores oil and gas separation technologies, detailing equipment types, operations, and the classification and features of separators. It then examines natural gas dehydration and sweetening processes, including solid bed and liquid sweetening, with a focus on amine and carbonate processes, as well as new amine-type technologies. Additional topics include physical absorption methods, sulfur production via the Claus process, and tail gas conditioning to meet environmental regulations. This comprehensive approach equips students with the knowledge to understand and design key systems in natural gas treatment.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to natural Gas Sweetening.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of natural gas Sweetening process design creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different natural gas Sweetening processes.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	3	Create a process to carry out natural gas Sweetening processes.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in recent technical advancements and developing disciplines related to natural gas Sweetening in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	-Characterization and properties of natural gas systems	7	2	-	3	2
2	-Product specification	7	2	-	3	2
3	-Basic process principles	7	2	-	3	2
4	-Natural gas phase behavior - Oil and gas separation technology	7	2	-	3	2
5	- Oil and gas separation technology. (continue) -Classification and common features of separators	7	2	-	3	2
6	-Natural gas dehydration and natural gas sweetening	7	2	-	3	2
7	-Solid bed sweetening	7	2	-	3	2

8	-Liquid sweetening *Midterm exam	7	2	-	3	2
9	-Sulfur production	7	2	-	3	2
10	-Tail gas conditioning	7	2	-	3	2
11	-Physical absorption methods	7	2	-	3	2
12	-Amine processes	7	2	-	3	2
13	-Carbonate processes	7	2	-	3	2
14	-New amine-type processes	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Kidnay, A. J., Parrish, W. R., & McCartney, D. G. (2020). Fundamentals of natural gas processing (3rd ed.). CRC Press.
	Other References	Al-Kuwari, O. (2024). The Future of Liquified Natural Gas in a Decarbonising World. Routledge.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Dr. Riham Atef

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Gas Engineering</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE316C</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Riham Atef</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
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2. Course Overview

This course provides an overview of natural gas, covering its origins, accumulations, and the distinction between conventional and unconventional resources. It examines natural gas composition, properties, and phase behavior of well fluids, including gas hydrates and their prevention. Key topics include product specifications, combustion characteristics, and the main products derived from natural gas. The course also addresses exploration, drilling, and well completion, followed by production and processing techniques such as gas-liquid separation, dehydration, and sweetening. Finally, it covers natural gas liquefaction, transportation, and storage.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to Gas Engineering.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of Gas Engineering process design creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different natural Gas Engineering.
		3	Create a process to carry out Gas Engineering processes.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in recent technical advancements and developing disciplines related to Gas Engineering in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Natural gas origins and accumulations.	7	2	-	3	2
2	Conventional and unconventional natural gas resources.	7	2	-	3	2
3	Natural gas composition.	7	2	-	3	2
4	Gas hydrates and their prevention	7	2	-	3	2
5	Phase behavior of well fluids	7	2	-	3	2
6	Natural gas properties- principal products	7	2	-	3	2
7	product specification and combustion characteristics	7	2	-	3	2
8	Exploration, drilling, and well completion *Midterm exam	7	2	-	3	2
9	Exploration, drilling, and well completion (continue)	7	2	-	3	2
10	Natural gas production	7	2	-	3	2

11	Natural gas processing (gas-liquid separation, natural gas dehydration, and natural gas sweetening)	7	2	-	3	2
12	Natural gas processing (gas-liquid separation, natural gas dehydration, and natural gas sweetening). (continue)	7	2	-	3	2
13	Natural gas liquefaction, transportation, and storage.	7	2	-	3	2
14	Natural gas liquefaction, transportation, and storage. (continue)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Kidnay, A. J., Parrish, W. R., & McCartney, D. G. (2020). Fundamentals of natural gas processing (3rd ed.). CRC Press.
	Other References	Al-Kuwari, O. (2024). The Future of Liquified Natural Gas in a Decarbonising World. Routledge.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. Riham Atef	**Name and Signature** **Program Coordinator** Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Introduction to Combustion Phenomena</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE316D</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course builds a foundation in combustion phenomena, focusing on transport processes and mechanisms in both homogeneous and heterogeneous systems. It explores the environmental implications of combustion and introduces basic modeling and design calculations for industrial applications such as hazardous waste incineration, gas turbines, catalytic converters, and coal combustion systems. Topics also include stoichiometry, thermochemistry, regulatory issues, incinerator design, and air pollution control.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to combustion Phenomena.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of combustion Phenomena creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different combustion Phenomena.
		3	Create a process to carry out combustion Phenomena.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in recent technical advancements and developing disciplines related to combustion Phenomena in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Brain storming
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Transport in combustion phenomena	7	2	-	3	2
2	Mechanisms in homogeneous combustion	7	2	-	3	2
3	Mechanisms in heterogeneous combustion	7	2	-	3	2
4	Environmental implications of combustion.	7	2	-	3	2
5	Environmental implications of combustion. (continue)	7	2	-	3	2
6	Elementary modeling and preliminary design	7	2	-	3	2
7	Elementary modeling and preliminary design (continue)	7	2	-	3	2
8	Calculations in industrial and modern applications of combustion,	7	2	-	3	2

	such as hazardous waste incineration. *Midterm exam					
9	Calculations in industrial and modern applications of combustion, such as gas turbines and catalytic converters.	7	2	-	3	2
10	Calculations in industrial and modern applications of combustion, such as coal combustion systems.	7	2	-	3	2
11	Regulatory concerns, stoichiometry	7	2	-	3	2
12	Regulatory concerns, stoichiometry. (continue)	7	2	-	3	2
13	Thermo-chemistry, incinerators	7	2	-	3	2
14	Air pollution control.	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Turns, S., & Haworth, D. C. (2021). Introduction to combustion concepts (4th ed.). McGraw-Hill Education.
	Other References	- trahle, W. C., & Sirignano, W. A. (2020). Introduction to combustion (1st ed.). Routledge. -Swaminathan, N., & Parente, A. (2023). Machine learning and its application to reacting flows: ML and combustion. Springer Nature.

	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc. Prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Air Pollution				
Course Code	CHE316E				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	Theoretical	Practical	Exercise	Total contact hours	Student load
	2	-	2	4	3
Course Type	Elective				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. Mohamed Elbindary				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course examines the sources of air pollutants and their effects on the environment and human health. It covers methods for measuring pollutants and designing equipment for their removal, with a focus on particulate matter and its control technologies. The dispersion of pollutants in the atmosphere and atmospheric photochemical reactions are also explored. Additionally, the course introduces instrumentation and emission testing equipment used for monitoring and regulatory compliance.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to Air Pollution.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of Air Pollution creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different Air Pollution.
		3	Create a process to carry out Air Pollution.
B2	Engage in the recent technological changes and emerging fields relevant to	1	Engage in recent technical advancements and developing disciplines related to Air

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.		Pollution in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Source of pollutants.	7	2	-	3	2
2	Source of pollutants. (continue)	7	2	-	3	2
3	measurements and equipment design for removal of air pollutants	7	2	-	3	2
4	measurements and equipment design for removal of air pollutants. (continue)	7	2	-	3	2
5	Effects of air pollutants.	7	2	-	3	2
6	Effects of air pollutants. (continue)	7	2	-	3	2
7	Dispersion of pollutants in the atmosphere	7	2	-	3	2
8	Dispersion of pollutants in the atmosphere. (continue) *Midterm exam	7	2	-	3	2
9	Particulate matter and its control equipment	7	2	-	3	2
10	Particulate matter and its control equipment. (continue)	7	2	-	3	2

11	Atmospheric photochemical reactions	7	2	-	3	2
12	Atmospheric photochemical reactions. (continue)	7	2	-	3	2
13	Instrumentation and emission testing equipment	7	2	-	3	2
14	Instrumentation and emission testing equipment. (continue)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Harrison, R. M. (Ed.). (2023). Pollution: Causes, effects and control. Royal Society of Chemistry.
	Other References	Manahan, S. E. (2022). Environmental chemistry (11th ed.). CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature Course Coordinator	**Name and Signature Program Coordinator**
Dr. Mohamed Elbindary	Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Engineering Materials Selection				
Course Code	CHE316F				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	Theoretical	Practical	Exercise	Total contact hours	Student load
	2	-	2	4	3
Course Type	Elective				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Assoc. Prof. Hend Elsayed Gadow				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course introduces the application of materials science principles in engineering, focusing on metals, ceramics, and plastics. It explores the properties, behaviors, and practical uses of these materials in various applications. Key topics include corrosion, oxidation, and how material properties change with temperature, providing a comprehensive understanding of material selection and performance in engineering environments.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Identify the general principles of design techniques specific to Engineering Materials Selection.
		2	Judge engineering decisions considering balanced quality and reliability.
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of Engineering Materials Selection process creatively.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations.
		2	Summarize the appropriate techniques relevant to different Engineering Materials Selection.
		3	Create a process to carry out Engineering Materials Selection.
B2	Engage in the recent technological changes and emerging fields relevant to	1	Engage in recent technical advancements and developing disciplines related to

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.		Engineering Materials Selection in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Brain storming
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction on the application of Engineering of materials science principles	7	2	-	3	2
2	Introduction on the application of Engineering of materials science principles. (continue)	7	2	-	3	2
3	The application of Engineering of materials science principles on the metals	7	2	-	3	2
4	The application of Engineering of materials science principles on the metals. (continue)	7	2	-	3	2
5	The application of Engineering of materials science principles on the ceramics	7	2	-	3	2
6	The application of Engineering of materials science principles on the ceramics. (continue)	7	2	-	3	2
7	The application of Engineering of	7	2	-	3	2

	materials science principles on the plastic Materials					
8	The application of Engineering of materials science principles on the plastic Materials. (continue) *Midterm exam	7	2	-	3	2
9	Uses of different materials in different application	7	2	-	3	2
10	Uses of different materials in different application. (continue)	7	2	-	3	2
11	Uses of different materials in different application. (continue)	7	2	-	3	2
12	Uses of different materials in different application. (continue)	7	2	-	3	2
13	Study the corrosion, oxidation, and variation of properties with temperature.	7	2	-	3	2
14	Study the corrosion, oxidation, and variation of properties with temperature. (continue)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific	**The main (essential) reference for the course**	Shackelford, J. F. (2021). Introduction to materials science for engineers (9th ed.). Prentice Hall.
	Other References	Waterman, N. (2024). The materials selector. Taylor & Francis.

references, etc.)	**Learning Platforms**	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

الفصل الدراسي الثاني

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Project Management and Control</td></tr>
<tr><td>Course Code</td><td colspan="5">BAS321</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Basic Science and Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Elin A. Eldars</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course provides a comprehensive overview of project management, focusing on essential tools and techniques for effective project execution. It covers project planning and scheduling, network-based scheduling methods such as the Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT), and the probabilistic analysis of project completion times. Students will also learn strategies for project cost control, efficient resource allocation, and forecasting funds requirements to ensure successful project delivery within time and budget constraints.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	1	Explain the basic principles of engineering.
		2	Apply engineering basics that are relevant to the subject.
		3	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	1	Apply safe systems at work by taking the necessary precautions to manage hazards.
		2	Use fundamental organizational and project management abilities.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	Interpret data from equipment flow sheets, charts, and curves.
		2	Acquire entrepreneurial skills.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Projects

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Project Management	8	2	-	4	2
2	Project Planning and Scheduling (Part 1)	8	2	-	4	2
3	Project Planning and Scheduling (Part 2)	8	2	-	4	2
4	Network Based Scheduling (Part 1)	8	2	-	4	2
5	Network Based Scheduling (Part 2)	8	2	-	4	2
6	Critical Path Method (CPM)	8	2	-	4	2
7	Program Evaluation & Review Technique (PERT) (Part 1)	8	2	-	4	2
8	Program Evaluation & Review Technique (PERT) (Part 2) * Midterm Exam	8	2	-	4	2
9	Probability Aspects of Project Completion Time	8	2	-	4	2
10	Project Cost Control (Part 1)	8	2	-	4	2
11	Project Cost Control (Part 2)	8	2	-	4	2
12	Resource Allocation (Part 1)	8	2	-	4	2
13	Resource Allocation (Part 2)	8	2	-	4	2
14	Forecasting Funds Requirements + Review	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments, reports, and projects)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Project Management Institute. (2022). A guide to the project management body of knowledge (PMBOK® guide) (7th ed.). Project Management Institute.
	Other References	-Dykstra, A., & Kade, L. (2023). Construction project management: A complete introduction (3rd ed.). Kirshner Publishing. -Gould, F., & Joyce, N. (2024). Construction project management (5th ed.). Pearson. -Ika, L. (2023). Managing fuzzy projects in 3D: A proven, multi-faceted blueprint for overseeing complex projects. Routledge. -Mason, P. (2023). Construction project management 101: For beginners & new graduates: 2024 student edition. Independently Published. -Mather, T. (2024). Construction project management: A practical guide to managing residential and commercial construction projects. Routledge.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. Elin A. Eldars	**Name and Signature** **Program Coordinator** Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Mass Transfer Operations II</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE321</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>3</td><td>-</td><td>2</td><td>5</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr./ Riham Atef</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course explores key inter-phase mass transport processes essential in chemical and environmental engineering. It covers continuous two-phase systems such as gas absorption and stripping, adsorption mechanisms, and crystallization techniques. Students will learn about double-effect evaporation for energy-efficient concentration, as well as humidification, water cooling, and drying operations. The course also introduces modern separation methods, including membrane separation technology, emphasizing their applications in industrial processes.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	1	Collaborate effectively within multidisciplinary team.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Identify the principles of chemical engineering including Mass Transfer.
		2	Summarize the appropriate techniques relevant to mass transfer
		3	Create a process, component or system to carry out specialized engineering designs
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to mass transport Phenomena and the basic equation of change to respond to the challenging role and responsibilities of a professional chemical engineer

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion

3. Problem solving
4. Brain storming
5. Self-learning

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Inter-phase mass transport	9	3	-	4	2
2	Continuous two phase mass transport processes	9	3	-	4	2
3	Continuous two phase mass transport processes. (continue)	9	3	-	4	2
4	Gas absorption	9	3	-	4	2
5	Gas stripping	9	3	-	4	2
6	adsorption	9	3	-	4	2
7	Adsorption (continue)	9	3	-	4	2
8	Crystallization *Midterm exam	9	3	-	4	2
9	double-effect evaporation	9	3	-	4	2
10	Humidification	9	3	-	4	2
11	Water cooling	9	3	-	4	2
12	Drying	9	3	-	4	2
13	Types of membranes	9	3	-	4	2
14	Membrane separation technology	9	3	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Wankat, P. (2022). Separation process engineering: Includes mass transfer analysis (5th ed.). Pearson Education.
	Other References	Gaskell, D. R., & Krane, M. J. M. (2024). An introduction to transport phenomena in materials engineering. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Dr./ Riham Atef	Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Corrosion Engineering</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE322</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course covers the fundamental theories and principles of corrosion, examining various types such as localized, pitting, crevice corrosion, cavitation, stress corrosion cracking, and corrosion fatigue. It addresses metallurgical factors, welding-related issues, and material selection for corrosion resistance. The course also includes inspection methods—both destructive and nondestructive—chemical cleaning, and flue gas attack. Key topics include polarization, passivity, corrosion testing, evaluation, and simulation, along with prevention techniques such as monitoring, cathodic and anodic protection, and water treatment for boilers and condensers.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Integrate in the recent technological changes and emerging fields relevant to corrosion engineering.
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Engage suitable national and international standards and codes to: design, operate, inspect and maintain systems susceptible to corrosion.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Brain storming
6. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Theories and principles of corrosion	7	2	-	3	2
2	Types of corrosion (Localized corrosion, pitting, and crevice corrosion).	7	2	-	3	2
3	Types of corrosion (cavitations, stress corrosion cracking and corrosion fatigue)	7	2	-	3	2
4	Metallurgical factors	7	2	-	3	2
5	Welding problems	7	2	-	3	2
6	Material selection	7	2	-	3	2
7	Inspection; destructive and nondestructive testing	7	2	-	3	2
8	Inspection; destructive and nondestructive testing. (continue) *Midterm exam	7	2	-	3	2
9	Chemical cleaning flue gas attack	7	2	-	3	2
10	Polarization, Passivity, corrosion testing evaluation and simulation	7	2	-	3	2
11	Polarization, Passivity, corrosion testing evaluation and simulation. (continue)	7	2	-	3	2
12	Corrosion prevention, monitoring, cathode protection and anodic protection	7	2	-	3	2
13	Water treatment for boilers and condensers	7	2	-	3	2
14	Water treatment for boilers and condensers. (continue)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students’ assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	%40
2	Final Written Exam	15^{th}	60	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Hussain, C. M., Verma, C., Aslam, J., Aslam, R., & Zehra, S. (2023). Handbook of corrosion engineering: Modern theory, fundamentals, practical applications. Elsevier.
	Other references	El Kacimi, Y., & Guo, L. (2023). Handbook of research on corrosion sciences and engineering. IGI Global.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Assoc. Prof. Hend Elsayed Gadow

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Mechanical Unit Operation				
Course Code	CHE323				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	3	**-**	**2**	**5**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Prof. Dr. Taha Farrag				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course focuses on key unit operations in chemical engineering involving particulate solids and fluid systems. Topics include filtration, size reduction, screening, size classification, solid drying, crystallization, centrifugation, and sedimentation. It also covers power consumption in gas/liquid contacting, design principles for stirrers, and scale-up using model experiments. Computational methods for analyzing multistage and multicomponent systems are introduced, with emphasis on operations involving particulate solids.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solve problems of design creatively.
		2	Refer to relevant literatures.
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Illustrate the principles of chemical engineering including thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations and process control.
		2	Summarize the appropriate techniques relevant to different industries.
		3	Create a process, component or system to carry out specialized engineering designs.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Filtration	9	3	-	4	2
2	Size reduction	9	3	-	4	2
3	Screening and Size Classification	9	3	-	4	2
4	Solid drying	9	3	-	4	2
5	Solid drying (continue)	9	3	-	4	2
6	Crystallization	9	3	-	4	2
7	Centrifugation	9	3	-	4	2
8	Sedimentation *Midterm exam	9	3	-	4	2
9	Sedimentation (continue)	9	3	-	4	2
10	Power consumption in gas /liquid contacting. Design principles for stirrer and model experiments for scale up.	9	3	-	4	2
11	Computation methods in multistage and multicomponent systems.	9	3	-	4	2
12	Computation methods in multistage and multicomponent systems. (continue)	9	3	-	4	2
13	Computation methods in operations including particulate solids	9	3	-	4	2
14	Computation methods in operations including particulate solids. (continue)	9	3	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	%40
2	Final Written Exam	15^{th}	90	%60

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Felder, R. M., Rousseau, R. W., & Bullard, L. G. (2020). Elementary principles of chemical processes (4th ed.). Wiley.
	Other references	-Gaskell, D. R., & Krane, M. J. M. (2024). An introduction to transport phenomena in materials engineering. CRC Press. -Wankat, P. C. (2022). Separation process engineering: Includes mass transfer analysis (5th ed.). Pearson Education.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Prof. Dr. Taha Farrag

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Process Modeling and Simulation</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE324</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>3</td><td>2</td><td>-</td><td>5</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Prof. Dr. Taha Farrag</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course introduces the principles and applications of mathematical modeling and simulation in chemical engineering. It covers model formulation, classification, steady-state and dynamic simulation, degree-of-freedom analysis, and numerical techniques. Fundamental laws such as mass, energy, and momentum balances, along with thermodynamics and kinetics, form the basis for modeling various systems including CSTRs, PFRs, batch reactors, distillation columns, and heat exchangers. Emphasis is placed on both theoretical and practical aspects, including stability analysis and simulation using software like Aspen Plus and Aspen HYSYS. Laboratory sessions focus on writing, solving, and simulating models for key chemical processes using process simulators.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Define the principles, basic properties, and features of Process Modeling and Simulation, as well as their use in chemical process industries such as petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.
		2	Analyze physical and chemical phenomena involved in various process.
		3	Evaluate mathematical models for various chemical processes.
B3	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.	1	Apply numerical modeling methods and using process simulators (ASPEN Plus/ ASPEN Hysys) to topics in chemical engineering.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving

4. Brain storming
5. Modeling

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction: Use and scope of mathematical modeling, Principles of model formulation. **Laboratory:** Writing and solving models for simple chemical processes	9	3	2	4	-
2	Role and importance of steady-state and dynamic simulation, Classification of models, and Model building. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-
3	Modeling difficulties, Degree-of-freedom analysis, and Selection of design variables. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-
4	Review of numerical techniques and Model simulation. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-
5	Fundamental Laws: Equations of continuity, energy, momentum, and state. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-

6	Fundamental Laws: Transport properties, Equilibrium and chemical kinetics. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-
7	Fundamental Laws: Review of thermodynamic correlations for the estimation of physical properties like phase equilibria, bubble and dew points. **Laboratory:** Writing and solving models for simple chemical processes. (continue)	9	3	2	4	-
8	Fundamental Laws: Review of thermodynamic correlations for the estimation of physical properties like phase equilibria, bubble and dew points. (continue) **Laboratory:** Writing and solving models for simple chemical processes. (continue) *Midterm exam	9	3	2	4	-
9	Modeling of Specific Systems: Constant and variable holdup CSTRs under isothermal and non-isothermal conditions, Stability analysis. **Laboratory:** use of process simulator for solving models for mixer and pumps.	9	3	2	4	-
10	Modeling of Specific Systems: Gas phase pressurized CSTR, Two phase CSTR, Non-isothermal PFR, Batch and semi-batch reactors, Heat conduction in a bar, Laminar flow of Newtonian liquid in a pipe. **Laboratory:** use of process simulator for solving models for compressor, heat exchanger.	9	3	2	4	-

11	Modeling of Specific Systems: Gravity flow tank, Single component vaporizer, Multi-component flash drum, Absorption column, Ideal binary distillation column and non-ideal multi-component distillation column, Batch distillation with holdup etc. **Laboratory:** Reactor and absorption/distillation column	9	3	2	4	-
12	Simulation: Simulation of the models, Sequential modular approach **Laboratory:** Writing and solving models for simple chemical processes.	9	3	2	4	-
13	Simulation: Equation oriented approach, Partitioning and tearing, Introduction and use of process simulation software (Aspen Plus/ Aspen Hysys) for flow sheet simulation. **Laboratory:** Use of process simulator for solving models for steady state flow sheet simulation.	9	3	2	4	-
14	Simulation: Introduction and use of process simulation software (Aspen Plus/ Aspen Hysys) for flow sheet simulation. **Laboratory:** Use of process simulator for solving models for steady state flow sheet simulation. (continue)	9	3	2	4	-
14	Practical Examination					
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	40	%40
2	Practical Examination	14th	10	%10
3	Final Written Exam	15th	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Vorländer, M. (2020). Auralization: Fundamentals of acoustics, modelling, simulation, algorithms and acoustic virtual reality. Springer International Publishing.
	Other references	Imtiaz, S. A. (Ed.). (2023). Modelling of chemical process systems (1st ed.). Elsevier.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Electronic programs	Aspen Plus/ Aspen Hysys
	Skill labs/Simulators	Computer lab

Name and Signature
Course Coordinator

Prof. Dr. Taha Farrag

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Foams Industry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE325A</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course covers the chemical composition and raw materials used in foam production, distinguishing between low and high-density foams and their applications. It includes methods for testing foam properties and explores various additives used to enhance foam performance, such as durability, flexibility, and thermal stability.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to foam industry to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards to design, operate, inspect and maintain foam industry engineering systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Presentation and movies
3. Discussion
4. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Chemical composition and raw materials of foams	8	2	-	4	2
2	Chemical composition and raw materials of foams. (continue)	8	2	-	4	2
3	Chemical composition and raw materials of foams. (continue)	8	2	-	4	2
4	Chemical composition and raw materials of foams. (continue)	8	2	-	4	2
5	Low and high density foams	8	2	-	4	2
6	Low and high density foams. (continue)	8	2	-	4	2
7	Testing of foams	8	2	-	4	2
8	Testing of foams. (continue) *Midterm exam	8	2	-	4	2
9	Testing of foams. (continue)	8	2	-	4	2
10	Testing of foams. (continue)	8	2	-	4	2
11	Additives improving properties of foams	8	2	-	4	2
12	Additives improving properties of foams. (continue)	8	2	-	4	2
13	Additives improving properties of foams. (continue)	8	2	-	4	2
14	Additives improving properties of foams. (continue)	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50

2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Gupta, R. K. (Ed.). (2023). Polymeric foams: Fundamentals and types of foams (Vol. 1, ACS Symposium Series 1439). American Chemical Society.
	Other references	Raghavan, P., & Ravindran, L. (2024). Handbook of thermosetting foams, aerogels, and hydrogels: From fundamentals to advanced applications. Elsevier.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

Assoc. Prof. Hend Elsayed Gadow

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Ceramics Industry</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE325B</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Nada Mohamed Aboeleneen</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This course offers a comprehensive study of ceramic raw materials preparation and processing, beginning with an introduction and classification of ceramics into traditional and modern types based on use and particle size. It explores the atomic and crystal structures of ceramics, including coordination numbers, silicate networks, and common lattice defects. The course covers plastic and non-plastic raw materials, their properties, and impurities, along with detailed methods for characterizing ceramic raw materials using microscopy, X-ray analysis, and thermal techniques. Emphasis is placed on the thermal, mechanical, electrical, magnetic, and optical properties of ceramics. The general ceramic forming and fabrication processes are thoroughly addressed, including raw material treatment, various forming methods, drying mechanisms, and sintering. Advanced topics include grain growth, vitrification, solid-state reactions, and kiln operations. The course concludes with the study of ceramic building materials and sanitary ware, focusing on glazes, enamels, refractory materials, and ceramic products like bricks, tiles, and sanitary fittings.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to ceramic industry to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards to design, operate, inspect and maintain ceramic industry systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Brain storming

6. Site visits
7. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	**Ceramic raw materials preparations:** Introduction and classification of ceramics (according to use- according to particle size), Traditional Ceramics, Modern Ceramics.	8	2	-	4	2
2	**Ceramic raw materials preparations:** Atomic structure of Ceramics- Crystal structure of ceramics (coordination number, minimum cation to anion radius ratio, open structure, Closed packed structures, Silicates structure, and three-dimensional networks)- Defects in ceramic lattices (Point imperfections, Line defects, and Planar defects).	8	2	-	4	2
3	**Ceramic raw materials preparations:** Plastic raw materials (clay properties, impurities, ores and categories)- Non – plastic raw materials (silica, Feldspars, Carbonates, Talc, Alumina, Zirconia, Grog, Chrome ores, and Titania).	8	2	-	4	2
4	**Ceramic raw materials preparations:** Characterization of ceramic raw materials (Light Microscopy, Electron microscopy, X – ray analyses, Thermal Analysis methods, and specific surface area).	8	2	-	4	2
5	**Ceramic raw materials preparations:** Properties of ceramic materials (Thermal properties, Mechanical properties).	8	2	-	4	2
6	**Ceramic raw materials preparations:** Properties of ceramic materials (Electrical properties, Magnetic properties, and Optical properties).	8	2	-	4	2
7	**General ceramic forming and fabrication process:**	8	2	-	4	2

	Ceramic Processing- Preliminary treatment of raw materials (Quarrying and storage, Crushing and grinding, Screening, Mixing).					
8	**General ceramic forming and fabrication process:** Forming techniques (Slip casting, stiff mud process, soft mud process, Dry pressing, and others). *Midterm exam	8	2	-	4	2
9	**General ceramic forming and fabrication process:** Water distribution in clay-based pastes- Drying mechanism- Drying shrinkage- Defects occurring on drying.	8	2	-	4	2
10	**General ceramic forming and fabrication process:** Industrial dryers- Firing- Sintering mechanisms- Stages of sintering- Sintering curves- Firing shrinkage.	8	2	-	4	2
11	**General ceramic forming and fabrication process:** Grain growth- Vitrification- Solid state reactions- Defects occurring on firing- Kilns for firing ceramic ware.	8	2	-	4	2
12	**Ceramic building materials and sanitary ware:** Types of glazes- Roles of oxides- Glaze application- Glaze defects- Enamels.	8	2	-	4	2
13	**Ceramic building materials and sanitary ware:** Enamel compositions- Application of enamels on metallic surface- Refractory materials (Classification, manufacture, types, Properties)	8	2	-	4	2
14	**Ceramic building materials and sanitary ware:** Refractory insulating materials- Refractory concrete- ceramic building material (bricks, tiles, sewer pipes)- Sanitary ware.	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Misra, K. P., & Misra, R. D. K. (Eds.). (2022). Ceramic science and engineering: Basics to recent advancements (1st ed.). Elsevier.
	Other references	Francis, L. F. (2024). Materials Processing: A Unified Approach to Processing of Metals, Ceramics, and Polymers. Elsevier.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom, institute library

Name and Signature
Course Coordinator

Dr. Nada Mohamed Aboeleneen

Name and Signature
Program Coordinator

Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Polymer Engineering				
Course Code	CHE325C				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Elective				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Dr. / Yasser Tawfik				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course covers the fundamentals of polymer chemistry, including types of polymerization reactions and techniques, as well as methods for measuring molecular weight. It explores the classification of polymers, focusing on plastics, elastomers, thermoplastics, and thermosetting resins. The structure, mechanical, and physical properties of polymers are discussed alongside their manufacturing and processing methods. Key polymer processing techniques such as extrusion, injection molding, and blow molding are examined, with emphasis on the production and properties of major commercial polymers.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to polymer engineering to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards to design, operate, inspect and maintain polymer engineering systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Problem solving
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Polymer chemistry.	8	2	-	4	2
2	Types of polymerization reactions.	8	2	-	4	2
3	Polymerization techniques.	8	2	-	4	2
4	Measurement of molecular weight.	8	2	-	4	2
5	Classification of polymers.	8	2	-	4	2
6	Plastics.	8	2	-	4	2
7	Elastomers.					
8	Thermoplastics and thermosetting resins. *Midterm exam	8	2	-	4	2
9	Structure, mechanical and physical properties of polymers.	8	2	-	4	2
10	Manufacture of polymers.	8	2	-	4	2
11	Polymer processing.	8	2	-	4	2
12	Extrusion.	8	2	-	4	2
13	Injection and blow molding.	8	2	-	4	2
14	Manufacture and properties of some commercial polymers.	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Yadav, S. S., Dhiman, R., & Anklekar, R. M. (2024). Materials Science and Engineering. Cambridge Scholars Publishing.
	Other references	Powell, P. C., & Housz, A. I. (2023). Engineering with polymers. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. / Yasser Tawfik	**Name and Signature** **Program Coordinator** Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Food processing technology				
Course Code	CHE325D				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Elective				
Academic level at which the course is taught	Level 3				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education & Scientific Research				
Name of Course Coordinator	Assoc. Prof. Hend Elsayed Gadow				
Course Specification Approval Date	27/7/2025				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	29/7/2025				

2. Course Overview

This course introduces the basic principles of food processing, focusing on methods that preserve and enhance food quality. It covers heat-based processing, including techniques using direct and radiated energy, as well as ambient temperature methods. The course also explores cooling and freezing processes involving heat removal, and concludes with post-processing operations essential for packaging, storage, and distribution.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to food industry to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards to design, operate, inspect and maintain food industry engineering systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Discussion
4. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Basic principles on food processing.	8	2	-	4	2
2	Basic principles on food processing. (continue)	8	2	-	4	2
3	Processing by application of heat- ambient temperature processing.	8	2	-	4	2
4	Processing by application of heat- ambient temperature processing. (continue)	8	2	-	4	2
5	Processing by application of heat- ambient temperature processing. (continue)	8	2	-	4	2
6	Processing by application of heat- ambient temperature processing. (continue)	8	2	-	4	2
7	Processing by removal of heat.	8	2	-	4	2
8	Processing by removal of heat. (continue) *Midterm exam	8	2	-	4	2
9	Processing by removal of heat. (continue)	8	2	-	4	2
10	Processing by removal of heat. (continue)	8	2	-	4	2
11	Heat processing by direct and radiated energy.	8	2	-	4	2
12	Heat processing by direct and radiated energy. (continue)	8	2	-	4	2
13	Post-processing operations.	8	2	-	4	2
14	Post-processing operations. (continue)	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	50	%50
2	Final Written Exam	15th	50	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Fellows, P. J. (2022). Food processing technology: principles and practice. Woodhead publishing.
	Other references	Summers, T. (2022). Food processing technology. States Academic Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	Devices/Instruments	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator
Assoc. Prof. Hend Elsayed Gadow

Name and Signature
Program Coordinator
Assoc. Prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Training 2</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE326</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 3</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education & Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc. Prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

In field training, chemical engineering students are expected to apply design principles to solve real-world problems. Emphasis is placed not only on technical content but also on developing strong presentation and communication skills.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Prepare technical reports
		2	Search for information to engage in lifelong self-learning discipline.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Participate in recent technological advancements and developing disciplines important to chemical engineering in order to respond to the demanding role and obligations of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. projects
3. Site visits
4. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1-3	Students in the field training of chemical engineering they will be expected to apply design to solve a given real world problem	-	-	-	-	-
4	Guidelines for creating and presenting professional presentations and drafting organized, accurate technical reports.	-	-	-	-	-

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Oral Examination	5^{th} week from training initiation	30	%60
2	Final work (presentation, Report)	6^{th} week from training initiation	20	%40

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Subject studies
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator
Assoc. Prof. Hend Elsayed Gadow

Name and Signature
Program Coordinator
Assoc. Prof. Hend Elsayed Gadow

الفرقة الرابعة

(2025-2026)

الفصل الدراسي الأول

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Computer applications in Chemical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE411</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>3</td><td>2</td><td>-</td><td>5</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Sohir Abo Baker</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

The course on computers and modeling provides a comprehensive review of MATLAB, focusing on its practical applications in chemical engineering problems. It begins with an introduction to MATLAB, emphasizing key concepts such as round-off and truncation errors. Students then apply MATLAB to solve various issues, including finding roots of non-linear algebraic equations using bracketing and open methods, as well as techniques in dimensional analysis and optimization. Further applications include solving linear algebraic equations through methods like Gauss elimination, matrix inversion, and iterative techniques, as well as performing linear and nonlinear regression, polynomial interpolation, and numerical integration. The course also covers numerical differentiation, solving ordinary and partial differential equations, demonstrating MATLAB's versatility in addressing complex chemical engineering problems through practical exercises.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Create a chemical engineering process, component or system to initiate for solution of problems by numerical methods.
B3	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.	1	Apply a computational tool that is capable of solving a particular chemical engineering problem. Such tools include MATLAB, MS Excel, and POLYMATH;

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Problem solving
4. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Computer and Modeling, Review of MATLAB **Practical** Introduction of MATLAB	9	3	2	4	-
2	Computer and Modeling, Review of MATLAB **Practical** Introduction of MATLAB	9	3	2	4	-
3	Round off and Truncation Errors **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
4	Round off and Truncation Errors **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
5	• Roots of Non-Linear Algebraic Equation – Bracketing Methods **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-

6	• Roots of Non-Linear Algebraic Equation – Open Methods **Practical** • Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
7	• Applying MATLAB for dimensional analysis and optimization in chemical engineering enables effective problem-solving and process improvement. • **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
8	• Applying MATLAB for dimensional analysis and optimization in chemical engineering enables effective problem-solving and process improvement. **Practical** • Application of MATLAB for some problem of chemical Engineering Midterm Exam	9	3	2	4	-
9	• Linear Algebraic Equations and Matrices • Gauss Elimination **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
10	• Matrix Inverse • Iterative Methods • Linear Regression **Practical**	9	3	2	4	-

	• Application of MATLAB for some problem of chemical Engineering					
11	• Nonlinear Regression • Polynomial Interpolation **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
12	• Numerical Integration **Practical** • Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
13	• Numerical Differentiation • Ordinary Differential Equations **Practical** Application of MATLAB for some problem of chemical Engineering	9	3	2	4	-
14	Partial Differential Equations **Practical Exam**	9	3	2	4	-
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	40	40%

2	Final Practical Exam	14th	10	10%
3	Final Written Exam	15th	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Rice, R. G., Do, D. D., & Maneval, J. E. (2023). Applied mathematics and modeling for chemical engineers. John Wiley & Sons.
	Other References	Foo, D. (Ed.). (2022). Chemical engineering process simulation. Elsevier.
		Andika, R., & Putra, Z. A. (2022). Teaching programming to chemical engineering students. ASEAN Journal of Science and Engineering Education, 2(1), 51-60.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Electronic Programs	MATLAB
	Skill Labs/ Simulators	Computer lab.

Name and Signature **Course Coordinator** Dr. Sohir Abo Baker		**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Petrochemical Engineering				
Course Code	CHE412				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. / Sohier Abo Bakr				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Petroleum chemistry involves understanding the occurrence and composition of crude oil, which serves as the primary raw material for various refining processes. Key processes such as distillation, catalytic and thermal cracking, alkylation, hydrogenation, isomerization, and polymerization are employed to transform crude oil into valuable fuels, chemicals, and intermediates. These techniques are essential for producing basic petrochemicals and intermediate products, with considerations of their techniques and economic viability playing a crucial role. Additionally, the production of end products relies on efficient processing and refining methods to meet market demands while optimizing costs, highlighting the integral relationship between chemical processes and economic factors in the petrochemical industry.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to Petrochemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Flipped Classroom
4. Self-learning and Research
5. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Petroleum chemistry; occurrence and composition of crude oil	8	2	-	4	2
2	Distillation	8	2	-	4	2
3	Catalytic cracking	8	2	-	4	2
4	Catalytic cracking (continuous)	8	2	-	4	2
5	Thermal cracking	8	2	-	4	2
6	Alkylation	8	2	-	4	2
7	Hydrogenation	8	2	-	4	2
8	Isomerization **Midterm Exam**	8	2	-	4	2
9	Polymerization	8	2	-	4	2
10	Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products	8	2	-	4	2
11	Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products	8	2	-	4	2
12	Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products	8	2	-	4	2
13	Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products	8	2	-	4	2
14	Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	40%
2	Final oral Exam	14^{th}	15	10%
3	Final Written Exam	15^{th}	75	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Uttam Ray Chaudhuri. (2020). Fundamentals of Petroleum and Petrochemical Engineering. CRC Press.
	Other references	Bajus, M. (2020). *Petrochemistry: Petrochemical Processing, Hydrocarbon Technology and Green Engineering*. John Wiley & Sons.
		Speight, J. G. (2019). *Handbook of petrochemical Processes*. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. / Sohier Abo Bakr	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Plant Design</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE413</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>3</td><td>-</td><td>2</td><td>5</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Riham Atef – Dr. Nada Abo Eleneen</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Design in chemical engineering encompasses the systematic development and planning of processes for the large-scale production of chemical products. It begins with understanding the anatomy of a chemical manufacturing process, which may operate in either continuous or batch modes. The primary aim of design is to create safe, cost-effective, and efficient processes through various stages, including conceptualization, feasibility studies, detailed engineering, and optimization. Chemical engineering projects are typically organized into structured teams handling different aspects like process development, safety, and economic analysis. Practical design considerations include plant location, layout, materials handling, and compliance with safety standards. The design approach involves selecting the type of design, conducting feasibility surveys, scaling up from laboratory to industrial scale, incorporating safety factors, and adhering to codes and standards. Flow sheeting, such as process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs), is used to visualize and simulate processes, often through software like HYSYS. Material and energy balances ensure the conservation of mass and energy throughout the process. Equipment is then designed in detail, considering size, construction, materials, and instrumentation. Broader considerations include operational control, fire and explosion risks, personnel safety, HAZOP studies, loss prevention, and process economics. Ultimately, design strategy aims to achieve optimal performance while ensuring safety, efficiency, and regulatory compliance.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the plant design and within the principles and contexts of sustainable design and development.	1	Illustrate particular products and processes including reactor and vessel design.
		2	Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
		3	Incorporate economic, societal, global, environmental, and risk management factors into design.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A9	Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	1	Solving problems of design creatively
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Define the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations and process control.
		2	Summarize the appropriate techniques relevant to different industries.
		3	Create a process, component or system to carry out specialized engineering designs
B3	Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.	1	Apply numerical modeling methods and/or computational techniques appropriate to plant design
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain plant.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Self-learning and Research
4. Problem solving
5. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Definition of design - The anatomy of a chemical manufacturing process - continuous and batch processes	9	3	-	4	2
2	Aim of design - stages of plant design - The Organization and structure of a Chemical Engineering Project- design optimization - Practical Considerations in Design.	9	3	-	4	2
3	The Design Approach- Types of Designs- feasibility survey and process choice - Scale-up in Design- Safety Factors- project documentation - Specification Sheets – codes and standards.	9	3	-	4	2
4	Flow sheeting and different types of process flow diagrams - Construction of a detailed flowsheet using a process simulator (currently HYSIS).	9	3	-	4	2
5	Material balances	9	3	-	4	2
6	Energy balances- Conservation of material and energy flows.	9	3	-	4	2
7	Detailed design of equipment: size, construction details.	9	3	-	4	2
8	Detailed design of equipment: materials of construction, instrumentation and control. **Midterm Exam**	9	3	-	4	2
9	General design considerations; plant location- plant layout- plant operation and control-	9	3	-	4	2
10	Health and safety hazards- fire and explosion hazards- personnel safety- loss prevention- HAZOP study.	9	3	-	4	2
11	Process economics- optimum design and design strategy.	9	3	-	4	2

12	Process economics- optimum design and design strategy.	9	3	-	4	2
13	Materials transfer, handling and treatment.	9	3	-	4	2
14	Materials handling (cont.)	9	3	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	60	40%
2	Final Written Exam	15^{th}	90	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Towler, G., & Sinnott, R. (2021). Chemical engineering design: principles, practice and economics of plant and process design. Butterworth-Heinemann.
	Other References	Dominic C.Y. Foo. (2022). Chemical Engineering Process Simulation. Elsevier.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature	**Name and Signature**
Course Coordinator	**Program Coordinator**
Dr. Riham Atef – Dr. Nada Abo Eleneen	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Project 1				
Course Code	CHE414				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	3	**2**	**-**	**5**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

The application of chemical engineering principles to industrial projects involves integrating fundamental concepts such as thermodynamics, fluid mechanics, heat and mass transfer, reaction engineering, and process control to design, analyze, and optimize processes within chemical industries. These principles guide the development of efficient, safe, and economically viable industrial operations. Effective communication of project findings is also essential; this is achieved through well-structured technical reports and professional presentations. Reports provide detailed documentation of methodologies, calculations, results, and recommendations, while presentations offer a concise and visual means of conveying key project insights to stakeholders, ensuring clarity, transparency, and informed decision-making throughout the project lifecycle.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Choose relevant mathematical and computer-based methodologies for problem modelling and analysis.
		2	Develop suitable experimentation and/or simulation.
		3	Apply statistical analyses and objective engineering judgment to draw conclusions.
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Incorporate economic, societal, global, environmental, and risk management factors into design
		2	Apply engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A5	Practice research techniques and methods of investigation as an inherent part of learning.	1	Prepare technical reports
		2	Search for information to engage in lifelong self-learning discipline.
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	Interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.
		2	Conduct troubleshooting in chemical engineering plants
		3	Acquire entrepreneurial skills

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Presentation and movies
3. Flipped Classroom
4. Site visits
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1-10	Application of principles of chemical engineering to chemical industries project	9*10	3	2	4	-
11-14	Reports and presentations	9*4	3	2	4	-
15	Final Oral Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams	any week	75	%50
2	Final Oral Exam	15^{th}	75	%50

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Subject studies
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom
	Skill Labs	lab

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Electroplating</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE415A</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc.prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Electrochemistry is the study of chemical processes that involve the movement of electrons, particularly in electrochemical cells, which convert chemical energy into electrical energy or vice versa. In industrial applications like electroplating, surface preparation is crucial to ensure proper adhesion and uniform coating. The effectiveness of metal deposition during electroplating depends on the throwing power of the electrochemical bath, which refers to the ability to deposit metal evenly across complex surfaces. Electrochemical baths contain specific metal ions and supporting chemicals necessary for plating, and their performance is influenced by several factors, including temperature and bath concentration. These variables must be carefully controlled to achieve high-quality, consistent coatings in electroplating processes.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to electroplating to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain electroplating systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Brain storming
4. Self-learning and Research
5. Discussion

6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Electrochemistry	8	2	-	4	2
2	Electrochemistry(cont.)	8	2	-	4	2
3	Electrochemical cells	8	2	-	4	2
4	Electrochemical cells(cont.)	8	2	-	4	2
5	Electrochemical cells(cont.)	8	2	-	4	2
6	Surface preparation	8	2	-	4	2
7	Surface preparation(cont.)	8	2	-	4	2
8	Surface preparation(cont.) **Midterm Exam**	8	2	-	4	2
9	Throwing power	8	2	-	4	2
10	Electrochemical baths	8	2	-	4	2
11	Electrochemical baths (cont.)	8	2	-	4	2
12	Factors affecting on electroplating (Current Density- Agitation (Stirring or Movement)	8	2	-	4	2
13	Factors affecting on electroplating (Electrode (Anode & Cathode) Conditions-Plating Time-Substrate Surface Finish & Geometry).	8	2	-	4	2
14	Factors affecting on electroplating (Temperature - bath concentration)	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Handbook of Corrosion Engineering. (2023). Elsevier Ebooks. https://doi.org/10.1016/c2021-0-02205-7
	Other References	Gamburg, Y. D. (2023). The Fundamentals of Electrochemistry. Cambridge Scholars Publishing.
		Clarke, T., Renault, C., & Dick, J. E. (2023). Electrochemistry Fundamentals. In *ACS in focus*. https://doi.org/10.1021/acsinfocus.7e7020
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

1. ....

Course Specification

(2025-2026)

1. Basic Information

Course Title:	Synthetic Fibers				
Course Code:	CHE415B				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of points of the course	Lectures	Exercise	Practical	Total contact hours	Student load
	2	2	-	4	4
Course Type	Elective اجباري				
Academic level at which the course is taught	Level: 4				
Academic Program	Chemical Engineering program				
Institute	Higher Institute for Engineering and Technology- New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Prof. Dr Khaled Samir Mohamed				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview (Brief summary of scientific content)

Classification, properties and manufacture of synthetic fibers as Nylon 6, Nylon 6,6 , Amide fibers, polyester and Teflon

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	**1**	Engage in the recent technological changes and emerging fields relevant to synthetic fibers industry to respond to the challenging role and responsibilities of a professional chemical engineer.
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	**1**	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to synthetic Fibers industry

4. Teaching and Learning Methods

1. Face to Face lectures.
2. discussion
3. Problem solving
4. Self-learning

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Lectures	Tutorial	Practical	Student load (Self-learning)
1	Introduction on fibers: natural and synthetic fibers	8	2	2	-	4
2	Synthetic fibers comparing with synthetic fibers: properties, advantages and disadvantages	8	2	2	-	4
3	Classification of synthetic fibers	8	2	2	-	4
4	Polyamide fibers: Nylon 6	8	2	2	-	4
5	Polyamide fibers: Nylon 6, 6	8	2	2	-	4
6	Polyamide fibers: Aramid fibers	8	2	2	-	4
7	Polyester fibers: Types of polyester fibers	8	2	2	-	4
8	Polyester fibers:: PET properties and production **Midterm Exam**	8	2	2	-	4
9	Applications of polyesters other than fibers	8	2	2	-	4
10	Polyacrylic fibers: Types and properties	8	2	2	-	4
11	Polyacrylic fibers: PAN and carbon fiber	8	2	2	-	4
12	Glass fibers	8	2	2	-	4
13	Teflon	8	2	2	-	4
14	Recent applications of synthetic fibers	8	2	2	-	4
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Sanjay Mavinkere Rangappa, Vinod Ayyappan, Manik, G., & Suchart Siengchin. (2024). Synthetic and Mineral Fibers, Their Composites and Applications. Elsevier.
	Other References	Ahmad, S., Rasheed, A., & Nawab, Y. (2020). Fibers for Technical Textiles. Springer International Publishing.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show system, sound system
	Supplies	White board, lecture class room

Name and Signature
Course Coordinator
Prof. Dr Khaled Samir Mohammed

Name and Signature
Program Coordinator

Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Paints technology				
Course Code	CHE415C				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Paints are complex mixtures composed of pigments, binders, solvents, and additives, each serving a specific function to provide color, adhesion, protection, and workability. Paints are classified based on their composition and application, including types like oil-based, water-based, epoxy, and polyurethane paints. A typical coating system includes primers, which promote adhesion and provide an initial protective layer, and final coats that deliver the desired finish and durability. Proper surface preparation is essential to ensure effective bonding and performance of the paint system. The chemical reactions within paint systems, such as curing and drying, determine their protective and aesthetic properties. Specialized paints are formulated to offer corrosion resistance, making them critical for protecting metal surfaces in harsh environments and industrial applications.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to painting technology to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain Painting systems.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Presentation and movies
4. Self-learning and Research
5. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Paints	8	2	-	4	2
2	Paints compositions	8	2	-	4	2
3	Classification of Paints Oil-Based	8	2	-	4	2
4	Classification of paints Water-Based	8	2	-	4	2
5	Manufacture of paints	8	2	-	4	2
6	Primers and final coats	8	2	-	4	2
7	Final Coats – Achieving Aesthetic and Protective Finishes	8	2	-	4	2
8	Surface preparation **Midterm Exam**	8	2	-	4	2
9	Surface Preparation – The Foundation of a Strong Paint System	8	2	-	4	2
10	Reaction of paint systems	8	2	-	4	2
11	Reaction of paint systems(cont.)					
12	Paint Curing and Drying	8	2	-	4	2
13	Paints for corrosion resistance	8	2	-	4	2
14	Industrial Applications of Paints – Challenges and Solutions	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	%50
2	Final Written Exam	15^{th}	50	%50

6. Learning Resources and Supportive Facilities

<table>
<tr><td rowspan="4">Learning resources (books, scientific references, etc.)</td><td>The main (essential) reference for the course</td><td>Handbook of Corrosion Engineering. (2023). Elsevier Ebooks. https://doi.org/10.1016/c2021-0-02205-7</td></tr>
<tr><td rowspan="2">Other References</td><td>Gamburg, Y. D. (2023). The Fundamentals of Electrochemistry. Cambridge Scholars Publishing.</td></tr>
<tr><td>Clarke, T., Renault, C., & Dick, J. E. (2023). Electrochemistry Fundamentals. In ACS in focus. https://doi.org/10.1021/acsinfocus.7e7020</td></tr>
<tr><td>Learning Platforms</td><td>MOODLE
http://www.ees.ndeti.edu.eg/</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="2">Supportive facilities & equipment for teaching and learning</td><td>Devices/Instruments</td><td>Data show system, Sound system</td></tr>
<tr><td>Supplies</td><td>White board, lecture classroom</td></tr>
</table>

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Renewable Energy Sources				
Course Code	CHE415D				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Nada Mohamed Abo Eleneen				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This content offers a detailed overview of global energy sources, comparing fossil fuels with renewable alternatives in terms of availability, environmental impact, and sustainability. It begins with an introduction to energy types, carriers, and the growing challenges associated with non-renewable sources, such as pollution and resource depletion. Renewable energy sources—solar, wind, hydro, geothermal, biomass, and ocean energy—are analyzed individually, covering their working principles, advantages, disadvantages, efficiency, land requirements, and environmental impact. Solar energy includes photovoltaic, thermal, and concentrated systems, influenced by factors like cost, efficiency, and area needs. Wind energy is addressed through turbine types (HAWT and VAWT), location considerations, and storage. Hydropower explores dam systems, turbines, energy storage, and ecological consequences. Geothermal energy is explained through various power cycles, including flash and binary systems, and its use in heating and power generation. Biomass and waste-to-energy technologies are discussed with focus on conversion methods like gasification and fermentation, as well as biofuel production. Lastly, ocean energy covers technologies like OTEC, tidal, wave, and salinity gradient power, highlighting their potential and technical limitations. The content emphasizes the role of renewables in a sustainable future while acknowledging economic, environmental, and practical challenges.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer.	1	Engage in the recent technological changes and emerging fields relevant to Renewable Energy Sources to respond to the challenging role and responsibilities of a professional chemical engineer.
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain Renewable Energy Sources.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion
5. Brain storming
6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Energy Fundamentals: Sources, Carriers, and Environmental Impact (Covering energy classification, fossil fuels vs. renewables, and pollution challenges.)	8	2	-	4	2
2	Renewable Energy: Benefits, Limitations, and Performance Factors	8	2	-	4	2
3	Fundamentals of Solar Energy: Types, Processes, and Efficiency Factors	8	2	-	4	2
4	Solar Energy Systems: Components, Design, and Cost Analysis	8	2	-	4	2
5	Applications and Environmental Impact of Solar Energy	8	2	-	4	2
6	Wind Energy Fundamentals: Principles, Turbine Types, and Design Considerations	8	2	-	4	2
7	Wind Power Applications: Challenges, Storage, and Environmental Impact	8	2	-	4	2
8	Hydropower Fundamentals: Principles, Components, and Plant Types **Midterm Exam**	8	2	-	4	2
9	Hydropower Performance: Benefits, Challenges, and Environmental Considerations	8	2	-	4	2

10	Geothermal Energy Fundamentals: Resources, Power Cycles, and Systems	8	2	-	4	2
11	Geothermal Applications and Impacts: Heating, Challenges, and Sustainability	8	2	-	4	2
12	Municipal solid waste and biomass	8	2	-	4	2
13	Ocean thermal energy	8	2	-	4	2
14	Tidal power Principles- Ocean currents- Horizontal and Vertical axis turbines- Stream Energy extractors.	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Twidell, J. (2021). *Renewable energy resources*. Routledge.
	Other References	Ehrlich, R., Geller, H. A., & Cressman, J. R. (2022). *Renewable energy: a first course*. CRC press.
		Jenkins, N., & Ekanayake, J. (2024). *Renewable energy engineering*. Cambridge University Press
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
	Devices/Instruments	Data show system, Sound system

Supportive facilities & equipment for teaching and learning	**Supplies**	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. Nada Mohamed Abo Eleneen	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Water Desalination</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE416A</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. / Yasser Tawfiq</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Water desalination is the process of removing salts and impurities from seawater or brackish water to produce fresh water. It begins with understanding water chemistry, including key challenges like scaling (mineral deposits) and corrosion, which affect system efficiency. Heat transfer principles are crucial in thermal methods like Multi-Stage Flash (MSF) and Vapor Compression (VC), while non-thermal techniques such as Reverse Osmosis (RO) and Electrodialysis (ED) rely on membranes and electric fields. Proper material selection and design principles ensure durability and performance. Water quality standards must be met for safe use, and corrosion control strategies help extend plant life. Advances in technology, including energy-efficient and sustainable methods, shape the future of desalination, addressing global water scarcity.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	1	Describe health and safety regulations and environmental concerns related to water desalination
		2	Apply safe systems at work by taking the necessary precautions to manage hazards.
		3	Utilize modern technologies related to water desalination
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Summarize the appropriate techniques relevant to water desalination.
		2	Create a process, component or system to carry out specialized engineering designs related to water desalination.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion
5. Brain storming
6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Water Desalination	8	2	-	4	2
2	Fundamentals of Water Chemistry in Desalination	8	2	-	4	2
3	Scaling in Desalination Systems	8	2	-	4	2
4	Corrosion in Desalination Plants.	8	2	-	4	2
5	Heat Transfer Principles in Thermal Desalination.	8	2	-	4	2
6	Material Selection for Desalination Equipment	8	2	-	4	2
7	Design Principles for Desalination Systems	8	2	-	4	2
8	Thermal Desalination Techniques: Multi-Stage Flash **Midterm Exam**	8	2	-	4	2
9	Thermal Desalination Techniques: Vapor Compression (VC)	8	2	-	4	2
10	Non-Thermal Desalination: Reverse Osmosis (RO)	8	2	-	4	2
11	Non-Thermal Desalination: Electrodialysis (ED)	8	2	-	4	2
12	Water Quality Standards for Desalination	8	2	-	4	2
13	Corrosion Control Strategies in Desalination Plants	8	2	-	4	2

14	Future of Desalination Technology	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Ludwig, H. (2022). Reverse Osmosis Seawater Desalination Volume 2: Planning, Process Design and Engineering–A Manual for Study and Practice. Springer Nature.
	Other References	Bazargan, A. (Ed.). (2022). A multidisciplinary introduction to desalination. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. / Yasser Tawfiq	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Wastewater treatment</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE416B</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc.prof. Dr. / Ramadan El kateb</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Water chemistry involves the study of water's chemical characteristics and interactions within different environments, focusing on parameters like pH, dissolved oxygen, and contaminants such as heavy metals and organic compounds. This understanding is crucial for maintaining safe water standards and assessing ecological health. Water sampling is the process of collecting water samples from various sources in a controlled manner to ensure they accurately reflect the water body's condition, which is vital for reliable analysis. Water analysis encompasses a range of tests to evaluate the water's physical, chemical, and microbiological properties, determining its quality and identifying potential contaminants. This analysis supports environmental monitoring and public health. Wastewater treatment technologies consist of various processes designed to remove pollutants from contaminated water before its safe release or reuse. These processes include primary physical separation, secondary biological treatment, and tertiary advanced purification, each crucial for protecting ecosystems and maintaining sustainable water resources. Together, these components form a comprehensive approach to managing and safeguarding water quality.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles..	a1	Describe health and safety regulations and environmental concerns related to wastewater treatment.
		c1	Apply safe systems at work by taking the necessary precautions to manage hazards.
		c3	Utilize modern technologies related to wastewater treatment
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design,	b1	Summarize the appropriate techniques relevant to wastewater treatment.
		c1	Create a process, component or system to carry out specialized engineering designs related to wastewater treatment.

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	Instrumentation and Control of Chemical Processes, and Process and Plant Design.		

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion
5. Brain storming
6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Water chemistry	8	2	-	4	2
2	Water chemistry(continuous)	8	2	-	4	2
3	Water sampling	8	2	-	4	2
4	Water sampling (continuous)	8	2	-	4	2
5	Water analysis	8	2	-	4	2
6	Water analysis(continuous)	8	2	-	4	2
7	Wastewater treatment technologies	8	2	-	4	2
8	Physical processes: screening, mixing Midterm exam	8	2	-	4	2
9	Physical processes: sedimentation, membrane separation	8	2	-	4	2
10	Chemical process: coagulation	8	2	-	4	2
11	Chemical process: chemical precipitation, disinfection	8	2	-	4	2

12	Chemical process: ion exchange	8	2	-	4	2
13	Biological process (aerobic).	8	2	-	4	2
14	Biological process (anaerobic).	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Mu. Naushad, Eric Lichtfouse "Green Materials for Wastewater Treatment" Springer , (2020)..
	Other References	Adsorption characteristics and applications of andesite in removing some pollutants from wastewater, Abdalla M. Khedr, Nadia Elwakiel , Sameh E. Halawia & Ramadan Abdelghany Mansour, Scientific reports, 2024
		Efficient adsorption of amoxicillin onto silica nanoparticles synthesized from rice husks, Wael Y. Elnazera,, Taha E. Farragc, Mokhtar S. Behearyd, Ramadan A. Mansour, Desalination and water treatment, 317 (2024) 100086.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
	Devices/Instruments	Data show system, Sound system

Supportive facilities & equipment for teaching and learning	**Supplies**	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc.prof. Dr. / Ramadan El kateb	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Rubber industry				
Course Code	CHE416C				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**4**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This course covers the fundamentals of natural rubber, beginning with its molecular basis in isoprene and the polymerization process that forms rubber. It explores the rubbers and elastomers, including their classification, properties, and applications. A key focus is the chemical vulcanization reaction, which enhances rubber's durability and elasticity through cross-linking. The course also examines synthetic polymers such as ABS (Acrylonitrile Butadiene Styrene), discussing its structure, production, and industrial uses.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	1	Describe health and safety regulations and environmental concerns related to rubber industry
		2	Apply safe systems at work by taking the necessary precautions to manage hazards.
		3	Utilize modern technologies related to rubber industry
B1	Design a practical chemical engineering system, component or process utilizing a full range of chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.	1	Summarize the appropriate techniques relevant to rubber industry.
		2	Create a process, component or system to carry out specialized engineering designs related to rubber industry.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Natural Rubber	8	2	-	4	2
2	Chemistry of Isoprene and Rubber Formation	8	2	-	4	2
3	Synthetic Rubbers and Elastomers	8	2	-	4	2
4	Classification of Elastomers	8	2	-	4	2
5	Mechanical Properties of Rubber.	8	2	-	4	2
6	Vulcanization: Principles and Chemistry	8	2	-	4	2
7	Accelerators and Activators in Vulcanization	8	2	-	4	2
8	Peroxide and Radiation Vulcanization **Midterm Exam**	8	2	-	4	2
9	Sulfur vulcanization	8	2	-	4	2
10	Fillers and Reinforcements in Rubber	8	2	-	4	2
11	Rubber Processing Technique	8	2	-	4	2
12	Introduction to ABS (Acrylonitrile Butadiene Styrene)	8	2	-	4	2
13	Blending Rubber with Thermoplastics	8	2	-	4	2
14	Recycling of Rubber and Elastomers	8	2	-	4	2

15	Final Written Exam

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Banerjee, B. (Ed.). (2024). Rubber Products: Technology and Cost Optimisation. Walter de Gruyter GmbH & Co KG.
	Other References	Shinzo Kohjiya, & Ikeda, Y. (2021). Chemistry, Manufacture and Applications of Natural Rubber. Woodhead Publishing.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature	Name and Signature
Course Coordinator	**Program Coordinator**
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

الفصل الدراسي الثاني

(2025-2026)

Course Specification

(2025-2026)

1. Basic Information

Course Title	Research and Analytic Skills				
Course Code	BAS421				
Department/s participating in delivery of the course	Basic Science and Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**-**	**2**	**3**
Course Type	Compulsory				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Amal beheiry, Dr. Ahmed Lotfy				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

يُعد إطار التحليل للمسائل الهندسية شاملاً، حيث يأخذ في الاعتبار الجوانب الفنية والاقتصادية والبيئية والأخلاقية، مع التركيز على مراحل حل المشكلة من فهمها وصياغتها، وضع خطة الحل، والتنفيذ، والتقييم، والمراجعة. يُعزز الإبداع في التحليل قدرة المهندس على ابتكار حلول جديدة ومبتكرة، بينما يُساعد تحليل SWOT في تحديد نقاط القوة والضعف، الفرص والتهديدات، لتقييم البدائل المختلفة بشكل فعال. كما يلعب تحليل التكلفة-الفائدة وتقييم المخاطر دورًا مهمًا في اختيار الحلول الأنسب. ويؤكد على أهمية العمل الجماعي والتعاون لنجاح المشاريع الكبيرة، فضلاً عن أهمية جمع البيانات والمعلومات الموثوقة من خلال مهارات البحث باستخدام أدوات وتقنيات متقدمة، مع تقييم مصادر المعلومات لضمان مصداقيتها. هذا كله يعزز من قدرة المهندس على اتخاذ قرارات مدروسة ومستندة إلى معلومات دقيقة وموثوقة.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	1	Apply Appropriate Research Methodologies
		2	Evaluate Research Findings
		3	Utilize Analytical and Statistical Tools

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Site visits
4. Self-learning and Research
5. Problem solving
6. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	-مقدمة في تحليل المشكلات الهندسية: المفهوم، الأهمية، والأهداف.	5	2	-	-	3
2	-طار التحليل الهندسي مع مراعاة النواحي الفنية، الاقتصادية، البيئية، والأخلاقية.	5	2	-	-	3
3	مراحل حل المشكلات: فهم وصياغة المشكلة.	5	2	-	-	3
4	-خطة الحل وتنفيذ الخطة.	5	2	-	-	3
5	-لتقييم والمراجعة – ودور الإبداع في التحليل.	5	2	-	-	3
6	تحليل SWOT: أوجه القوة والضعف والفرص والمخاطر.	5	2	-	-	3
7	-تحليل التكلفة والفائدة – التحليل التفصيلي.	5	2	-	-	3
8	-تحليل المخاطر ودور التعاون والعمل الجماعي في المشكلات المعقدة. **Midterm Exam**	5	2	-	-	3
9	أهمية العثور على البيانات والمعلومات والمعرفة المناسبة.	5	2	-	-	3
10	-مهارات البحث: استخدام العبارات والمنطق(AND, OR, NOT).	5	2	-	-	3
11	البحث باستخدام العناوين، النطاق، URL، والمضيف.	5	2	-	-	3
12	تقييم نتائج البحث واختيار محرك البحث المناسب.	5	2	-	-	3
13	تقييم مصداقية المصادر على الشبكة العالمية.	5	2	-	-	3
14	-مراجعة عامة، تقديم المشاريع أو الأنشطة التقييمية.	5	2	-	-	3
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	20	40%
2	Final Written Exam	15^{th}	30	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Pattanaik, L. N. (2017). Analytical Tools in Research. Educreation Publishing.
	Other References	Babazade, Y. (2023). Critical thinking in elt: developing analytical skills in english learners. International journal of philosophical studies and social sciences, 3(6), 1-13.
		Timmermans, S., & Tavory, I. (2022). Data analysis in qualitative research: Theorizing with abductive analysis. University of Chicago Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Assoc.prof. Amal beheiry, Dr. Ahmed Lotfy	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Industrial Technology in Chemical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE421</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>4</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. / Yasser Tawfik</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This comprehensive course explores the fundamental processes of chemical manufacturing with a focus on organic industrial applications and textile production. Beginning with an introduction to chemical process industries, it examines key combined chemical operations including nitration, sulfonation, halogenation, oxidation, and polymerization - detailing their mechanisms and industrial implementations. The curriculum covers process design through flow diagrams and concentration techniques for organic chemical production. The latter portion shifts to textile manufacturing, investigating industrial knitting processes with emphasis on natural fibers like cotton and wool. Students will analyze cotton processing from raw material to finished textile, followed by wool treatment methods including spinning and finishing applications. The course provides both theoretical understanding of chemical transformations and practical knowledge of their application in creating industrial and textile products, bridging the gap between chemical engineering principles and real-world manufacturing processes. Special attention is given to operational charts that trace production from raw materials to final outputs.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Demonstrate the professional ethics and impacts of engineering solutions on society and environment
		2	Identify the environmental and economic impact of various industries, waste minimization, and industrial facility remediation
		3	Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact
		4	Incorporate economic, societal, global, environmental, and risk management factors into design.
B1	Design a practical chemical engineering system, component or process utilizing a full range of	1	Illustrate the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
	chemical engineering principles and techniques including: Mass and Energy Balance, Thermodynamics, Mass Transfer, Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design.		energy balance; transport processes; separation processes, mechanical unit operations and process control
		2	Summarize the appropriate techniques relevant to different industries.
		3	Create a process, component or system to carry out specialized engineering designs.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Site visits
4. Self-learning and Research
5. Problem solving
6. Brain storming

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Chemical Process Industries	8	2	-	4	2
2	Fundamentals of Combined Chemical Processes	8	2	-	4	2
3	Nitration Processes in Industry	8	2	-	4	2
4	Sulfonation and Sulfation Processes	8	2	-	4	2
5	Halogenation Techniques in Chemical Manufacturing	8	2	-	4	2
6	Industrial Oxidation Processes	8	2	-	4	2

7	Polymerization Processes in Industry	8	2	-	4	2
8	Process Flow Diagrams for Organic Chemical Production **Midterm Exam**	8	2	-	4	2
9	Concentration Processes in Organic Chemical Manufacturing	8	2	-	4	2
10	Introduction to Textile Fibers and Industrial Knitting	8	2	-	4	2
11	Natural Fiber Processing: Cotton	8	2	-	4	2
12	Natural Fiber Processing: Cotton (cont.)	8	2	-	4	2
13	Wool Processing and Industrial Applications	8	2	-	4	2
14	Wool Processing and Industrial Applications(cont.)	8	2	-	4	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	40%
2	Final Oral Exam	14^{th}	15	12%
3	Final Written Exam	15^{th}	60	48%

6. Learning Resources and Supportive Facilities

Learning resources (books,	**The main (essential) reference for the course**	Lionello Pogliani, Ameta, S. C., & Haghi, A. K. (2020). Chemistry and Industrial Techniques for Chemical Engineers. CRC Press.

scientific references, etc.)	**Other References**	Murzin, D. Y. (2022). Chemical reaction technology. Walter de Gruyter GmbH & Co KG.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. / Yasser Tawfik	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Petroleum Refining Engineering				
Course Code	CHE422				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Compulsory				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. / Sohier Abo Bakr				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Petroleum refineries transform crude oil into valuable products through a series of integrated processes, including distillation, cracking, reforming, hydrotreating, and alkylation. These operations are designed to optimize yield, enhance product quality (e.g., gasoline octane, lubricant performance), and comply with environmental regulations. Key challenges include managing feed variability, minimizing emissions, and maximizing efficiency. The refinery's organization relies on interdependent units from crude distillation to hydro processing and blending each tailored to specific feedstock and market demands. A term project using real refinery data helps bridge theory with practice, enabling design calculations for process optimization while addressing environmental and operational constraints. This holistic approach ensures refineries meet energy demands sustainably and economically.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		**Course Learning Outcomes**	
Code	**Text**	**Code**	**Text**
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the petroleum refining engineering knowledge, understanding, and feedback to improve design, products and/or services.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Participate in recent technical advancements and developing disciplines pertinent to Petroleum Refining Engineering in order to respond to the demanding role and responsibilities of a professional chemical engineer.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Flipped Classroom

4. Site visits
5. Self-learning and Research
6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Petroleum Refineries: Organization and Key Processes	7	2	-	3	2
2	Refinery Feedstocks and Products: Types and Specifications	7	2	-	3	2
3	Crude Distillation: Principles and Operation	7	2	-	3	2
4	Thermal and Catalytic Cracking: Converting Heavy Fractions	7	2	-	3	2
5	Catalytic Reforming: Octane Enhancement and Aromatics Production	7	2	-	3	2
6	Hydrotreating: Sulfur Removal and Product Upgrading	7	2	-	3	2
7	Alkylation	7	2	-	3	2
8	Lubricating Oil Production: Refining and Dewaxing **Midterm Exam**	7	2	-	3	2
9	Petroleum Gases: Processing and Utilization	7	2	-	3	2
10	Advanced Hydro processing: Hydrocracking and Isomerization	7	2	-	3	2
11	Product Blending: Formulating Marketable Fuels	7	2	-	3	2
12	Environmental Constraints in Refining: Regulations and Solutions	7	2	-	3	2
13	Term Project: Refinery Data Analysis and Problem Definition	7	2	-	3	2
14	Term Project Completion: Design Calculations and Optimization	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	40%
2	Final Written Exam	15^{th}	75	60%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	A. Kayode Coker. (2023). Petroleum Refining Design and Applications Handbook, Volume 5. John Wiley & Sons.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator
Dr. / Sohier Abo Bakr

Name and Signature
Program Coordinator
Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Quality Assurances and Engineering Reliability</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE423</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>1</td><td>3</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Compulsory</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Dr. Yasser Tawfik</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

This comprehensive course covers the fundamental principles and advanced techniques of quality control and reliability engineering. Beginning with an introduction to quality control systems, it explores methods for establishing precise product specifications and the application of statistical process control (SPC) to monitor manufacturing processes. The curriculum details the use of control charts for both variables and attributes to maintain process stability, along with acceptance sampling plans and operating characteristic (OC) curves to assess quality risks. Process capability analysis is examined to evaluate performance against specifications, supported by modern quality control software tools. The reliability engineering segment introduces key concepts such as system reliability for serial and parallel configurations, life testing methodologies including accelerated life models, and the critical role of reliability in mechanical, electrical, and structural design. The course concludes by analyzing how reliability directly impacts product quality, integrating quality control and reliability principles to optimize product performance and durability. Through this structured approach, students gain the expertise to implement robust quality and reliability practices across various engineering disciplines.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

<table>
<tr><th colspan="2">Program Outcomes (NARS 2018)</th><th colspan="2">Course Learning Outcomes</th></tr>
<tr><th>Code</th><th>Text</th><th>Code</th><th>Text</th></tr>
<tr><td rowspan="5">A4</td><td rowspan="5">Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.</td><td>1</td><td>Describe quality assurance systems, codes of practice, and standards, as well as health and safety regulations and environmental concerns.</td></tr>
<tr><td>2</td><td>List the engineering-related business and management principles</td></tr>
<tr><td>3</td><td>Create methodical approaches when dealing with new and advancing technology</td></tr>
<tr><td>4</td><td>Use fundamental organizational and project management abilities.</td></tr>
<tr><td>5</td><td>Apply quality assurance procedures and follow codes and standards.</td></tr>
</table>

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
A6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	1	Interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation. Analyze and interpret data.
		2	Acquire entrepreneurial skills.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Discussion
3. Flipped Classroom
4. Presentation and movies
5. Self-learning and Research
6. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Quality Control Systems	6	2	-	3	1
2	Quality Methods for Product Specifications	6	2	-	3	1
3	Statistical Process Control (SPC) Fundamentals	6	2	-	3	1
4	Control Charts for Variables					
5	Control Charts for Attributes	6	2	-	3	1
6	Acceptance Sampling Plans	6	2	-	3	1
7	Operating Characteristic (OC) Curves Analysis	6	2	-	3	1
8	Process Capability Analysis **Midterm Exam**	6	2	-	3	1
9	Quality Control Software	6	2	-	3	1

10	Reliability Engineering Basics	6	2	-	3	1
11	Reliability of Serial and Parallel Systems	6	2	-	3	1
12	Life Testing & Accelerated Life Models	6	2	-	3	1
13	Reliability in Engineering Design (Mechanical/Electrical/Structural)	6	2	-	3	1
14	Reliability's Impact on Product Quality	6	2	-	3	1
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	The main (essential) reference for the course	Mitra, A. (2021). Fundamentals of Quality Control and Improvement. https://doi.org/10.1002/9781119692379
	Other References	Papp, J. (2023). Quality Management in the Imaging Sciences-E-Book: Quality Management in the Imaging Sciences-E-Book. Elsevier Health Sciences.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching	Devices/Instruments	Data show system, Sound system
	Supplies	White board, lecture classroom

and learning		

Name and Signature **Course Coordinator** Dr. Yasser Tawfik		**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Project 2				
Course Code	CHE424				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**4**	**-**	**6**	**4**
Course Type	Compulsory				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Investigations on the chemical industrial problems of Project I by written reports and team presentations.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

<table>
<tr><th colspan="2">Program Outcomes (NARS 2018)</th><th colspan="2">Course Learning Outcomes</th></tr>
<tr><th>Code</th><th>Text</th><th>Code</th><th>Text</th></tr>
<tr><td rowspan="2">A7</td><td rowspan="2">Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.</td><td>1</td><td>Collaborate effectively within multidisciplinary team.</td></tr>
<tr><td>2</td><td>Work in stressful environment and within constraints.</td></tr>
<tr><td rowspan="2">A8</td><td rowspan="2">Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.</td><td>1</td><td>Communicate effectively</td></tr>
<tr><td>2</td><td>Demonstrate efficient IT capabilities</td></tr>
<tr><td rowspan="3">A9</td><td rowspan="3">Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.</td><td>1</td><td>Solving problems of design creatively</td></tr>
<tr><td>2</td><td>Manage tasks, time, and resources</td></tr>
<tr><td>3</td><td>Refer to relevant literatures</td></tr>
<tr><td>B3</td><td>Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering.</td><td>1</td><td>Apply numerical modeling methods and/or computational techniques appropriate to project of chemical engineering.</td></tr>
<tr><td>B4</td><td>Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.</td><td>1</td><td>Adopt suitable national and international standards and codes to: design, operate chemical engineering systems related to the project.</td></tr>
</table>

4. Teaching and Learning Methods

1. Face-to-Face Lecture

2. Presentation and movies
3. Projects
4. Site visits
5. Self-learning and Research

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1-14	Investigations on the chemical industrial problems of Project I by written reports and team presentations.	10*14	2	4	4	-
15	Final Oral Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams	any week	50	33.33%
2	Final Practical Exam	14^{th}	25	16.67%
3	Final Oral Exam	After final exam by 2 weeks	75	50%

6. Learning Resources and Supportive Facilities

<table>
<tr><td rowspan="2">Learning resources (books, scientific references, etc.)</td><td>The main (essential) reference for the course</td><td>Subject studies</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td rowspan="3">Supportive facilities & equipment for teaching and learning</td><td>Devices/Instruments</td><td>Data show system, Sound system</td></tr>
<tr><td>Supplies</td><td>White board, lecture classroom</td></tr>
<tr><td>Skill Labs</td><td>lab</td></tr>
</table>

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

<table>
<tr><td>Course Title</td><td colspan="5">Industrial Safety</td></tr>
<tr><td>Course Code</td><td colspan="5">CHE425A</td></tr>
<tr><td>Department/s participating in delivery of the course</td><td colspan="5">Chemical Engineering Department</td></tr>
<tr><td rowspan="2">Number of hours of the course</td><td>Theoretical</td><td>Practical</td><td>Exercise</td><td>Total contact hours</td><td>Student load</td></tr>
<tr><td>2</td><td>-</td><td>2</td><td>4</td><td>3</td></tr>
<tr><td>Course Type</td><td colspan="5">Elective</td></tr>
<tr><td>Academic level at which the course is taught</td><td colspan="5">Level 4</td></tr>
<tr><td>Academic Program</td><td colspan="5">Chemical Engineering Program</td></tr>
<tr><td>Institute</td><td colspan="5">The Higher Institute of Engineering and Technology in New Damietta</td></tr>
<tr><td>University</td><td colspan="5">Ministry of Higher Education& Scientific Research</td></tr>
<tr><td>Name of Course Coordinator</td><td colspan="5">Assoc.prof. Hend Elsayed Gadow</td></tr>
<tr><td>Course Specification Approval Date</td><td colspan="5">27/7/2025</td></tr>
<tr><td>Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)</td><td colspan="5">29/7/2025</td></tr>
</table>

2. Course Overview

Overview of industrial safety, starting with fundamental safety principles and strategies for preventing emergencies in industrial processes. It emphasizes the role of human error in safety incidents and highlights the importance of accurately identifying and assessing potential hazards, including risks of fires and explosions. The inclusion of case studies offers real-world examples of plant hazards, facilitating practical understanding and learning. Additionally, various miscellaneous topics presented by invited lecturers aim to further explore specialized aspects of safety management, all contributing to enhancing safety awareness and risk mitigation in industrial environments.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Demonstrate the professional ethics and impacts of Industrial Safety on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into design.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve process safety.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Presentation and movies
4. Self-learning and Research
5. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction in safety	7	2	-	3	2
2	Introduction in safety(cont.)	7	2	-	3	2
3	Preventing emergencies in the process of industry	7	2	-	3	2
4	Preventing emergencies in the process of industry (cont.)	7	2	-	3	2
5	Human error	7	2	-	3	2
6	Human error (cont.)	7	2	-	3	2
7	Identification of hazards	7	2	-	3	2
8	Assessment of hazards **Midterm Exam**	7	2	-	3	2
9	Fires and explosions	7	2	-	3	2
10	Case studies of hazard of plant	7	2	-	3	2
11	Case studies of hazard of plant (cont.)	7	2	-	3	2
12	Case studies of hazard of plant (cont.)	7	2	-	3	2
13	Miscellaneous topics to be covered by invited Lecturers	7	2	-	3	2
14	Miscellaneous topics to be covered by invited Lecturers (cont.)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Massimiliano Fabbricino. (2023). Safety in Chemical and Process Industries: A Comprehensive Assessment. Bentham Science Publishers.
	Other References	Panchal, D., Ram, M., Chatterjee, P., & Anish Kumar Sachdeva. (2023). Industrial Reliability and Safety Engineering. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature Course Coordinator	Name and Signature Program Coordinator
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Special Topics in Chemical Engineering				
Course Code	CHE425B				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Special topics to be selected by the department to address new subjects in Chemical Engineering.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Determine the professional ethics and impacts of engineering solutions on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into design.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to selected topics.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion
5. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1-14	Special topics to be selected by the department to address new subjects in Chemical Engineering. **Midterm Exam in 8th week**	7*14	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8th) and others in any week	50	50%
2	Final Written Exam	15th	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Muhammad Imran Malik, Hussain, D., Muhammad Raza Shah, & Guo, D.-S. (2024). Handbook of Nanomaterials, Volume 1. Elsevier.
	Other References	Awan, T. I., Bashir, A., & Tehseen, A. (2020). Chemistry of nanomaterials: Fundamentals and applications. Elsevier.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

and learning		

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow		**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Plasticizers				
Course Code	CHE425C				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Plasticization is the process of adding substances (plasticizers) to polymers to increase flexibility, workability, and durability. The theoretical foundations explain how plasticizers reduce intermolecular forces, while their classification includes primary, secondary, and polymeric types. However, factors opposing plasticization, such as polymer crystallinity, can limit effectiveness. Effective plasticizers must meet key requirements, including compatibility, low volatility, and stability. Analytical methods assess properties like viscosity and migration resistance, and structure-efficiency relationships help optimize performance. Plasticization mechanisms vary in natural polymers (e.g., starch, cellulose) compared to synthetics. Beyond plasticizers, stabilizers prevent degradation, extenders reduce costs, and lubricants improve processing. Functional fillers enhance mechanical properties, while pigments provide coloration. Modern polymer formulations often rely on integrated additive systems to balance performance, cost, and sustainability. Understanding these principles is essential for designing high-performance plasticized materials.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Demonstrate the professional ethics and impacts of Plasticizers on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into design.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information about Plasticizers to engage in lifelong self-learning discipline.
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to plasticizers industry.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion
5. Problem solving

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Plasticization Principles	7	2	-	3	2
2	Theoretical Foundations of Plasticization	7	2	-	3	2
3	Classification and Types of Plasticizers	7	2	-	3	2
4	Factors opposing Plasticization	7	2	-	3	2
5	Essential Requirements for Effective Plasticizers.	7	2	-	3	2
6	Analytical Methods for Plasticizer Property Measurement	7	2	-	3	2
7	Structure-Efficiency Relationships in Plasticizers	7	2	-	3	2
8	Plasticization Mechanisms in Natural Polymers **Midterm Exam**	7	2	-	3	2
9	Stabilizers: Functions and Applications in Polymer	7	2	-	3	2
10	Extenders: Roles and Economic Considerations	7	2	-	3	2
11	Lubricants: Mechanisms and Performance Effects	7	2	-	3	2
12	Functional Fillers in Polymer Systems	7	2	-	3	2
13	Pigments: Coloring Agents in Plasticized Materials	7	2	-	3	2
14	Integrated Additive Systems in Polymer Formulations	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Godwin, A. D. (2024). Plasticizers. In Applied plastics engineering handbook (pp. 595-618). William Andrew Publishing.
	Other References	Powell, P. C., & Housz, A. I. (2023). Engineering with polymers. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Fertilizers Technology				
Course Code	CHE425D				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

This overview explores the history, significance, and various types of fertilizers used in agriculture. It details the importance of fertilizers in enhancing crop productivity and discusses the production and applications of key nutrients such as potassium, phosphorus, sulfur, calcium, magnesium, and nitrogen. The presentation also covers advanced fertilizer technologies including slow-release, controlled-release, liquid, bio, and nano fertilizers, highlighting their roles in promoting sustainable and efficient nutrient delivery. Overall, these topics emphasize the evolution and diverse applications of fertilizers to improve agricultural yield and soil health.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Determine the professional ethics and impacts of Fertilizers on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into Fertilizers industry.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to fertilizers technology.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Self-learning and Research
3. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	History of chemical fertilizers	7	2	-	3	2
2	Importance and uses of fertilizers	7	2	-	3	2
3	Potassium fertilizers; production and uses	7	2	-	3	2
4	Potassium fertilizers; production and uses	7	2	-	3	2
5	Phosphorus fertilizers; production and uses	7	2	-	3	2
6	Phosphorus fertilizers; production and uses	7	2	-	3	2
7	Sulfur fertilizers	7	2	-	3	2
8	Calcium and Magnesium fertilizers. **Midterm Exam**	7	2	-	3	2
9	Nitrogen fertilizers; production and uses	7	2	-	3	2
10	Nitrogen fertilizers; production and uses	7	2	-	3	2
11	Slow release and controlled release fertilizers	7	2	-	3	2
12	Slow release and controlled release fertilizers	7	2	-	3	2
13	Liquid fertilizers	7	2	-	3	2
14	Bio fertilizers- Nano fertilizers.	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Mishra, B. (2020). Fertilizer Technology And Management. Dreamtech Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Pulp and Paper Industry				
Course Code	CHE426A				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

The pulp and paper industry transforms raw lignocellulosic materials—primarily wood but also non-wood sources—into various paper products through mechanical, chemical, or chemi-mechanical pulping processes. Mechanical pulping uses physical force to separate fibers, retaining lignin for high yields but lower strength, while chemical pulping (e.g., Kraft and sulfite processes) dissolves lignin to produce stronger, purer fibers. Chemi-mechanical pulping combines chemical pretreatment with mechanical refining to balance quality and yield. The resulting pulp undergoes screening and washing to remove impurities, followed by bleaching to enhance brightness using chlorine-based methods. Lignin characterization and removal techniques optimize fiber quality, while black liquor recovery systems reclaim chemicals and generate energy, improving sustainability. Evaporation processes concentrate black liquor before combustion, and the paper machine’s drying section removes moisture to form sheets, which may undergo finishing treatments like calendering or coating for enhanced properties. Environmental challenges, including emissions and wastewater, are addressed through advanced treatment technologies and sustainable practices, ensuring the industry meets ecological and economic demands. This integrated process highlights the balance between material science, engineering, and environmental stewardship in pulp and paper production.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Demonstrate the professional ethics and impacts of Pulp and Paper Industry on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into Pulp and Paper Industry.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline
		2	Merge the engineering knowledge, understanding, and feedback to improve

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
			design, products and/or services related to paper Technology.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to paper technology to respond to the challenging role and responsibilities of a professional chemical engineer
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain paper technology systems.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Pulp & Paper Industry	7	2	-	3	2
2	Raw Materials for Pulping	7	2	-	3	2
3	Chemical Structure of Lignocellulosic Materials	7	2	-	3	2
4	Mechanical Pulping Processes	7	2	-	3	2
5	Chemical Pulping Processes	7	2	-	3	2
6	Chemi-mechanical Pulping	7	2	-	3	2
7	Pulp Screening and Washing Operations	7	2	-	3	2

8	Bleaching Chemistry and Processes **Midterm Exam**	7	2	-	3	2
9	Lignin Characterization and Removal Techniques	7	2	-	3	2
10	Black Liquor Recovery - Chemical and Energy Aspects	7	2	-	3	2
11	Evaporation Processes in Pulp Mills	7	2	-	3	2
12	Paper Machine Drying Section - Principles and Optimization	7	2	-	3	2
13	Finishing Treatments	7	2	-	3	2
14	Environmental Challenges and Sustainable Solutions	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Joint, & Newell, S. J. (2022). *The Manufacture of Pulp and Paper*. Legare Street Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

and learning		

Name and Signature **Course Coordinator** Assoc.prof. Hend Elsayed Gadow	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Polymer Processing				
Course Code	CHE426B				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Dr. Riham Atef				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Polymer processing encompasses both theoretical and practical aspects, focusing on transforming raw polymers into usable products. Central to this is understanding the non-Newtonian flow behavior of polymers, which significantly affects their processing characteristics. During processing, the kinetics and structural development during solidification play crucial roles in defining the final properties of the polymer. Physical characterization of both microstructure and macroscopic properties is essential to ensure desired performance in applications. Various types of polymer processing methods, such as extrusion, injection molding, fiber and film manufacturing, and rubber processing, are employed based on the specific requirements of the product. Additionally, component manufacturing, compounding, blending, and recycling are important considerations in polymer processing, addressing efficiency and sustainability. These processes must account for the complexities of polymer behavior to produce high-quality, functional materials while minimizing environmental impact.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Illustrate the professional ethics and impacts of Polymer Processing on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into design.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to polymer processing.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to polymer processing to respond to the challenging role and responsibilities of a professional chemical engineer

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain polymer processing systems.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Theory and practice of polymer processing	7	2	-	3	2
2	Theory and practice of polymer processing(cont.)	7	2	-	3	2
3	Non-Newtonian flow	7	2	-	3	2
4	Kinetics of Polymer Solidification	7	2	-	3	2
5	Structural development during solidification	7	2	-	3	2
6	Physical characterization of microstructure	7	2	-	3	2
7	Macroscopic properties	7	2	-	3	2
8	Type of polymer processing (Extrusion Processes) **Midterm Exam**	7	2	-	3	2
9	Injection Molding	7	2	-	3	2
10	Fiber and Film Processing	7	2	-	3	2
11	Rubber Processing	7	2	-	3	2
12	Component manufacturing	7	2	-	3	2
13	Recycling Polymers	7	2	-	3	2

14	Compounding and Blending	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Kohlgrüber, K., Bierdel, M., & Rust, H. (2021). Plastics Compounding and polymer processing: fundamentals, machines, equipment, application technology. Carl Hanser
	Other References	Lawrence, S. (2021). Extrusion Handbook. States Academic Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator** Dr. Riham Atef	**Name and Signature** **Program Coordinator** Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Refractories				
Course Code	CHE426C				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

The production and finishing of ceramic and related materials involve a range of techniques and materials aimed at achieving desired aesthetics and functionality. Glazes are integral to adding decorative and protective layers to ceramic surfaces, which are applied before the drying and firing stages. These stages ensure that ceramics like stoneware and porcelain achieve their characteristic strength and aesthetic appeal. Processes such as hot forming and melt forming shape materials under high temperatures, crucial for products requiring precision and detail. Additionally, porcelain and gypsum are utilized for their unique qualities in creating durable and fine objects. Enameling adds both ornamental value and protective features, while abrasives are employed for surface finishing and shaping. Cement production and the use of refractories benefit from a deeper understanding of equilibrium diagrams, highlighting the properties vital for high-temperature applications and structural integrity.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Determine the professional ethics and impacts of Refractories on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into Refractories.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to refractories.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the challenging role and responsibilities of a professional chemical engineer	1	Engage in the recent technological changes and emerging fields relevant to refractories.to respond to the challenging role and responsibilities of a professional chemical engineer

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain refractories systems

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Problem solving
4. Self-learning and Research
5. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Glazes	7	2	-	3	2
2	Drying	7	2	-	3	2
3	Firing	7	2	-	3	2
4	Hot forming	7	2	-	3	2
5	Melt forming	7	2	-	3	2
6	Stone ware	7	2	-	3	2
7	Stone ware (cont.)	7	2	-	3	2
8	Porcelain **Midterm Exam**	7	2	-	3	2
9	Gypsum	7	2	-	3	2
10	Enameling abrasives	7	2	-	3	2
11	Enameling abrasives (cont.)	7	2	-	3	2
12	Cement	7	2	-	3	2
13	Cement (cont.)	7	2	-	3	2
14	Properties of refractories and Equilibrium diagrams.	7	2	-	3	2

15	Final Written Exam

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Company, H.-W. R. (2021). Modern Refractory Practice. Hassell Street Press.
	Other References	Surendranathan, A. O. (2020). An Introduction to Ceramics and Refractories. CRC Press.
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature **Course Coordinator**	**Name and Signature** **Program Coordinator**
Assoc.prof. Hend Elsayed Gadow	Assoc.prof. Hend Elsayed Gadow

Course Specification

(2025-2026)

1. Basic Information

Course Title	Printing Technology				
Course Code	CHE426D				
Department/s participating in delivery of the course	Chemical Engineering Department				
Number of hours of the course	**Theoretical**	**Practical**	**Exercise**	**Total contact hours**	**Student load**
	2	**-**	**2**	**4**	**3**
Course Type	Elective				
Academic level at which the course is taught	Level 4				
Academic Program	Chemical Engineering Program				
Institute	The Higher Institute of Engineering and Technology in New Damietta				
University	Ministry of Higher Education& Scientific Research				
Name of Course Coordinator	Assoc.prof. Hend Elsayed Gadow				
Course Specification Approval Date	**27/7/2025**				
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**29/7/2025**				

2. Course Overview

Printing inks are diverse in types and classification, tailored to various substrates and printing techniques. The printing process varies depending on the material, with specific conditions and constraints that influence quality and efficiency. When printing on textiles, proper preparation and finishing are essential to achieve durability and vibrancy. Similarly, printing on paper requires surface preparation and finishing treatments to ensure clarity and adhesion. Printing on plastics involves specialized preparation to address surface smoothness and compatibility, along with finishing steps to enhance durability. The stability of printing quality is affected by multiple factors such as ink formulation, substrate properties, environmental conditions, and processing parameters. Managing these factors effectively ensures high-quality, consistent print results across different materials.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS 2018)

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	**Text**	**Code**	**Text**
A3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.	1	Determine the professional ethics and impacts of Printing Technology on society and environment
		2	Incorporate economic, societal, global, environmental, and risk management factors into Printing Technology.
A10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	1	Search for information to engage in lifelong self-learning discipline
		2	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to printing.
B2	Engage in the recent technological changes and emerging fields relevant to chemical engineering to respond to the	1	Engage in the recent technological changes and emerging fields relevant to printing to respond to the challenging role and responsibilities of a professional chemical engineer

Program Outcomes (NARS 2018)		Course Learning Outcomes	
Code	Text	Code	Text
	challenging role and responsibilities of a professional chemical engineer		
B4	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems.	1	Adopt suitable national and international standards and codes to: design, operate, inspect and maintain printing systems.

4. Teaching and Learning Methods

1. Face-to-Face Lecture
2. Flipped Classroom
3. Self-learning and Research
4. Discussion

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures)	Training (Practical)	Self-learning (Tasks/ Assignments/ Projects)	Tutorial
1	Introduction to Printing Inks – Types and Composition	7	2	-	3	2
2	Classification of Printing Inks – Properties and Applications	7	2	-	3	2
3	Printing on different Materials	7	2	-	3	2
4	Printing Conditions	7	2	-	3	2
5	Constraints in the Printing Process	7	2	-	3	2
6	Printing on textile, preparation and finishing	7	2	-	3	2
7	Printing on textile, preparation and finishing (cont.)	7	2	-	3	2
8	Printing on textile, preparation and finishing (cont.) **Midterm Exam**	7	2	-	3	2
9	Printing on paper, preparation and finishing	7	2	-	3	2
10	Printing on paper, preparation and finishing(cont.)	7	2	-	3	2

11	Printing on plastics, preparation and finishing	7	2	-	3	2
12	Printing on plastics, preparation and finishing(cont.)	7	2	-	3	2
13	Stability effect of different factors on printing quality	7	2	-	3	2
14	Stability effect of different factors on printing quality(cont.)	7	2	-	3	2
15	Final Written Exam					

5. Methods of students' assessment

No.	Assessment Methods	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Periodic exams (midterm, quizzes, sheets, assignments and reports)	Midterm (8^{th}) and others in any week	50	50%
2	Final Written Exam	15^{th}	50	50%

6. Learning Resources and Supportive Facilities

Learning resources (books, scientific references, etc.)	**The main (essential) reference for the course**	Klein, S., & Carinna Parraman. (2024). Printing Technologies and Applications. https://doi.org/10.1088/978-0-7503-2568-4
	Learning Platforms	MOODLE http://www.ees.ndeti.edu.eg/
Supportive facilities & equipment for teaching and learning	**Devices/Instruments**	Data show system, Sound system
	Supplies	White board, lecture classroom

Name and Signature
Course Coordinator

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