# Mathematics 1

# (MTH101)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mathematics1 |
| Course Code | MTH101 |
| Year/Level | Level: 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of Mathematics engineering knowledge and specialized skills of Algebra and Calculus, as well as the ability to apply acquired knowledge of Algebra and Calculus in real-world situations by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve mathematical engineering problems of varying systems models. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1 Explain the relevant mathematical engineering principles and theories in the Algebra and Calculus.  b1 Use the mathematical engineering principles and theories that apply in the most fundamental problems .  a3 Explain the basic concepts of derivative and algebra. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lecture | Tutorial | Practical |
| 1 |  Vectors - Vectors Algebra- partial fractions | 4 | 4 | - |
| 2 |  The Concept of functions | 2 | 2 | - |
| 3 |  Equations theory –Mathematical Deduction | 4 | 4 | - |
| 4 | * Basic Trigonometric functions and its inverse * Exponential and Logarithmic functions * Hyperbolic functions and its inverse * Connection (definition – theories) * Maclaurin expansion * The Taylor series | 4 | 4 | - |
| 5 |  Numerical solutions methods | 4 | 4 | - |
| 6 |  Limits, derivatives and curves drawing | 4 | 4 | - |
| 7 |  Introduction of Partial Derivatives | 4 | 4 | - |
| 8 |  Linear equations systems – Gauss Jordan method for deletion. | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| Vectors - Vectors Algebra- partial fractions | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| The Concept of functions | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| Equations theory –  Mathematical Deduction | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| * Basic Trigonometric functions and its inverse * Exponential and   Logarithmic functions   * Hyperbolic functions and its inverse * Connection (definition – theories) * Maclaurin expansion The Taylor series | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| Numerical solutions methods | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| Limits, derivatives and curves drawing | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| Introduction of Partial Derivatives | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| Linear equations systems – Gauss Jordan method for deletion. | x | x |  |  | x | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | b1 |
| 3 | Final term examination | A1 | a1,b1,a3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 7th - 9th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Richard W. Fisher "No-Nonsense Algebra, 2nd Edition" Math Essentials; 2nd edition (2018). |
| 2 | Sherman K. Stein " Calculus in the First Three Dimensions" Dover Publications; First Edition, (2016). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Fa | cility | |
| 1 | Lecture classroom | 3 | White board |
| 2 | Seminar | 4 | Data Show system |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No | Topic |  | Aims | Competencies | LO’s |
| 1 |  Vectors - Vectors Algebra- partial fracti | o | 1 | A1 | a1,b1 |
| 2 |  The Concept of functions |  | 1 | A1 | a1, b1 |
| 3 |  Equations theory –Mathematical Deduction |  | 1 | A1 | a1,b1 |
| 4 | * Basic Trigonometric functions and its inverse * Exponential and Logarithmic functions * Hyperbolic functions and its inverse * Connection (definition – theories) * Maclaurin expansion * The Taylor series |  | 1 | A1 | a1, b1 |
| 5 |  Numerical solutions methods | 1 | | A1 | a1,b1 |
| 6 |  Limits, derivatives and curves drawing | 1 | | A1 | a3, b1 |
| 7 |  Introduction of Partial Derivatives | 1 | | A1 | a3, b1 |
| 8 |  Linear equations systems – Gauss Jordan method for deletion. | 1 | | A1 | a1, b1 |

Course Coordinator: Dr / Reda Abdo

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Mechanics 1

(ENG 101)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mechanics 1 |
| Course Code | ENG101 |
| Year/Level | Level: 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2- Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of statics knowledge to apply it on force system, distributed forces and moment of inertia. |
| 3 | Use the techniques, skills, and current engineering tools required for engineering practice of Statics applications by taking full responsibility for one's own learning and development, participating in lifelong learning and consider the impact of statics study in real world, and its strong relation with environment and almost of all the technology fields upgrades. |

3-Competencies:

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1 Define concepts and theories of space vectors, momentums, equivalent couples, and equation of equilibrium for rigid body.    a2 Recognize methodologies of solving equilibrium under the effect of forces.  b1 Solve engineering problems, such as finding the center of mass (group of particles – flat surfaces). |

1. Course Contents:

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No. | | Topics | | Lectures | | | Tutorial | | | Practical | | |
| 1 | | Introduction to statics.  Fundamental concept  Basic quantities of unit dimension- System of units Space, Trigonometry and U.S. Customary units, Force.  Statics of particle, Statics of Rigid Body, Free body diagrams.  Types of forces, Types of system of forces | | 2 | | | 2 | | | - | | |
| 2 | | Statics of particles  Forces on a particle, Addition of vectors, Resultant of several concurrent forces. | | 2 | | | 2 | | | - | | |
| 3 | | Resolution of a forces into components Rectangular components of a forces, (unit vectors).  Addition of forces by summing X and Y components.  Equilibrium of a particle, and Newton’s first law of motion. | | 2 | | | 2 | | | - | | |
| 4 | | Problem involving the equilibrium of a practice- free body diagram.  Rectangular components of a forces in space, force defined by its magnitude and two points on its line of action.  Addition of concurrent forces in space, equilibrium of a particle in space. | | 2 | | | 2 | | | - | | |
| 5 | | Rigid bodies: equivalent systems of forces. External and internal forces, principle of transmissibility and equivalent forces, vector product of two vectors, vector product expressed in terms of rectangular components | | 2 | | | 2 | | | - | | |
| 6 | | Moment of a force about a point.  Varignon’s theorem, rectangular components of the moment of a force, equivalent systems of forces. | | 4 | | | 4 | | | - | | |
| 7 | | Equilibrium of rigid bodies  Free- body diagram.  Equilibrium of a rigid body in two dimensions. | | 2 | | | 2 | | | - | | |
| 8 | | Equilibrium of three- dimension force body. | | 4 | | | 4 | | | - | | |
|  | | Reduction of a system of forces to one force and one couple.  Equilibrium of a rigid body in three dimensions.  Reactions at supports and connections for a two- dimensional and for a three- dimensional structure. |  |  | |  |  | |  |  | | |
| 9 | | Centroids and centers of gravity.  Centre of gravity of a two- dimensional body, centroids of area and lines, first moments of areas and lines, composite plates and wires. |  | 4 | |  | 4 | |  | - | | |
| 10 | | Analysis of structures  Definition of truss  Simple trusses  Analysis of trusses by the method of joints |  | 4 | |  | 4 | |  | - | | |
|  |  | Total |  |  | 28 |  |  | 28 |  |  | - |  |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| Introduction to statics.  Fundamental concept Basic quantities of unit dimension- System of units Space,  Trigonometry and U.S.  Customary units, Force. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Statics of particle, Statics of Rigid Body, Free body diagrams.  Types of forces, Types of system of forces |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Statics of particles  Forces on a particle,  Addition of vectors, Resultant of several concurrent forces. | x | x |  |  |  | x |  |  |  |  |  |  |  |  |
| Resolution of a forces into components  Rectangular components  of a forces, (unit vectors). Addition of forces by summing X and Y components.  Equilibrium of a particle, and Newton’s first law of motion. | x | x |  |  |  |  | x |  |  |  |  |  |  |  |
| Problem involving the equilibrium of a practice- free body diagram. Rectangular components of a forces in space, force defined by its magnitude and two points on its line of action.  Addition of concurrent forces in space, equilibrium of a particle in space. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| Rigid bodies: equivalent systems of forces. External and internal forces, principle of transmissibility and | x | x |  |  | x | x |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| equivalent forces, vector product of two vectors, vector product expressed  in terms of rectangular components |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Moment of a force about a point.  Varignon’s theorem, rectangular components of the moment of a force, equivalent systems of forces. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| Equilibrium of rigid bodies  Free- body diagram.  Equilibrium of a rigid body in two dimensions. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| Equilibrium of three- dimension force body. Reduction of a system of forces to one force and one couple.  Equilibrium of a rigid body in three dimensions. Reactions at supports and connections for a two- dimensional and for a three- dimensional structure. | x | x |  |  |  | x |  |  |  |  |  |  |  |  |
| Centroids and centers of gravity.  Centre of gravity of a two- dimensional body, centroids of area and lines, first moments of areas and lines, composite plates and wires. | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| Analysis of structures  Definition of truss  Simple trusses  Analysis of trusses by the  method of join | x | x |  |  | x |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,b1 |
| 3 | Final term examination | A1 | a1,a2,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | M. Abdullah Al Faruque, Bahar Zoghi, Sylvester A. Kalevela " Engineering statics" 1st edition, CRC Press (2019). |
| 2 | Bogachev, V., Smolyanov, Oleg G. "Topological Vector Spaces and Their Applications" Springer International Publishing (2017). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  |  | Facility |
| 1 | Lecture classroom |  |  |
| 2 | Seminar |  |  |
| 3 | White board |  |  |
| 4 | Data Show system |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction to statics. Fundamental concept Basic quantities of unit dimension- System of units Space, Trigonometry and U.S. Customary units, Force.  Statics of particle, Statics of Rigid Body, Free body diagrams.  Types of forces, Types of system of forces | 1 | A1 | a1 |
| 2 | Statics of particles  Forces on a particle, Addition of vectors, Resultant of several concurrent forces. | 1 | A1 | a1 |
| 3 | Resolution of a forces into components  Rectangular components of a forces, (unit vectors).  Addition of forces by summing X and Y components.  Equilibrium of a particle, and Newton’s first law of motion. | 3 | A1 | a2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | Problem involving the equilibrium of a practice- free body diagram. Rectangular components of a forces in space, force defined by its magnitude and two points on its line of action.  Addition of concurrent forces in space, equilibrium of a particle in space. | 3 | A1 | a2 |
| 5 | Rigid bodies: equivalent systems of forces.  External and internal forces, principle of transmissibility and equivalent forces, vector product of two vectors, vector product expressed in terms of rectangular components | 1 | A1 | a1 |
| 6 | Moment of a force about a point. Varignon’s theorem, rectangular components of the moment of a force, equivalent systems of forces. | 1 | A1 | a1 |
| 7 | Equilibrium of rigid bodies Free- body diagram.  Equilibrium of a rigid body in two dimensions. | 3 | A1 | a2 |
| 8 | Equilibrium of three- dimension force body.  Reduction of a system of forces to one force and one couple.  Equilibrium of a rigid body in three dimensions.  Reactions at supports and connections for a two- dimensional and for a three- dimensional structure. | 3 | A1 | a1,a2 |
| 9 | Centroids and centers of gravity. | 1 | A1 | b1 |
|  | Centre of gravity of a two- dimensional body, centroids of area and lines, first moments of areas and lines, composite plates and wires. |  |  |  |
| 10 | Analysis of structures  Definition of truss  Simple trusses  Analysis of trusses by the method of  joints | 3 | A1 | b1 |

Course Coordinator: Dr / Moataz Mostafa

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Physics1

(PHY101)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Physics1 |
| Course Code | PHY101 |
| Year/Level | level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Mastery of a broad range of engineering physics knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in critical and systemic analytical thinking to identify, diagnose, and solve engineering problems of varying complexity and variance. |
| 4 | Use the experimental techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1 Explain concepts and theories of mathematics for physical quantities, unit’s dimensional analysis and basics of thermodynamics. |
|  | a2 Recognize methodologies of solving problems for stress-strain diagram, and fluids study.    b1 Select the appropriate solutions for properties of materials through Brittle and Ductile material. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Physics and Measurement  Practical: measurement methods | 4 | 4 | 2 |
| 2 | Mechanical properties for materials Practical: Hooks' Law | 4 | 4 | 2 |
| 3 | Oscillations  Practical: simple pendulum. | 4 | 4 | 2 |
| 4 | Sounds.  Practical: Resonance in the Air columns. | 2 | 2 | 4 |
| 5 | Fluids.  Practical: Viscosity. | 4 | 4 | 4 |
| 6 | Heat transfer  Practical: Heat& Specific Heat& thermo-electrical equivalent& the latent heat of melting ice. | 2 | 2 | 6 |
| 7 | The kinetic theory of gases and the work in thermodynamics  Practical: melting point of solid materials. | 2 | 2 | 4 |
| 8 | The laws of thermodynamic  Practical: heating and cooling curves. | 4 | 4 | 2 |
| 9 | Temperature and thermal expansion  Practical: coefficient of linear thermal expansion. | 2 | 2 | 2 |
|  | Total | 28 | 28 | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning  and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Physics and Measurement  Practical: measurement methods | x | X |  |  |  | x |  |  |  |  |  |  |  | X |
| 2 | Mechanical properties for materials  Practical: Hooks' Law | x | X |  |  | X |  |  |  |  |  |  |  |  | X |
| 3 | Oscillations  Practical: simple pendulum. | x | X |  |  |  |  | X |  |  |  |  |  |  | X |
| 4 | Sounds.  Practical: Resonance in the Air columns. | x | X |  |  |  | x |  |  |  |  |  |  |  | X |
| 5 | Fluids.  Practical: Viscosity. | x | X |  |  |  |  | X |  |  |  |  |  |  | X |
| 6 | Heat transfer  Practical: Heat& Specific  Heat& thermo-electrical equivalent& the latent heat of melting ice. | x | X |  |  | X |  |  |  |  |  |  |  |  | x |
| 7 | The kinetic theory of gases and the work in  thermodynamics  Practical: melting point of solid materials. | x | X |  |  |  |  |  |  |  |  |  |  |  | X |
| 8 | The laws of thermodynamic  Practical: heating and cooling curves. | x | X |  |  |  | x |  |  |  |  |  |  |  | X |
| 9 | Temperature and thermal expansion  Practical: coefficient of linear thermal expansion. | x | x |  |  |  |  | X |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,a2 |
| 3 | Practical exam | A1 | a2,b1 |
| 4 | Final term examination | A1 | a1,a2 |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work | 7th,9th |  |
| 3 | Practical examination | 14th |  |
| 4 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | final examination | 60% |
| 3 | Practical examination | 10% |
| 4 | Semester work | 20% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Peter J. Williams ; Firas Mansour ; Robert L. Hawkes ; (Nuclear physicist) Javed Iqbal ; Marina  Milner-Bolotin. Physics for scientists and engineers : an interactive approach, Nelson Education Ltd.,  Year: 2019 |
| 2 | David Halliday, Robert Resnick, Jearl Walker. Fundamentals of Physics, 9th Edition, Binder Ready  Version,2019 |
| 3 | Serway, Raymond A., and John W. Jewett. Physics for scientists and engineers. Cengage learning, 2018. |
| 4 | Hibbeler, Russell C. "Mechanics of materials." (2018). |
| 5 | Bauer, Wolfgang, and Gary D. Westfall. University Physics. New York, NY: McGrawHill, 2011. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  |  | Facility |
| 1 | Lecture classroom |  |  |
| 2 | Laboratory |  |  |
| 3 | Presenter |  |  |
| 4 | White board |  |  |
| 5 | Data show system |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Physics and Measurement  Practical: measurement methods | 1,4 | A1 | a1 |
| 2 | Mechanical properties for materials Practical: Hooks' Law | 1,4 | A1 | a2,b1 |
| 3 | Oscillations  Practical: simple pendulum. | 1,4 | A1 | a1 |
| 4 | Sounds.  Practical: Resonance in the Air columns. | 1,4 | A1 | a1 |
| 5 | Fluids.  Practical: Viscosity. | 1,4 | A1 | a2 |
| 6 | Heat transfer  Practical: Heat& Specific Heat& thermoelectrical equivalent& the latent heat of melting ice. | 1,4 | A1 | a1 |
| 7 | The kinetic theory of gases and the work in thermodynamics  Practical: melting point of solid materials. | 1,4 | A1 | a1 |
| 8 | The laws of thermodynamic  Practical: heating and cooling curves. | 1,4 | A1 | a1 |
| 9 | Temperature and thermal expansion Practical: coefficient of linear thermal expansion. | 1,4 | A1 | a1 |

Course Coordinator: Dr. Ahmed Lotfy

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

# General Chemistry

# CHE 101

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | General Chemistry |
| Course Code | CHE 101 |
| Year/Level | Level:1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a wide spectrum of engineering knowledge and specialized skills for applying acquired knowledge using theories and abstract thinking in real life situations. |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals and basic science. | a1 Describe the relevant Chemical principles and theories in the discipline.    c2 Identify the chemical engineering principles and theories that apply to the topic.    c3 Solve chemical engineering problems by applying chemical engineering fundamentals. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d2 Acquire chemical engineering principles for professionally merge , understanding, and feedback to improve design, products for many chemical engineering industries. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Gaseous status.  Practical: Chemistry Laboratory Equipment, Titrimetric Analysis. | 4 | - | 4 |
| 2 | Chemical thermodynamics.  Practical:Preparation of standard solution of  Na2CO3 (0.1N),Determination of normality of hclby using standard solution of oxalic acid. | 4 | - | 4 |
| 3 | Properties of solutions.  Practical:Determination of normality of acetic acid by using standard solution of sodium hydroxide,Determination of normality of sodium carbonate by using standard solution of hcl. | 4 | - | 4 |
| 4 | Material balance in combustion processes. Practical: Standardization of potassium permanganate with oxalic acid. | 2 | - | 2 |
| 5 | Dynamic balance in physical and chemical operations.  Practical:Determination of nitrites, precipitation titrations. | 4 | - | 4 |
| 6 | Kinetic chemical interactions.  Practical: Preparation of 0.05N of sodium chloride. | 2 | - | 2 |
| 7 | Electrochemistry, corrosion and corrosion control.  Practical: Determination of chloride ion by using Mohr method. | 2 | - | 2 |
| 8 | Fertilizers.  Practical: Determining Molecule Weight by Freezing Point Depression Method. | 2 | - | 2 |
| 9 | Manufacturing and chemistry of Cement. Practical: Determining Molecule Weight by Freezing Point Depression Method. | 2 | - | 2 |
| 10 | Water processes.  Practical: determination of water hardness bycomplex metric titration. | 2 | - | 2 |
| Total | | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Gaseous status.  Practical: Chemistry  Laboratory Equipment, Titrimetric Analysis. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 2 | Chemical thermodynamics.  Practical: Preparation of standard solution of  Na2CO3 (0.1N), Determination of normality of Hcl by using standard solution of oxalic acid. | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 3 | Properties of solutions.  Practical: Determination of normality of acetic acid by using standard solution of sodium hydroxide, Determination of normality of sodium carbonate by using standard solution of Hcl. | x | x |  |  |  |  | x |  |  |  |  |  |  | X |
| 4 | Material balance in combustion processes. | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
|  | Practical:  Standardization of potassium permanganate with oxalic acid. |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Dynamic balance in physical and chemical operations.  Practical: Determination of nitrites, precipitation titrations. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 6 | Kinetic chemical interactions.  Practical: Preparation of  0.05N of sodium chloride. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 7 | Electrochemistry, corrosion and corrosion control.  Practical: Determination of chloride ion by using Mohr method. | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 8 | Fertilizers.  Practical: Determining  Molecule Weight by Freezing Point  Depression Method. | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 9 | Manufacturing and chemistry of Cement.  Practical: Determining  Molecule Weight by Freezing Point  Depression Method. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 10 | Water processes.  Practical: determination of water hardness by complex metric titration. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,c3 |
| 2 | Semester work(quizzes, sheets, report) | A1 | c2,c3,d2 |
| 3 | Practical Examination | A1 | c2,c3,d2 |
| 4 | Final term examination | A1 | a1,c2,c3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Theodore L. Brown, et al, Chemistry the Central Science, Prentice Hall Int. (Pearson International 14 edition), 2017. |
| 2 | Shriver and Atkins', Inorganic Chemistry, Oxford University Press, 2010. |
| 3 | Peter Atkins , Julio de Paula, James Keeler " Atkins' Physical Chemistry 11ed" Oxford University Press; 11th edition ( 2018) |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board | 6 | Laboratory |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Gaseous status.  Practical: Chemistry Laboratory Equipment, Titrimetric Analysis. | 1 | A1 | a1 |
| 2 | Chemical thermodynamics.  Practical: Preparation of standard solution of  Na2CO3 (0.1N), Determination of normality of Hcl by using standard solution of oxalic acid. | 1 | A1 | a1 |
| 3 | Properties of solutions.  Practical: Determination of normality of acetic acid by using standard solution of sodium hydroxide, Determination of normality of sodium carbonate by using standard solution of Hcl. | 1 | A1 | a1 |
| 4 | Material balance in combustion processes.  Practical: Standardization of potassium permanganate with oxalic acid. | 1 | A1 | a1, c3 |
| 5 | Dynamic balance in physical and chemical operations.  Practical: Determination of nitrites, precipitation titrations. | 1 | A1 | a1,c3 |
| 6 | Kinetic chemical interactions.  Practical: Preparation of 0.05N of sodium chloride. | 1 | A1 | a1 |
| 7 | Electrochemistry, corrosion and corrosion control.  Practical: Determination of chloride ion by using Mohr method. | 1,8 | A10 | d2 |
| 8 | Fertilizers.  Practical: Determining Molecule Weight by Freezing Point Depression Method. | 8 | A10 | d2 |
| 9 | Manufacturing and chemistry of Cement. Practical: Determining Molecule Weight by Freezing Point Depression Method. | 8 | A10 | d2 |
| 10 | Water processes.  Practical: determination of water hardness by complex metric titration. | 8 | A10 | d2 |

Course Coordinator: Asso.prof. Khaled Samir

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Engineering Drawing and Projection

(ENG103)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Engineering Drawing and Projection |
| Course Code | ENG103 |
| Year/Level | level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 1 | - | 4 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering drawing knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations. |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1.Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1 Explain the basic principles of engineering drawing.  a2 Explain the scientific principles and theories that apply to the topic. b1 Using scientific concepts and tools that are relevant to the profession.  b2 Applying engineering drawing basics that are relevant to the subject. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Techniques and skills of engineering drawing | 1 | - | 4 |
| 2 | Engineering operations | 1 | - | 4 |
| 3 | Orthogonal projection – Secondary orthogonal | 2 | - | 8 |
| 4 | Intersections | 1 | - | 4 |
| 5 | projections of simple bodies | 1 | - | 4 |
| 6 | rules of writing dimensions | 1 | - | 4 |
| 7 | Deduction of missing projections | 1 | - | 4 |
| 8 | Drawing of engineering sections. | 1 | - | 4 |
| 9 | Steel frames | 2 | - | 8 |
| 10 | Introduction to AutoCAD Fundamentals of engineering drafting by way of computer aided drawing (CAD) software. Basic features and capabilities of CAD software and drafting fundamentals including orthographic projection, and isometric pictorials, part dimensioning in 2 dimensional drawings. | 3 | - | 12 |
| Total | | 14 |  | 56 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning  and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Techniques and skills of engineering drawing | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Engineering operations |  |  |  |  | x |  |  |  |  |  |  |  |  |  |
| 3 | Orthogonal projection – Secondary orthogonal | x |  |  |  | x |  |  |  |  |  |  |  |  |  |
| 4 | Intersections | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 5 | Projections of simple bodies | X |  |  |  | X |  |  |  |  |  |  |  |  |  |
| 6 | Rules of writing dimensions | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 7 | Deduction of missing projections | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 8 | Drawing of engineering sections. | x |  |  |  | X |  |  |  |  |  |  |  |  |  |
| 9 | Steel frames | x | X |  |  | X |  |  |  |  |  |  |  |  |  |
| 10 | Introduction to  AutoCAD Fundamentals of engineering drafting by way of computer  aided drawing (CAD)  software. Basic features  and capabilities of CAD software and drafting  fundamentals including  orthographic projection, and isometric pictorials, part dimensioning in 2 dimensional drawings. | X |  |  |  |  |  |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm exam | A1 | a1,a2,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,a2 |
| 3 | Final exam | A1 | b1,b2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work | 2nd -7th - 9th |
| 2 | Mid Term exam | 8th |
| 3 | Practical examination | 14th |
| 4 | Final term exam | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | Practical examination | 10% |
| 3 | Semester work | 20% |
| 4 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | K. V. NATARAJAN "ENGINEERING GRAPHICS Paperback" DHANALAKSHMI PUBLISHERS (2018) |
| 2 | Lakhwinder Pal Singh, Harwinder Singh "Engineering Drawing: Principles and Applications" Cambridge University Press; First edition (2019) |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Computer lab |  |
| 3 | Seminar |  |
| 4 | White board |  |
| 5 | Data Show system |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Techniques and skills of  engineering drawing | 1 | A1 | a1 |
| 2 | Engineering operations | 1,4 | A1 | a2 |
| 3 | Orthogonal projection – Secondary orthogonal | 1,4 | A1 | a1 |
| 4 | Intersections | 1 | A1 | a1 |
| 5 | Projections of simple bodies | 1 | A1 | a2 |
| 6 | Rules of writing dimensions | 1,2 | A1 | b1 |
| 7 | Deduction of missing projections | 1 | A1 | b1 |
| 8 | Drawing of engineering sections. | 1 | A1 | b2 |
| 9 | Steel frames | 1 | A1 | b2 |
| 10 | Introduction to AutoCAD Fundamentals of engineering drafting by way of computer aided drawing (CAD) software. Basic features and capabilities of CAD software and drafting fundamentals including orthographic projection, and isometric pictorials, part dimensioning in 2 dimensional drawings. | 1,4 | A1 | b1,b2 |

Course Coordinator: Dr / Motaz Mostafa

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

# Introductions to Computer Systems

(ENG104)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and  EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Introductions to Computer Systems |
| Course Code | ENG104 |
| Year/Level | Level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 1 | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a wide range of engineering knowledge and specialized skills, as well as the ability to apply that information in real-world situations using theories and analytical thinking. |
| 7 | Use techniques, skills and modern engineering tools necessary for engineering practice; |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | c2. Identify the concepts and theories of science necessary for engineering system c3. Applying engineering basics that are relevant to the subject. |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | b1. Assess different ideas, views, and knowledge from a range of sources. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lecture | Practical | Tutorial |
| 1 | Computer architecture. practical: Visual Studio C# Interface Writing simple statements | 1 | 2 | - |
| 2 | Computer systems  Practical: Variables, Data type | 2 | 4 | - |
| 3 | Files systems  Practical: Input & Output | 1 | 2 | - |
| 4 | Computer networks  Practical: Conditional Statements | 2 | 4 | - |
| 5 | Internet networks Practical:Arrays | 2 | 4 | - |
| 6 | Data systems and information technology  Practical: Loop Statement (For, while & do -while) | 2 | 4 | - |
| 7 | Computer graphics – Multimedia systems  Practical: Loop Statement (For, while & do -while) | 1 | 2 | - |
| 8 | Methods of solving problems and logical design for the programs and matrices. Practical: Nested loop | 2 | 4 | - |
| 9 | Engineering applications in programming using one structured programming language.  Practical: Engineering Case Study. | 1 | 2 | - |
|  | Total | 14 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Computer architecture. practical: Visual Studio  C# Interface  Writing simple statements | x | x | x |  |  |  |  |  |  |  |  |  |  | X |
| 2 | Computer systems Practical: Variables,  Data type | x | x |  |  | x |  |  |  |  |  |  |  |  | X |
| 3 | Files systems  Practical: Input &  Output | x | x |  |  | x |  |  |  |  |  |  |  |  | X |
| 4 | Computer networks  Practical: Conditional  Statements | x |  | X |  |  |  |  |  |  |  |  |  |  | X |
| 5 | Internet networks Practical:Arrays | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 6 | Data systems and  information technology  Practical: Loop  Statement (For, while & do -while) | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 7 | Computer graphics –  Multimedia systems  Practical: Loop  Statement (For, while & do -while) | x | x |  |  | x |  |  |  |  |  |  |  |  | X |
| 8 | Methods of solving problems and logical design for the programs and matrices.  Practical: Nested loop | x | x |  |  |  | x |  |  |  |  |  |  |  | X |
| 9 | Engineering applications in programming using one structured programming language. Practical: Engineering Case Study. | x | x |  |  |  |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of  students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | c2,c3 |
| 2 | Semester work(quizzes, sheets, report) | A5 | b1 |
| 3 | Practical Examination | A1 | c2,c3 |
| 4 | Final term examination | A1 | c3,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th,13th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | EvaluationMethod | |  | Weights |
| 1 | Mid-term examination | | 10% |  |
| 2 | final examination | | 60% |  |
| 3 | Practical examination | | 10% |  |
| 4 | Semester work |  | 20% | |
|  |  | Total | 100% | |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Darrell Hajek , Cesar Herrera "Introduction to Computers" CreateSpace Independent Publishing Platform (May 8, 2018). |
| 2 | Computing essentials timothy, O' leary and linda, 2015. |
| 3 | Ludwik Czaja "Introduction to Distributed Computer systems: Principles and features" Springer; 1st ed. 2018. |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
| No. | Facility |
| 1 | Lecture classroom |
| 2 | Computer lab |
| 3 | Presenter |
| 4 | White board |
| 5 | Data show system |
| 6 | Wireless internet |
| 7 | Sound system |

10. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Computer architecture.  practical: Visual Studio C#  Interface  Writing simple statements | 1 | A1 | c2 |
| 2 | Computer systems  Practical: Variables, Data type | 1 | A1 | c2 |
| 3 | Files systems  Practical: Input & Output | 1 | A1 | c3 |
| 4 | Computer networks  Practical: Conditional Statements | 1 | A1 | c3 |
| 5 | Internet networks Practical:Arrays | 1 | A1 | c3 |
| 6 | Data systems and information technology  Practical: Loop Statement (For,  while & do -while) | 1,7 | A1 | c3 |
| 7 | Computer graphics – Multimedia systems  Practical: Loop Statement (For,  while & do -while) | 1,7 | A1 | c3 |
| 8 | Methods of solving problems and logical design for the programs and matrices.  Practical: Nested loop | 7 | A5 | b1 |
| 9 | Engineering applications in programming using one structured programming language.  Practical: Engineering Case Study. | 7 | A5 | b1 |

Course Coordinator: Dr. Amira El Sonbaty

Head of Department: Dr / Amira El Sonbaty

Date of Approval: 2022

Mathematics 2

(MTH102)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mathematics 2 |
| Course Code | MTH102 |
| Year/Level | Level: 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of fundamental Mathematical engineering knowledge and specialized skills of Analytical geometry and Integration, as well as the ability to apply acquired knowledge of Analytical geometry and Integration in real-world situations as determine the plain areas , circular volumes, plain technical length and circular surfaces by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve mathematical engineering problems by using different methods. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Explain the relevant mathematical engineering principles and theories in the Analytical geometry and Integration.  b1. Use the mathematical engineering principles and theories that apply in the most fundamental problems .  a3. Explain the basic concepts of Analytical geometry and Integration |
|  | b3. Use the basics of integration and Geometry that are applicable to the field. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Lecture | Tutorial | Practical |
| 1 |  Basic concepts- equations of second degree and double equation for two straight lines  Movement and rotation of axes | 4 | 4 | - |
| 2 |  Circle– conical sectors | 6 | 6 | - |
| 3 | * Analytical geometry in space * Cartesian coordinates * Cylindrical-spherical -plane in space | 2 | 2 | - |
| 4 |  Equations of surfaces in second order – rotation and movement of axes in space. | 2 | 2 | - |
| 5 |  Indefinite integration (basic functions – theories) – method of integration | 6 | 6 | - |
| 6 | * Definite integration (definition – properties -theories) * Applications of definite integration (plain areas – circular volumes – plain technical length) | 4 | 4 | - |
| 7 |  Areas – Circular surfaces | 2 | 2 | - |
| 8 |  Numerical integration. | 2 | 2 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online  Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 |  Basic concepts- equations of second degree and double equation for two straight lines  Movement and rotation of axes | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Circle– conical sectors | x | x |  |  |  | X |  |  |  |  |  |  |  |  |
| 3 | * Analytical geometry in space * Cartesian coordinates   Cylindrical-spherical plane in space | x | x |  |  |  |  | X |  |  |  |  |  |  |  |
| 4 | Equations of surfaces in second order – rotation and movement of axes in space. | x | x |  |  | x |  | X |  |  |  |  |  |  |  |
| 5 | Indefinite integration  (basic functions – theories) – method of integration | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 6 |  Definite integration  (definition – properties -theories)  Applications of definite integration (plain areas –  circular volumes – plain technical length) | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 7 | Areas – Circular surfaces | x |  |  |  |  | X | x |  |  |  |  |  |  |  |
| 8 | Numerical integration. | x | x |  |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a3 |
| 2 | Semester work(quizzes, sheets, report) | A1 | b1,b3 |
| 3 | Final term examination | A1 | a1,a3,b1,b3 |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work | 7th - 9th |  |
| 3 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method |  |  | Weights |
| 1 | Midterm examination | 20% | |  |
| 2 | Semester work | 20% | |  |
| 3 | Final term examination | 60% | |  |
|  | Total | 100% | |  |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | P.N.Chatterjee "Analytical Geometry Paperback"Anu Books (2019) |
| 2 | Gerardus Blokdyk "System Integration A Complete Guide" 5STARCooks (2019). |
| 3 | Chris McMullen " Essential Calculus Skills Practice Workbook with Full Solutions" Zishka Publishing (2018). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
|  | F | acility | |
| 1 | Lecture classroom | 3 | White board |
| 2 | Seminar | 4 | Data Show system |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Topic | Aims | Competencies | LO’s |
| 1 | Position, Displacement, Velocity, and Acceleration of Particle | 1 | A1 | a1,a3 |
| 2 | Plane Motion path of Particle | 1 | A1 | a1,a3 |
| 3 | Description of plane Motion using Cartesian axes | 1 | A1 | a1,a3 |
| 4 | Projectiles | 1 | A1 | a1,a3 |
| 5 | Relative motion between particles | 1 | A1 | a1,a3 |
| 6 | Motion for particle in circular path | 1 | A1 | a1,a3 |
| 7 | Newton’s second law of motion | 1 | A1 | b1,b3 |
| 8 | Principle of work and energy of motion | 1 | A1 | b1,b3 |
| 9 | Principle of conservation of mechanical energy | 1 | A1 | b1,b3 |
| 10 | Principle of impulse and momentum of rigid body | 1 | A1 | b1,b3 |

Course Coordinator: Dr / Reda Abdo

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Mechanics 2

(ENG 102)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mechanics 2 |
| Course Code | ENG 102 |
| Year/Level | Level: 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of Mechanics knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1 Define position, velocity and acceleration of particles and principles of conversation of mechanical energy a2 Recognize methodologies of solving engineering problems including principles of work and energy  b1 Solve engineering problems to determine the velocity and position of projectile |
|  | c1 Apply knowledge of principle of work and principle of work and energy of motion and principle of conservation of mechanical energy and momentum of rigid body. |

* + 1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Position, Displacement, Velocity, and Acceleration of particle | 4 | 4 | - |
| 2 | Plane Motion Path of Particle | 2 | 2 | - |
| 3 | Description of plane motion using Cartesian axes | 2 | 2 | - |
| 4 | Projectiles | 2 | 2 | - |
| 5 | Relative motion between particles | 2 | 2 | - |
| 6 | Motion for particle in circular path | 2 | 2 | - |
| 7 | Newton’s second law of motion | 4 | 4 | - |
| 8 | Principle of work and energy of motion | 4 | 4 | - |
| 9 | Principle of conservation of mechanical energy | 2 | 2 | - |
| 10 | Principle of Impulse and Momentum of rigid body | 4 | 4 | - |
| Total | | 28 | 28 | - |

* + 1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Position, Displacement, Velocity, and  Acceleration of Particle | x | X |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Plane Motion path of Particle | x | X |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Description of plane  Motion using Cartesian axes | x | X | x |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Projectiles | x | X |  |  |  |  | x |  |  |  |  |  |  |  |
| 5 | Relative motion between particles | x | X |  |  | X |  |  |  |  |  |  |  |  |  |
| 6 | Motion for particle in circular path | x | X |  |  | X |  |  |  |  |  |  |  |  |  |
| 7 | Newton’s second law of motion | x | X |  |  |  | X |  |  |  |  |  |  |  |  |
| 8 | Principle of work and energy of motion | x | x | x |  |  |  |  |  |  |  |  |  |  |  |
| 9 | Principle of conservation of mechanical energy | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 10 | Principle of impulse and momentum of rigid body | x | x |  |  |  | X |  |  |  |  |  |  |  |  |

* + 1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

* + 1. Student Evaluation:
  1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | b1,c1 |
| 3 | Final term examination | A1 | a1,a2,b1,c1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Marcelo R. M. Crespo da Silva "Fundamentals of Dynamics and Analysis of Motion" 1st edition, Dover Publications; (2016). |
| 2 | C. Hibbeler, Russell "Engineering Mechanics: Dynamics in SI Units, Global Edition" 14th edition, P&C ECS; 14th edition 2016). |
| 3 | Hibbeler, R. C. "Engineering Mechanics: Statics and Dynamics 13/e." (2013). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Fa | cility |  |
| 1 | Lecture classroom | 3 | White board |
| 2 | Seminar | 4 | Data Show system |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Topic | Aims | Competencies | LO’s |
| 1 | Position, Displacement, Velocity, and Acceleration of Particle | 1 | A1 | a1 |
| 2 | Plane Motion path of Particle | 1 | A1 | a1 |
| 3 | Description of plane Motion using Cartesian axes | 1 | A1 | a2 |
| 4 | Projectiles | 1 | A1 | b1 |
| 5 | Relative motion between particles | 1 | A1 | b1 |
| 6 | Motion for particle in circular path | 1 | A1 | a2 |
| 7 | Newton’s second law of motion | 1 | A1 | b1 |
| 8 | Principle of work and energy of motion | 1 | A1 | a2 |
| 9 | Principle of conservation of mechanical energy | 1 | A1 | a1 |
| 10 | Principle of impulse and momentum of rigid body | 1 | A1 | c1 |

Course Coordinator: Dr / Motaz Mostafa

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Physics 2

(PHY102)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Physics 2 |
| Course Code | PHY 102 |
| Year/Level | level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering physics knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying  engineering fundamentals, basic science and mathematics. | a1. Define concepts and theories of physics necessary for engineering system analysis. a2. Study solving engineering problems including Einstein's quantum hypothesis, laws of reflection and refraction, interference and diffraction.  a3. Define measurement devices in electrical conductivity, basic characteristics, and properties. |
|  | b2. Select the appropriate solutions for engineering problems including Newton's Rings and design of optical fibers. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic of electricity.  Practical: measurement devices in electrical conductivity. | 2 | 2 | 4 |
| 2 | Column’s law and Gauss’s law.  Practical: sensitivity of galvanometer. | 4 | 4 | 2 |
| 3 | capacitors and capacitance.  Practical: capacitors and capacitance | 2 | 2 | 2 |
| 4 | Currents and Resistance.  Practical: ohm’s law - series connection &parallel connection& resistance colour code& meter bridge - voltmeter resistance. | 4 | 4 | 10 |
| 5 | Magnetic field and magnetic force.  Practical: the inverse square law in magnetism. | 4 | 4 | 2 |
| 6 | The nature and propogation of light. Practical: the glass prism. | 4 | 4 | 2 |
| 7 | Optical fiber.  Practical: the glass prism. | 2 | 2 | 2 |
| 8 | Introduction to Quantum theory. | 2 | 2 | 0 |
| 9 | Laser.  Practical: | 2 | 2 | 0 |
| 10 | Lenses and mirrors.  Practical: spherometer- mirrors and lenses. | 2 | 2 | 4 |
|  | Total | 28 | 28 | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Basic of electricity.  Practical: measurement devices in electrical conductivity. | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 2 | Column’s law and  Gauss’s law.  Practical: sensitivity of galvanometer. | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 3 | capacitors and capacitance.  Practical: capacitors and capacitance | x | x |  |  |  |  | X |  |  |  |  |  |  | X |
| 4 | Currents and Resistance. Practical: ohm’s law - series connection  &parallel connection& resistance colour code&  meter bridge - voltmeter resistance. | x | x |  |  | X | X |  |  |  |  |  |  |  | X |
| 5 | Magnetic field and magnetic force.  Practical: the inverse square law in magnetism. | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 6 | The nature and propogation of light.  Prac tical: the glass prism. | x | x |  |  |  | X |  |  |  |  |  |  |  | x |
| 7 | Optical fiber.  Practical: the glass prism. | x | x |  |  |  |  | X |  |  |  |  |  |  | x |
| 8 | Introduction to Quantum theory. | x | x |  |  |  | X |  |  |  |  |  |  |  | x |
| 9 | Laser.  Practical: | x | x |  |  |  |  | x |  |  |  |  |  |  | x |
| 10 | Lenses and mirrors.  Practical: spherometer- mirrors and lenses. | x | x |  |  |  | X |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments, each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a3 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,a3 |
| 3 | Final term examination | A1 | a1,a2,b2 |
| 4 | Practical exam | A1 | a2,b2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 5th ,7th ,14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weights |
| 1 | Mid-term examination | 10% |  |
| 2 | final examination | 60% | |
| 3 | Practical examination | 10% | |
| 4 | Semester work | 20% | |
|  | Total | 100% | |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Shankar, Ramamurti. Fundamentals of Physics II. Yale University Press, 2020. |
| 2 | Peter J. Williams ; Firas Mansour ; Robert L. Hawkes ; (Nuclear physicist) Javed Iqbal  ; Marina Milner-Bolotin. Physics for scientists and engineers : an interactive approach, Nelson Education Ltd., Year: 2019 |
| 3 | David Halliday, Robert Resnick, Jearl Walker. Fundamentals of Physics, 9th Edition, Binder Ready Version,2019 |
| 4 | Serway, Raymond A., and John W. Jewett. Physics for scientists and engineers. Cengage learning, 2018. |
| 5 | Bauer, Wolfgang, and Gary D. Westfall. University Physics. New York, NY: McGraw-Hill, 2011. |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
| No. | Facility |
| 1 | Lecture classroom |
| 2 | Laboratory |
| 3 | Presenter |
| 4 | White board |
| 5 | Data show system |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic of electricity.  Practical: measurement devices in electrical conductivity. | 1 | A1 | a1,a3 |
| 2 | Column’s law and Gauss’s law. Practical: sensitivity of galvanometer. | 1 | A1 | a1 |
| 3 | capacitors and capacitance. Practical: capacitors and capacitance | 1 | A1 | a1 |
| 4 | Currents and Resistance.  Practical: ohm’s law - series connection &parallel connection& resistance colour code& meter bridge - voltmeter resistance. | 1 | A1 | a1,a3 |
| 5 | Magnetic field and magnetic force.  Practical: the inverse square law in magnetism. | 1 | A1 | a1 |
| 6 | The nature and propogation of light. Prac tical: the glass prism. | 1 | A1 | a2 |
| 7 | Optical fiber.  Practical: the glass prism. | 1 | A1 | b2 |
| 8 | Introduction to Quantum theory. | 1 | A1 | a2 |
| 9 | Laser.  Practical: | 1 | A1 | b2 |
| 10 | Lenses and mirrors.  Practical: spherometer- mirrors and lenses. | 1 | A1 | a2,b2 |

Course Coordinator: Dr / Amal Bahiry

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Production Engineering

(ENG105)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All Programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Production Engineering |
| Course Code | ENG105 |
| Year/Level | Level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 3 | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of production engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations. |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 3 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1.Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Explain the basic principles of production engineering.    a3. List the characteristics of engineering materials related to production engineering. |
|  | b3. Evaluate the characteristics and  performance of engineering materials related to production engineering |
| A3.Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic and environmental. | c1. Apply engineering knowledge to improve products of modern tools, systems and procedure, to make the engineering process more balanced costs, benefits, safety, quality and reliability and environmental impact.  c2. Apply safe systems including the use laboratory and field equipment competently |
| A6. Plan, supervise and monitor of production process, taking into consideration other trades requirements. | a1. Show the conventional procedures and characterization of common engineering materials and components.    c2. Acquire production skills. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | The engineering substances and its properties Practical: engineering materials | 3 | - | 2 |
| 2 | Heating and cooling diagrams  Practical: iron and steel production | 3 |  | 2 |
| 3 | Heating equilibrium diagrams Practical : heat treatment | 3 | - | 2 |
| 4 | Alloys - Casting operation (sand casting and the preparation of the mold)  Practical: metal casting & mold for a sand casting& carpenter workshop | 6 | - | 4 |
| 5 | Forming processes (cold and hot forming: forging rolling – Wire drawing – Blanking and piercing - Deep drawing - The extrusion)  Practical: metal forming | 6 | -- | 4 |
| 6 | Processes of metal connections (the riveting – welding with its types sticking) Practical: metal joining process | 6 | -- | 2 |
| 7 | Cutting machining: Lathing - Shaping – Drilling – Milling - Grinding – Work Piece fixation - Cutting tools fixation - Specifications of the operating machine)  Practical: carpenter workshop | 6 | - | 2 |
| 8 | Methods of solving problems Practical: metal machining | 3 | - | 2 |
| 9 | Measuring tools (venire caliper – micrometers and its types)  Practical: measurement tools | 3 | - | 4 |
| 10 | Production cycle production efficiency - Industrial safety Practical training in the different workshops | 3 | - | 4 |
|  | Total | 42 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | The engineering substances and its properties  Practical: engineering materials | x | X |  |  | x |  |  |  |  |  |  |  |  | x |
| 2 | Heating and cooling diagrams  Practical: iron and steel production | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 3 | Heating equilibrium diagrams  Practical : heat treatment | x | X | x |  |  |  |  |  |  |  |  |  |  | x |
| 4 | Alloys - Casting operation (sand casting and the preparation of the mold)  Practical: metal casting  & mold for a sand | x |  |  |  |  |  |  |  |  |  |  |  |  | x |
|  | casting& carpenter workshop |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Forming processes (cold and hot forming: forging rolling – Wire drawing –  Blanking and piercing - Deep drawing - The extrusion)  Practical: metal forming | X | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 6 | Processes of metal connections (the riveting – welding with its types sticking)  Practical: metal joining process | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 7 | Cutting machining:  Lathing - Shaping –  Drilling –Milling -  Grinding – Work Piece fixation - Cutting tools fixation - Specifications of the operating machine)  Practical: carpenter workshop | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 8 | Methods of solving problems  Practical: metal machining | x | X |  |  | x | x |  |  |  |  |  |  |  | x |
| 9 | Measuring tools (venire caliper – micrometers and its types)  Practical: measurement tools | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 10 | Production cycle  production efficiency -  Industrial safety  Practical training in the different workshops | x | x |  |  | x |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments, each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of  students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a3,b3 |
| 2 | Semester work(quizzes, sheets report), | A3 | c1,c2 |
| 3 | Practical Exam | A3 | c1,c2 |
| 4 | Final term examination | A1 | a1,b3,a3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 7th,9th ,14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | final examination | 60% |
| 3 | Practical examination | 10% |
| 4 | Semester work | 20% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Shanker, Kripa, Shankar, Ravi, Sindhwani, Rahu "Advances in Industrial and  Production Engineering" 1st edition, Springer Nature Singapore Pte Ltd. (2018). |
| 2 | Jeff Hansen "Manufacturing and Production Engineering: Planning and Control" Willford Press (2018). |

9. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  | Facility |  |
| 1 | Lecture classroom |  |  |
| 2 | Production engineering workshops |  |  |
| 2 | Presenter |  |  |
| 3 | White board |  |
| 4 | Data show system |  |  |
| 5 | Sound system |  |  |

10. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | The engineering substances and its properties Practical: engineering materials | 1 | A1 | a1,a3 |
| 2 | Heating and cooling diagrams  Practical: iron and steel production | 1 | A1 | a3 |
| 3 | Heating equilibrium diagrams Practical : heat treatment | 1 | A1 | b3 |
| 4 | Alloys - Casting operation (sand casting and the preparation of the mold)  Practical: metal casting & mold for a sand casting& carpenter workshop | 1,3 | A3 | c1,c2 |
| 5 | Forming processes (cold and hot forming: forging rolling – Wire drawing – Blanking and piercing - Deep drawing - The extrusion)  Practical: metal forming | 1,2 | A3 | c1,c2 |
| 6 | Processes of metal connections (the riveting – welding with its types sticking) Practical: metal joining process | 1,3 | A3 | c1,c2 |
| 7 | Cutting machining: Lathing - Shaping – Drilling  –Milling - Grinding – Work Piece fixation - Cutting tools fixation - Specifications of the  operating machine)  Practical: carpenter workshop | 1,2,3 | A6 | a1,c2 |
| 8 | Methods of solving problems Practical: metal machining | 1,3 | A1 | b3 |
| 9 | Measuring tools (venire caliper – micrometers and its types)  Practical: measurement tools | 1,3 | A3 | c1 |
| 10 | Production cycle production efficiency - Industrial safety Practical training in the different workshops | 1,3 | A6 | c2 |

Course Coordinator: Dr. Moataz Mostafa

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Introduction to Engineering and Environment

(ENG106)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All programs |
| Department Offering the Program | Basic Science and Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Introduction to Engineering and Environment |
| Course Code | ENG106 |
| Year/Level | level 1 |
| Specialization | Basics |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his or her role in promoting engineering and contributing to the profession's and community's development; by appreciating the importance of the environment, both physical and natural, and working to promote sustainability concepts |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2 Explain the scientific principles and theories that apply to the topic.    a3 Explain the basic principles of engineering. b2 Use scientific concepts and theories that are relevant to the profession.    c3 Solve complex engineering problems by applying engineering fundamentals. |
| A3. Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, | a2 Understand the professional ethics and impacts of engineering solutions on society and environment. |
| environmental, ethical and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development. | a3 Recognizes the environmental and economic impact of various industries, waste minimization, and industrial facility remediation.    b1Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.    c1 Incorporate economic, societal, global, environmental, and risk management factors into design. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Engineering concepts: What is engineering – international classification for the engineering jobs – Relation between engineering development and environment economic and social development – Engineering branches – Ethics of the engineering jobs. | 10 | - | - |
| 2 | Introduction to environmental science: the importance of studying environmental science | 2 | - | - |
| 3 | Modern technology and its effect on the environment – Quality of the environment and development elements | 4 | - | - |
| 4 | Sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution – economics of environmental pollution control – legislations for the environment protection. | 12 | - | - |
|  | Total | 28 | - | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Engineering concepts: What is engineering – international classification for the engineering jobs – relation between engineering development and environment economic and social development – engineering branches – ethics of the engineering jobs. | x | X |  |  |  |  |  |  |  | X |  |  |  |  |
| 2 | Introduction to environmental science: the importance of studying environmental science | x | X |  |  |  |  |  |  |  | X |  |  |  |  |
| 3 | Modern technology and its effect on the environment  – quality of the environment and development elements | x | X | X |  |  |  |  |  |  | X |  |  |  |  |
| 4 | Sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution –noise) – economics of environmental pollution control – legislations for  the environment protection. | x | X | x |  |  |  |  |  |  | X |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material. | Better access any time. |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different levels of students. |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Mid Term Examination | A1/A3 | a2,a3,b2/b1 |
| 2 | Semester work(quizzes, sheets, report) | A3 | c1 |
| 3 | Final Term Examination | A1,A3 | b1,b2,c3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work (Sheets, Quiz and Reports) | 2𝑛𝑑, 7𝑡ℎ , 9𝑡ℎ |
| 2 | Mid Term Examination | 8𝑡ℎ |
| 3 | Final Term Examination | 15𝑡ℎ |

* 1. Weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | د. جمال صالح السلامة من الكوارث الطبيعية والمخاطر البشرية، دار الشروق، 2019 |
| 2 | Raju, Fundamental of air pollution, Oxyford&IBH, 2019. |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Seminar |  |
| 2 | Lecture Classroom |  |
| 3 | White Board |  |
| 4 | Data Show system |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Engineering concepts: What is engineering – international classification for the engineering jobs – relation between engineering development and environment economic and social development – engineering branches – ethics of the engineering jobs. | 3 | A3 | a2,a3 |
| 2 | Introduction to environmental science: the importance of studying environmental science | 3 | A1 | a2,b2 |
| 3 | Modern technology and its effect on the environment – quality of the environment and development elements | 3 | A3 | b1,c1 |
| 4 | Sources of environmental pollution and method of control (air pollution – water pollution – solid wastes pollution –noise) – economics of environmental pollution  control – legislations for the environment protection. | 3 | A1 | b2,c3 |

Course Coordinator: Dr. Ramadan Elkateb

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

## Technical English Language 1

(LNG101)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | All Programs |
| Department Offering the Program | Basic Science and Engineering  Department |
| Department Responsible for the Course | Basic Science and Engineering  Department |
| Course Title | Technical English Language 1 |
| Course Code | LNG101 |
| Year/Level | level 1 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 1 | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 5 | Communicate effectively with a variety of audiences using a variety of forms, methods, and languages; cope with academic and professional issues in a critical and creative manner; and display leadership, business administration, and entrepreneurial abilities. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1. Communicate effectively with a range of audiences using contemporary tools. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Engineering  Lab. : skills in English  Lesson 1 Bob's day at work & Lesson 2  Bob returns home with bad news | 3 | - | 6 |
| 2 | A private flat  Lab. : skills in English | 1 | - | 2 |
|  | Lesson 3 Ted's day at school |  |  |  |
| 3 | Book shelves  Lab. : skills in English  Lesson 4 Nicole's day at school | 1 | - | 2 |
| 4 | Bridges  Lab. : skills in English  Lesson 5 Ted goes out for the evening  Grammar Topics | 2 | - | 4 |
| 5 | Reinforced concrete  Lab. : skills in English  Lesson 6 Susan stays home and bake cookies & Lesson 7 Susan hires Bob to run her own business | 2 | - | 4 |
| 6 | Surveying  Lab. : skills in English  Lesson 8 Ted forms a rock band &  Lesson 9 Nicole for president | 2 | - | 4 |
| 7 | Hydraulic works  Lab. : skills in English  Lesson 10 Bob visits the village market | 2 | - | 4 |
| 8 | Soil mechanics and foundations  Lab. : skills in English Grammar topics | 1 |  | 2 |
| Total | | 14 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation  and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Engineering  Lab. : skills in English Lesson 1 Bob's day at work & Lesson 2 Bob | x | x |  | x |  |  |  |  |  |  |  |  |  | x |
|  | returns home with bad news |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | A private flat  Lab. : skills in English  Lesson 3 Ted's day at school | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 3 | Book shelves  Lab. : skills in English  Lesson 4 Nicole's day at school | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 4 | Bridges  Lab. : skills in English Lesson 5 Ted goes out for the evening  Grammar Topics | x | x |  | x |  |  |  |  |  |  |  |  |  | x |
| 5 | Reinforced concrete  Lab. : skills in English  Lesson 6 Susan stays home and bake cookies  & Lesson 7 Susan hires  Bob to run her own business | x | x |  | x |  |  |  |  |  |  |  |  |  | x |
| 6 | Surveying  Lab. : skills in English Lesson 8 Ted forms a rock band & Lesson 9  Nicole for president | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 7 | Hydraulic works  Lab. : skills in English  Lesson 10 Bob visits the village market | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 8 | Soil mechanics and foundations  Lab. : skills in English Grammar topics | x | x |  |  |  |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Midterm examination | A8 | d1 |  |
| 2 | Semester work(quizzes, sheets, report) | A8 | d1 |  |
| 3 | Practical exam | A8 | d1 |  |
| 4 | Final term examination | A8 | d1 |  |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work | 7th,9th |  |
| 3 | Practical examination | 14th |  |
| 4 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | Practical examination | 10% |
| 3 | Semester work | 20% |
| 4 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | David Bonamy "Technical English" Longman Publishing Group 2016 |
| 2 | Paul J. Hamel "English for Better Jobs 1: Language for Working and Living" Create Space Independent Publishing Platform; 1st edition (2016) |
| 3 | Mahmood Reza Atai, Alireza Zaré Alanagh, Morteza Nasiri and Reza Taherkhani "English for The Students of Engineering" 1st edition, SAMT Publication (2016). |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Computer lab. |  |
| 3 | Seminar |  |
| 4 | White board |  |
| 5 | Data Show system | |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Engineering  Lab. : skills in  English  Lesson 1 Bob's day at work & Lesson 2 Bob returns home with bad news | 5 | A8 | d1 |
| 2 | A private flat  Lab. : skills in  English  Lesson 3 Ted's day at school | 5 | A8 | d1 |
| 3 | Book shelves  Lab. : skills in  English  Lesson 4 Nicole's day at school | 5 | A8 | d1 |
| 4 | Bridges  Lab. : skills in  English  Lesson 5 Ted goes out for the evening  Grammar Topics | 5 | A8 | d1 |
| 5 | Reinforced concrete  Lab. : skills in  English  Lesson 6 Susan stays home and bake cookies & Lesson 7 Susan hires Bob to run her own business | 5 | A8 | d1 |
| 6 | Surveying  Lab. : skills in  English  Lesson 8 Ted forms a rock band & Lesson 9 Nicole for president | 5 | A8 | d1 |
| 7 | Hydraulic works  Lab. : skills in  English  Lesson 10 Bob visits the village market | 5 | A8 | d1 |
| 8 | Soil mechanics and foundations  Lab. : skills in  English  Grammar topics | 5 | A8 | d1 |

Course Coordinator: Dr/ Doaa Elsherbiny

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

# Mathematics 3

# (MTH201)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mathematics 3 |
| Course Code | MTH 201 |
| Year/Level | Level: 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | MTH 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of fundamental Mathematical engineering knowledge and solve of ordinary differential equations and partial differentiation applications , as well as the ability to apply acquired knowledge of ordinary differential equations and partial differentiation applications in real-world situations by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve multi integrations of mathematical engineering . |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying | a1. Understand the relevant engineering mathematical of ordinary differential equations |
| engineering fundamentals, basic science and mathematics. | and applications of Partial differentiation equations.  a2. Describe the effect of mathematical engineering principles and theories that apply in the most fundamental problems .  a3. Define the basic concepts of ordinary differential equations and Partial differentiation equations  b1. Applying the basics of ordinary differential equations and applications of Partial differentiation equations in engineering problems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Lectures | Tutorial | Practical |
| 1 | * Functions of several variables * Limits of functions of several variables. * Continuity in multivariable functions | 2 | 4 | - |
| 2 | Partial derivatives of higher order extreme for functions of two variables | 4 | 4 | - |
| 3 | * Double integral * Triple integral * Line integral in space, Green’s theorem * Surface integral * Gauss and stokes's theory | 10 | 4 | - |
| 4 | * Basic concepts Formation of the differential equations * Separable differential equations * Homogenous differential equations * Exact differential equation * linear differential equation * Bernoulli’s equation the linear differential operator | 4 | 12 | - |
| 5 | * Second order homogeneous differential equations with constant coefficients | 4 | 2 | - |
|  | * Non-homogeneous linear differential equations |  |  |  |
| 6 | * Convergence of la-place transform * Important properties of la-place transform * Laplace transform of derivatives * Inverse la-place transform | 4 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped  Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | * Functions of several variables * Limits of functions of several variables. * Continuity in   multivariable functions | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 2 | • Partial derivatives of higher order  extreme for functions of two variables | x | x |  |  | X |  | X |  |  |  |  |  |  |  |
| 3 | * Double integral * Triple integral * Line integral in space, Green’s theorem * Surface integral * Gauss and stokes's theory | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 4 | * Basic concepts Formation of the differential   equations   * Separable   differential equations   * Homogenous   differential equations   * Exact differential equation * linear differential equation • Bernoulli’s   equation  the linear differential  operator | x | x |  |  | X |  | X |  |  |  |  |  |  |  |
| 5 | * Second order homogeneous differential equations with constant   coefficients   * Non-   homogeneous linear differential equations | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 6 | * Convergence of laplace transform * Important   properties of laplace transform   * Laplace transform of derivatives * Inverse la-place transform | x | x |  |  | X |  | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a2,a3 |
| 3 | Final term examination | A1 | a1,a2,a3,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weights |
| 1 | Midterm examination | 20% |  |
| 2 | Semester work | 20% |  |
| 3 | Final term examination | 60% |  |
|  | Total | 100% |  |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Harumi Hattori " Partial Differential Equations: Methods, Applications and Theories" WSPC; 2nd edition (2019). |
| 2 | Schaeffer, David, Cain, John Wesley "Ordinary Differential Equations: Basics and Beyond" 1st edition, Springer-Verlag New York (2016). |
| 3 | Yuefan Deng "Lectures, Problems and Solutions for Ordinary Differential Equations" 2nd edition, WSPC; Second Edition (2017). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 3 | White board |
| 2 | Seminar | 4 | Data Show system |

1. Matrix of Competencies and LO’s methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | * Functions of several variables * Limits of functions of several variables * Continuity in multivariable functions | 1 | A1 | a1,a2 |
| 2 | • Partial derivatives of higher order extreme for functions of two variables | 1 | A1 | a1 |
| 3 | * Double integral * Triple integral * Line integral in space, Green’s theorem * Surface integral * Gauss and stokes's theory | 1 | A1 | a2 |
| 4 | * Basic concepts Formation of the differential equations * Separable differential equations * Homogenous differential equations * Exact differential equation * linear differential equation * Bernoulli’s equation the linear differential operator | 1 | A1 | a1,a3 |
| 5 | * Second order homogeneous differential equations with constant coefficients * Non-homogeneous linear differential equations | 1 | A1 | a3 |
| 6 | * Convergence of la-place transform * Important properties of la-place transform * Laplace transform of derivatives * Inverse la-place transform | 1 | A1 | b1 |

Course Coordinator: Dr / Samar Madin

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Chemical Engineering Principles I

### CHE 201

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Chemical Engineering Principles I |
| Course Code | CHE 201 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |
| 10 | Apply research findings in Chemical Engineering Principles to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2. Demonstrate the scientific principles and theories that apply to the Chemical Engineering Principles.  a3. Explain the basic principles of engineering related to Chemical Engineering Principles.  b3. Applying engineering basics that are relevant to the subject  c3. solve complex engineering problems by applying Chemical engineering Principles fundamentals. |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements | a1.Demonstrate how to conduct a characterization of typical engineering materials and components using standard methodologies.  c1. Conduct troubleshooting in chemical engineering plants.  c2. Acquire entrepreneurial skills. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1.Think creatively in solving problems of design.  d2. Manage effectively for tasks, time and resources. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Units and dimensions | 4 | 4 | - |
| 2 | Basic concepts of material balances | 8 | 8 |  |
| 3 | Balances on non-reactive and reactive processes | 12 | 12 | - |
| 4 | Application of material balances on unit operations. | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Dimensions and units | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 2 | Basic concepts of material balances | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 3 | Balances on nonreactive and reactive processes | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 4 | Application of material balances on unit operations. | x | x |  |  | x | x | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high  performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a2,a3,b3 |
| 2 | Semester work(sheets,quizs) | A6/A9 | c1,c2/d1,d2 |
| 3 | Final term examination | A6/A1 | a1/a2, a3,c3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizs) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Principles of Chemical Engineering Processes: Material and Energy Balances, Second Edition, 2014 |
| 2 | Felder and Rousseu, "Elementary principles of chemical processes", John Wiley and Sons Inc. 4th edition, 2015 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of teaching and learning methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Dimensions and units | 9 | A1 | b3,c3 |
| 2 | Basic concepts of material balances | 9 | A1/A6 | a2,a3/a1 |
| 3 | Balances on non-reactive and reactive processes | 9,10 | A9 | d1,d2 |
| 4 | Application of material balances on unit operations. | 10 | A6 | c1,c2 |

Course Coordinator: Dr. / Sohier Abo Bakr

Head of Department: Asso.prof. Hend Elsayed Gadow Date of Approval: 2022

Computer Programming

(ENG201)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic science and Engineering Department |
| Course Title | Computer Programming |
| Course Code | ENG201 |
| Year/Level | Level2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Apply acquired knowledge in real-world situations by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | b3. Applying engineering basics that are relevant to the computer programing (java )    c1. Solve engineering problems by applying engineering d different algorithms .    c2. Identif complex engineering problems by applying engineering fundamentals for solving. |
| 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. | a1. Describe an appropriate system by applying “ java “ language programming.    b3.Interpret data problems to identify java programs  c1.Choose relevant computer-based software for modelling to analysis java programs |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic concepts of programming.   Practical: problem analysis& Developing the programs charts& Structured programming | 2 | - | 2 |
| 2 | Introduction Java Applications   Practical: Form of the Program& fundamentals of  Java programming language and its syntax& Primitive data types, operators, variables&Joptionpane& scanner Classes. | 4 | - | 4 |
| 3 | Branching[Control Statements].   Practical: programs about (If statement, If -Else, Nested IF, Switch) | 2 | - | 2 |
| 4 | [Iterations] Control Statements.   Practical: solved problems about (Repetition statements: for, while, do-while& Nested loop &Continue, Break.) | 4 | - | 4 |
| 5 | Concepts of object Oriented programming   Practical: Examples Of Classes, Inheritance Concept. | 2 | - | 2 |
| 6 | Methods in java.   Practical: problems of ( Declare method& Message passing& Method overloading) | 2 | - | 2 |
| 7 | Arrays and Array list   Practical: Create Array& Matrix& Array List. | 4 | - | 4 |
| 8 | Introduction to java Applets.  Practical: java Applets programs. | 4 | - | 4 |
| 9 | Graphical user interface (GUI).  Practical: GUI exercises. | 4 | - | 4 |
|  | Total | 28 | - | 28 |

Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Basic concepts of programming.  Practical: problem analysis & Developing the programs charts&  Structured programming | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 2 | Introduction Java  Applications  Practical: Form of the  Program& fundamentals of Java programming language and its syntax& Primitive data  types, operators,  variables&Joptionpane& scanner Classes. | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 3 | Branching [Control Statements].  Practical: programs about (If statement, If Else, Nested IF, Switch) | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 4 | [Iterations] Control Statements.  Practical: solved problems about  (Repetition statements:  for, while, do-while&  Nested loop &Continue, Break.) | x | x |  |  | x |  |  |  |  |  |  |  |  | X |
| 5 | Concepts of object  Oriented programming  Practical: Examples Of Classes, Inheritance Concept. | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 6 | Methods in java.  Practical: problems of (  Declare method&  Message passing&  Method overloading) | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 7 | Arrays and Array list  Practical: Create Array& Matrix& Array List. | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 8 | Introduction to java Applets.  Practical: java Applets programs. | x | x |  |  |  |  |  |  |  |  |  |  |  | x |
| 9 | Graphical user interface (GUI).  Practical: GUI exercises. | x | x |  |  |  |  |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1,A2 | b3/c1 |
| 2 | Semester work (report, quizzes ) | A1 | c1,c2 |
| 3 | Final term examination | A2 | a1,b3 |
| 4 | Practical examination | A1/A2 | c1,c2/c1 |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work | 2nd ,7th ,9th |  |
| 3 | Practical examination | 14th |  |
| 4 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weights |
| 1 | Mid-term examination | 10% |  |
| 2 | final examination | 60% |  |
| 3 | Practical examination | 10% |  |
| 4 | Semester work | 20% |  |
|  | Total | 100% |  |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Jeffrey L. Nyhoff, Larry R. Nyhoff "Processing: An Introduction to Programming" ebook (2017). |
| 2 | Usman Opeyemi Lateef, Akeem Owoade, Abimbola B.L. and Gbenga Ogunsanwo  "INTRODUCTION TO COMPUTER PROGRAMMING" 2nd edition, College of Science and Information Technology, (2016). |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
| No. | Facility |
| 1 | Lecture classroom |
| 2 | Computer |
| 3 | Presenter |
| 4 | White board |
| 5 | Data show system |

1. Matrix of teaching and learning methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic concepts of programming.   Practical: problem analysis & Developing the programs charts&  Structured programming | 1 | A1 | b3,c1 |
| 2 | Introduction Java Applications   Practical: Form of the Program& fundamentals of Java programming language and its syntax& Primitive data types, operators, variables&Joptionpane& scanner Classes. | 1 | A1 | b3 |
| 3 | Branching [Control Statements].   Practical: programs about (If statement, If -Else, Nested IF, Switch) | 1 | A1 | b3 |
| 4 | [Iterations] Control Statements.   Practical: solved problems about (Repetition statements: for, while, do-while& Nested loop  &Continue, Break.) | 1 | A1 | c2 |
| 5 | Concepts of object Oriented  programming   Practical: Examples Of Classes, Inheritance Concept. | 1 | A2 | b3 |
| 6 | Methods in java.   Practical: problems of ( Declare method& Message passing& Method overloading) | 1 | A2 | a1 |
| 7 | Arrays and Array list   Practical: Create Array& Matrix& Array List. | 1 | A2 | c1 |
| 8 | Introduction to java Applets.  Practical: java Applets programs. | 1 | A1 | b3 |
| 9 | Graphical user interface (GUI). Practical: GUI exercises. | 1 | A2 | a1,c1 |

Course Coordinator: Dr. Amira Elsonbaty

Head of Department: Dr. Amira Elsonbaty

Date of Approval: 2022

Engineering Thermodynamics

(ENG 202)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Engineering Thermodynamics |
| Course Code | ENG 202 |
| Year/Level | level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | ENG 102 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering thermodynamics knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying thermodynamics laws to identify, diagnose, and solve engineering problems of varying complexity and variation. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying | a1. Demonstrate the thermodynamics laws that apply to the engineering problems. |
| engineering fundamentals, basic science and mathematics. | a2. Explain the basic principles of engineering thermodynamics.    a3. Study the concepts and theories of mathematical, science necessary for engineering thermodynamic properties for different types of systems.    b1. Select the appropriate solutions for engineering problems and system design, gas power cycles, vapor cycles.  b2. Using scientific concepts and thermodynamics laws that are relevant to the real life.    c1. Modify engineering knowledge and understanding to improve design, products and services, gas power cycles, vapor cycles.    c2. Solve complex engineering problems by applying the concepts and the thermodynamics laws. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Fundamental concepts - Properties of a pure substance | 2 | 2 | - |
| 2 | Equation of state - thermodynamic systems - Work and heat | 2 | 2 | - |
| 3 | First law of thermodynamics; Applications to Systems and Control Volumes | 6 | 6 | - |
| 4 | Second Law of Thermodynamics; Principle of Carnot cycles | 4 | 4 | - |
| 5 | Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy | 4 | 4 | - |
| 6 | Applications to systems and control volumes - Irreversibility and availability | 6 | 6 | - |
| 7 | Power and refrigeration cycles | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Fundamental concepts -  Properties of a pure substance | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Equation of state - thermodynamic systems  - Work and heat | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 3 | First law of thermodynamics;  Applications to Systems and Control Volumes | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 4 | Second Law of  Thermodynamics;  Principle of Carnot cycles | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 5 | Heat engines,  Refrigerators and heat pumps - Principle of the increase of entropy | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 6 | Applications to systems and control volumes -  Irreversibility and availability | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 7 | Power and refrigeration cycles | x | x |  |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material. | Better access any time |
| 2 | Web communication with students. | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work(quizzes, sheets) | A1 | c1,c2 |
| 3 | Final term examination | A1 | a3 , b1,b2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th,14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 20% |
| 2 | final examination | 60% |
| 3 | Semester work | 20% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | P. K. Nag "Engineering Thermodynamics | 6th Edition" McGraw Hill Education; Sixth edition (2017). |
| 2 | Michael J. Moran, Howard N. Shapiro, Daisie D. Boettner, Margaret B. Bailey "Fundamentals of Engineering Thermodynamics" 9th edition Wiley (2018) |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Presenter |  |
| 3 | White board |  |
| 4 | Data show system |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Fundamental concepts - Properties of a pure substance | 1 | A1 | a1,a2 |
| 2 | Equation of state - thermodynamic systems - Work and heat | 1 | A1 | a1,a2 |
| 3 | First law of thermodynamics; Applications to Systems and Control Volumes | 1 | A1 | a1,a2,b2 |
| 4 | Second Law of Thermodynamics; Principle of Carnot cycles | 1 | A1 | b1,b2,c1 |
| 5 | Heat engines, Refrigerators and heat pumps - Principle of the increase of entropy | 1 | A1 | b1,c1 |
| 6 | Applications to systems and control volumes - Irreversibility and availability | 1 | A1 | a3,c2 |
| 7 | Power and refrigeration cycles | 1 | A1 | b1,c1 |

Course Coordinator: Dr. A. E. Kabeel

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Electrical Engineering Fundamentals

# (ENG204)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Electrical Engineering Fundamentals |
| Course Code | ENG204 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 3 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the modern electrical engineering techniques, skills, and current engineering tools required for engineering practice related to electrical engineering techniques by taking full responsibility for one's own learning and development |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in Electrical, Electronics and Communication engineering |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying  engineering fundamentals, basic science and mathematics. | a1. Describe the relevant mathematical principles and theories related to electrical engineering fundamentals.    a2. Explain the scientific principles and theories that apply to the electrical engineering.    b1. Use math ideas and theories that are applicable to the electrical engineering.    b2. Use scientific concepts and theories that are relevant to electrical engineering.  c1. Solve complex engineering problems related  to electrical engineering by applying the concepts and the theories of mathematics.  c2. Identify complex engineering problems by applying the concepts and the theories of sciences, appropriate to the electrical 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. | a1. Define electrical engineering principles.    b3. Analyze data to interpret it    b4. Evaluate components, systems, and processes are evaluated for their characteristics and performance.    c1. Choose relevant mathematical and computer-based methodologies for problem modelling and analysis. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Direct Current | 3 | 2 | - |
| 2 | Theory of electric circuits | 8 | 6 | - |
| 3 | Delta and Star connections | 2 | 2 | - |
| 4 | Sine A.C and D.C circuits | 8 | 4 | - |
| 5 | Time vectors diagram | 3 | 2 | - |
| 6 | Electric power and power factor in A.C circuits | 3 | 2 | - |
| 7 | 3-Phase current - Electric machines - D.C machines | 6 | 4 | - |
| 8 | Transformers | 3 | 2 | - |
| 9 | Induction and synchronous machines | 3 | 2 | - |
| 10 | Fractional power machine | 3 | 2 | - |
|  | Total | 42 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face  Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Direct Current | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Theory of electric circuits | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Delta and Star connections | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 4 | Sine A.C and D.C  circuits | x | x |  |  | X |  | X |  |  |  |  |  |  |  |
| 5 | Time vectors diagram | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 6 | Electric power and power factor in A.C  circuits | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 7 | 3-Phase current -  Electric machines - D.C machines | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 8 | Transformers | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 9 | Induction and synchronous machines | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 10 | Fractional power machine | x | x |  |  | X |  | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1,b2 |
| 2 | Semester work(quizzes, sheets, report) | A1/A2 | b1,c1,c2/c1 |
| 3 | Final term examination | A2 | a1,b3,b4 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th,14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | | Weights |
| 1 | Mid-term examination |  | 20% |
| 2 | Semester work |  | 20% |
| 3 | final examination |  | 60% |
|  |  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Fundamentals of electric circuits alexander sadiku 4th edition.2019. |
| 2 | Fundamentals of Electrical Circuit Analysis, March 2018 |
| 3 | Thomas Talavage (Author), T. Arthur Terlep "Electrical Engineering Fundamentals" Independently published (2019). |
| 4 | Viktor Hacker and Christof Sumereder " Electrical Engineering: Fundamentals" De Gruyter Oldenbourg (2019). |

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  |  | Facility |
| 1 | Lecture classroom |  |  |
| 2 | Presenter |  |  |
| 3 | White board |  |  |
| 4 | Data show system |  |  |
| 5 | Wireless internet |  |  |
| 6 | Sound system |  |  |

1. Facilities required for teaching and learning:

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Direct Current | 4 | A1 | a1, a2,b1,b2 |
| 2 | Theory of electric circuits | 4 | A1 | a1, a2,b1,b2 |
| 3 | Delta and Star connections | 4 | A1 | a1, a2,b1,b2 |
| 4 | Sine A.C and D.C circuits | 4 | A1 | a1, a2,b1,b2 |
| 5 | Time vectors diagram | 4 | A1 | a1, a2,b1,b2 |
| 6 | Electric power and power factor in A.C circuits | 4 | A1 | c1,c2 |
| 7 | 3-Phase current - Electric machines - D.C machines | 7 | A2 | a1,b3 |
| 8 | Transformers | 7 | A2 | b4,c1 |
| 9 | Induction and synchronous machines | 7 | A2 | b3,c1 |
| 10 | Fractional power machine | 7 | A2 | a1,c1 |

Course Coordinator: Dr. Hossam Abdelfatah

Head of Department: Dr. Amira Elsonbaty

Date of Approval: 2022

Technical English Language 2

(LNG201)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Technical English Language 2 |
| Course Code | LNG201 |
| Year/Level | level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | LNG101 |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Teaching hours | | Lectures |  |  | Tutorial | Practical |
| 1 |  |  | - | 2 |
| - Course Aims: | |  |  | |  |  |
| No. |  |  | Aims | |  |  |

2

|  |  |
| --- | --- |
| 5 | Communicate effectively with a variety of audiences using a variety of forms, methods, and languages; cope with academic and professional issues in a critical and creative manner; and display leadership, business administration, and entrepreneurial abilities. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1. Communicate effectively.  d2. Demonstrate efficient IT capabilities. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d1. Search for information to engage in lifelong self-learning discipline.    d2. Professionally merge the language skills in self learning |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Content | Lecture | Tutorial | Practical |
| 1 | Water  Lab skills in English : Lesson 1 Bob drives a hard bargain& Lesson 2 Bob's big coolie order& grammar topics | 2 | - | 4 |
| 2 | Chemical and physical properties.  Lab skills in English Lesson 3 Amber comes over to bake cookies & Lesson 4Amber and Ted heat up the kitchen& grammar topics | 2 | - | 4 |
| 3 | Water cycle  Lab skills in English lesson 5 Nicole practices her election speech& grammar topics | 1 | - | 2 |
| 4 | Human uses  Lab skills in English : Grammar topics | 2 | - | 4 |
| 5 | Heat transfer  Lab skills in English lesson 6 Bob brings the cookies to the village market& lesson 7 Carol tells Bob the good news& grammar topics | 2 | - | 4 |
| 6 | Graphic language  Lab skills in English : lesson 8 Every one bakes cookies & lesson 9 Nicole's close election & grammar topics | 2 | - | 4 |
| 7 | Energy  Lab Skills in English lesson 10 Bob gets any angry call from Carol & Grammar topics | 2 | - | 4 |
| 8 | Automatic Control  Lab Skills in English Grammar topics | 1 |  | 2 |
|  | Total | 14 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online    Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Water  Lab skills in English :  Lesson 1 Bob drives a hard bargain & Lesson 2  Bob's big coolie order & grammar topics | x | X |  | X |  |  |  |  |  |  |  |  |  | x |
| 2 | Chemical and physical properties.  Lab skills in English Lesson 3 Amber comes over to bake cookies &  Lesson 4Amber and Ted heat up the kitchen & grammar topics | x | X |  | X |  |  |  |  |  |  |  |  |  | x |
| 3 | Water cycle  Lab skills in English lesson 5 Nicole practices  her election speech & grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 4 | Human uses  Lab skills in English :  Grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | X |
| 5 | Heat transfer  Lab skills in English lesson 6 Bob brings the cookies to the village  market& lesson 7 Carol  tells Bob the good news  & grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 6 | Graphic language  Lab skills in English :  lesson 8 Every one  bakes cookies & lesson  9 Nicole's close election  & grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | X |
| 7 | Energy  Lab Skills in English lesson 10 Bob gets any  angry call from Carol &  Grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 8 | Automatic Control  Lab Skills in English Grammar topics | x | X |  |  |  |  |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A8,A10 | d1,d2 |
| 2 | Semester work(quizzes, sheets, report) | A8 | d1,d2 |
| 3 | Practical exam | A8,A10 | d1,d2 |
| 4 | Final term examination | A10 | d1,d2 |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work | 7th,9th |  |
| 3 | Practical examination | 14th |  |
| 4 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work | 20% |
| 3 | Practical examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | David Bonamy "Technical English" Longman Publishing Group 2016 |
| 2 | Paul J. Hamel "English for Better Jobs 1: Language for Working and Living" Create Space Independent Publishing Platform; 1st edition (2016)/ |
| 3 | Mahmood Reza Atai, Alireza Zaré Alanagh, Morteza Nasiri and Reza Taherkhani "English for The Students of Engineering" 1st edition, SAMT Publication (2016). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  |  | Facility |
| 1 | Lecture classroom |  |  |
| 2 | Computer lab. |  |  |
| 3 | Seminar |  |  |
| 4 | White board |  |  |
| 5 | Data Show system |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Water  Lab skills in English : Lesson 1 Bob drives a hard bargain & Lesson 2 Bob's big coolie order & grammar topics | 5 | A8 | d1,d2 |
| 2 | Chemical and physical properties.  Lab skills in English  Lesson 3 Amber comes over to bake cookies & Lesson 4Amber and Ted heat up the kitchen & grammar topics | 5 | A8 | d1,d2 |
| 3 | Water cycle  Lab skills in English lesson 5 Nicole practices her election speech & grammar topics | 5 | A8 | d1,d2 |
| 4 | Human uses  Lab skills in English : Grammar topics | 5 | A10 | d2 |
| 5 | Heat transfer  Lab skills in English lesson 6 Bob brings the cookies to the village market& lesson 7 Carol tells Bob the good news & grammar topics | 5 | A10 | d2 |
| 6 | Graphic language Lab skills in English :  lesson 8 Every one bakes cookies & lesson 9 Nicole's close election & grammar topics | 5 | A10 | d2 |
| 7 | Energy  Lab Skills in English lesson 10 Bob gets any angry call from Carol &  Grammar topics | 5 | A10 | d1,d2 |
| 8 | Automatic Control  Lab Skills in English Grammar topics | 5 | A10 | d1,d2 |

Course Coordinator: Dr. Doaa El sherbny

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Mathematics4

(MTH202)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Mathematics 4 |
| Course Code | MTH 202 |
| Year/Level | Level: 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | MTH 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2- Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of fundamental Mathematical engineering knowledge and specialized skills of Complex Analysis and Special functions, as well as the ability to apply acquired knowledge of Complex Analysis and Special functions in real-world situations as Heat equation and Wave equation by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve mathematical engineering problems as by using complex series and Fourier series . |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Learn the general principles of differential equations and series and it’s applications in mathematical engineering.  a2. Describe the effect of mathematical engineering principles and theories that apply in the most fundamental problems.  a3. Define the basic concepts of series and analytic functions.  b1. Use the basics of Complex Analysis and Special functions to solve engineering problems.  c1. Apply the methods of solving partial differential equations to generate solutions for heating and wave equations. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lecture | Tutorial | Practical |
| 1 | Special functions – Fourier series | 4 | 4 | - |
| 2 | periodic functions and Euler's laws | 2 | 2 | - |
| 3 | Fourier's integrations | 4 | 4 | - |
| 4 | solutions of the differential equations by series | 2 | 2 | - |
| 5 | solving the partial differential equations using variables separation | 2 | 2 | - |
| 6 | Functions with complex variables | 2 | 2 | - |
| 7 | complex quantities algebra | 2 | 2 | - |
| 8 | multiple values functions | 2 | 2 | - |
| 9 | the analytical functions and Koshi'stheorem | 2 | 2 | - |
| 10 | the complex series and Taylor and Lorant series | 2 | 2 | - |
| 11 | the zeros, unique points and the rest | 2 | 2 | - |
| 12 | the infinite series | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and  Research | Cooperative | Discovering | Modeling | lab |
| 1 | Special functions Fourier series | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 2 | periodic functions and Euler's laws | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 3 | Fourier's integrations | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 4 | solutions of the  differential equations by  series | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 5 | solving the partial  differential equations using variables separation | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 6 | Functions with complex variables | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 7 | complex quantities algebra | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 8 | multiple values functions | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 9 | the analytical functions  and Koshi'stheorem | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 10 | the complex series and  Taylor and Lorant series | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 11 | the zeros, unique points and the rest | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 12 | the infinite series | x | x |  |  | x | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,a3,b1 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,c1 |
| 3 | Final term examination | A1 | b1,a3,c1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Brett Borden and James Luscombe "Fourier series and integrals" Morgan & Claypool Publishers (2017). |
| 2 | Chris McMullen " Essential Calculus Skills Practice Workbook with Full Solutions" Zishka Publishing (2018). |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
|  | Facility |
| 1 | Lecture classroom |
| 2 | Seminar |
| 3 | White board |
| 4 | Data Show system |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Special functions Fourier series | 1 | A1 | a1,b1 |
| 2 | periodic functions and Euler's laws | 1 | A1 | a1,a2 |
| 3 | Fourier's integrations | 1 | A1 | a3 |
| 4 | solutions of the differential equations by series | 1 | A1 | c1 |
| 5 | solving the partial differential equations using variables separation | 1 | A1 | c1 |
| 6 | Functions with complex variables | 1 | A1 | b1 |
| 7 | complex quantities algebra | 1 | A1 | b1 |
| 8 | multiple values functions | 1 | A1 | b1 |
| 9 | the analytical functions and Koshi'stheorem | 1 | A1 | a3 |
| 10 | the complex series and Taylor and Lorant series | 1 | A1 | b1 |
| 11 | the zeros, unique points and the rest | 1 | A1 | c1 |
| 12 | the infinite series | 1 | A1 | a3 |

Course Coordinator: Dr .samar Madin

Head of Department: Asso.prof.Amal Bahiry

Date of Approval:2022

Organic Chemistry

CHE 202

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Organic Chemistry |
| Course Code | CHE 202 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 3 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of organic chemistry engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in organic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 8 | Consider the impact of organic chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2. Demonstrate the organic chemistry principles and reactions that apply to the chemical engineering industries.  b2. Use scientific concepts and fundementals that are relevant to the organic chemistry.    c2. Solve organic chemistry problems by applying the concepts and the theories of organic chemistry. |
| 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. | a1.Recognize the organic chemical reactions that utilize a full range of thermodynamics and kinetics of chemical reactions.  b1. Design new processes or products through utilization organic chemical reactions.    c1. Apply the practical organic chemistry to identify the different classes of organic chemistry. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Organic Chemistry: basic concepts  Practical  Identification of hydrocarbons | 3 | - | 2 |
| 2 | Alkanes  Practical  Identification of alcohols | 3 | - | 2 |
| 3 | Stereochemistry  Practical  Identification of phenols | 3 | - | 2 |
| 4 | Alkenes  Practical  Identification of aldehydes and ketones | 6 | - | 4 |
| 5 | Alkynes  Practical  Identification of aliphatic carboxylic acids | 3 | - | 2 |
| 6 | Aromatic Compounds  Practical  Identification of aromatic | 6 | - | 4 |
| 7 | Alcohols  Practical  Identification of salt of carboxylic acids | 3 | - | 2 |
| 8 | Ethers  Practical  Identification of amines | 3 | - | 2 |
| 9 | Aldehydes and Ketones  Practical  Identification of carbohydrates | 3 | - | 2 |
| 10 | Carboxylic Acids and Their Derivatives  Practical  Scheme for identification of unknown organic  compounds | 3 | - | 2 |
| 11 | Amines  Practical  Revision | 3 | - | 2 |
| 12 | Poly functional compounds  Practical  Practical exam | 3 | - | 2 |
| Total | | 42 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | L  ab |
| 1 | Organic  Chemistry: basic concepts Practical  Identification of hydrocarbons | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 2 | Alkanes  Practical  Identification of  alcohols | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 3 | Stereochemistry  Practical  Identification of phenols | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 4 | Alkenes  Practical  Identification of aldehydes and ketones | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 5 | Alkynes  Practical  Identification of aliphatic carboxylic acids | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 6 | Aromatic  Compounds  Practical Identification of aromatic | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 7 | Alcohols  Practical  Identification of salt of carboxylic acids | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 8 | Ethers  Practical  Identification of  amines | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 9 | Aldehydes and  Ketones  Practical  Identification of carbohydrates | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 10 | Carboxylic  Acids and Their  Derivatives    Practical Scheme for identification of unknown organic  compounds | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 11 | Amines  Practical  Revision | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 12 | Poly functional compounds  Practical  Practical exam | X | x |  |  |  |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each  composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a2,b2,c2 |
| 2 | Semester work (sheets, quizzes) | A1/B1 | c2/c1 |
| 3 | Practical Examination | A1/B1 | c2/c1 |
| 4 | Final term examination | A1/B1 | a2/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets, quizzes) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | T. W. Graham Solomons; Organic Chemistry 12th edition, Wiley, 2017. |
| 2 | Francis, A. Carey and Robert M. Giuliano; Organic Chemistry 11th edition, WCB/McGraw-Hill, 2019. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 6 | Sound system |
| 2 | Presenter | 7 | Wireless internet |
| 3 | White board |  |  |
| 4 | Data show system |
| 5 | Lab |

1. Matrix of teaching and learning methods:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Organic Chemistry: basic concepts | 1 | A1 | a2,b2 |
| Practical  Identification of hydrocarbons | A1 | a2 |
| 2 | Alkanes | 1 | B1 | c1 |
| Practical  Identification of alcohols | A1 | a2 |
| 3 | Stereochemistry | 1 | A1 | c2 |
| Practical  Identification of phenols | A1 | a2 |
| 4 | Alkenes | 1 | B1 | c1 |
| Practical  Identification of aldehydes and ketones | A1 | a2 |
| 5 | Alkynes | 1,8 | B1 | c1 |
| Practical  Identification of aliphatic carboxylic acid | A1 | a2 |
| 6 | Aromatic Compounds | 1,8 | B1 | c1 |
| Practical  Identification of aromatic | A1 | a2 |
| 7 | Alcohols | 1,8 | B1 | c1 |
| Practical  Identification of salt of carboxylic acids | A1 | a2 |
| 8 | Ethers | 1,8 | B1 | c1 |
| Practical  Identification of amines | A1 | a2 |
| 9 | Aldehydes and Ketones | 1,8 | B1 | c1 |
| Practical  Identification of carbohydrates | A1 | a2 |
| 10 | Carboxylic Acids and Their Derivatives | 1,8 | B1 | c1,b1 |
| Practical  Scheme for identification of unknown  organic compounds | A1 | a2 |
| 11 | Amines | 1,8 | B1 | c1 |
| Practical Revision | A1 | a2 |
| 12 | Poly functional compounds | 1,8 | A1,B1 | a2,a1 |

Head of Department: Asso.prof. Khalid Samir

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Inorganic Chemistry

CHE 203

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Inorganic Chemistry |
| Course Code | CHE 203 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the inorganic chemistry experiments to manage resources creatively. |
| 8 | Consider the impact of inorganic chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2. 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    b2. 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.    c2. Develop suitable experimentation and/or simulation. |
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | d2. Work in stressful environment |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Atomic structure – periodic table  Practical   * Introduction in investigation for Acidic and basic Radical in sample salts * Dilute HCl group * Concentrated H2SO4 group | 6 | - | 12 |
| 2 | Chemical bonding | 4 | - | - |
| 3 | Representative elements (from Gr.1 to gr.7) Practical   * Miscellaneous group * Scheme of identification of acidic radical * Investigation for Basic Radical in sample salts group Dil. HCl * Dil. HCl + H2S group * NH4OH + NH4Cl group * NH4OH + NH4Cl + H2S group | 12 | - | 12 |
| 4 | Nobel gases, Lanthanides and Actinides  Practical   * NH4OH + NH4Cl + (NH4)2 CO3 group * Scheme of identification of basic | 6 | - | 4 |
|  | Total | 28 |  | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped  Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Atomic structure – periodic table  Practical   * Introduction in investigation for Acidic and basic Radical in sample salts * Dilute HCl group * Concentrated   H2SO4 group | x | x |  |  |  |  |  |  |  | x |  |  |  | X |
| 2 | Chemical bonding | x | x |  |  |  |  |  |  |  | x |  |  |  | X |
| 3 | Representative elements  (from Gr.1 to  gr.7) Practical   * Miscellaneous group * Scheme of   identification of acidic radical   * Investigation for Basic Radical in sample salts group Dil. HCl * Dil. HCl + H2S group NH4OH + NH4Cl group * NH4OH + NH4Cl + H2S group | x | x |  |  |  |  |  |  |  | x |  |  |  | X |
| 4 | Nobel gases,  Lanthanides and  Actinides  Practical   * NH4OH + NH4Cl   + (NH4)2 CO3 group   * Scheme of   identification of  basic Radical | x | x |  |  |  |  |  |  |  | x |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A2 | a2,b2 |
| 2 | Semester work (sheets ,quiz , presentation ) | A2/A7 | c2/d2 |
| 3 | Practical Examination | A2/A7 | c2/d2 |
| 4 | Final term examination | A2 | a2,b2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets ,quiz , reports, presentation ) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets ,quiz ,reports, presentation ) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Housecroft, Catherine E., And Alan G. Sharpe. Inorganic Chemistry. 3rded.Harlow: PeasonEducation, 2008. |
| 2 | Dr./ R.D. Madan, Modern inorganic chemistry, S. Chand Publishing, 2019 |
| 3 | Petrucci,Ralph H.,Harwood, William S.,Herring ,F.G., And Madura Jeffrey D. “ General Chemistry : Principles & Modern Applications’’ 9th Ed. New Jersey : Peasrson Education , Inc., 2007.Print |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Atomic structure – periodic table | 6 | A2 | a2 |
| Practical   * Introduction in investigation for Acidic and basic Radical in sample salts * Dilute HCl group * Concentrated H2SO4 group | A2/A7 | b2,c2/d2 |
| 2 | Chemical bonding | 6 | A2 | a2 |
| 3 | Representative elements (from Gr.1 to gr.7) | 6,8 | A2 | a2 |
|  | Practical   * Miscellaneous group * Scheme of identification of acidic radical * Investigation for Basic Radical in sample salts group Dil. HCl * Dil. HCl + H2S group * NH4OH + NH4Cl group * NH4OH + NH4Cl + H2S group |  | A2/A7 | b2,c2/d2 |
| 4 | Nobel gases, Lanthanides and Actinides | 6 | A2 | a2 |
| Practical   NH4OH + NH4Cl + (NH4)2 CO3 group  Scheme of identification of basic | A2/A7 | b2,c2/d2 |

Course Coordinator: Dr. Ramadan El kateb

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Strength of Materials

(ENG 205)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Strength of Materials |
| Course Code | ENG 205 |
| Year/Level | level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | ENG 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1.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.  b1. 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.  c2. Practice the neatness and aesthetics in design to approach stresses in beams, torsional stresses, and pressure vessels  c3.Apply engineering knowledge and understanding to improve design, products and/or services, normal stress, direct shear stress, stresses in beams, torsional stresses, pressure vessels,mohr`s cycle. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Simple states of stress and strain | 2 | 2 | - |
| 2 | Tension and compression stress | 4 | 4 | - |
| 3 | Shear stress in bolts | 4 | 4 | - |
| 4 | Bending and shearing stresses in beams | 4 | 4 | - |
| 5 | Torsion stresses | 2 | 2 | - |
| 6 | Deflection of Beams | 4 | 4 |  |
| 7 | Analysis of thin-walled pressure vessels | 4 | 4 | - |
| 8 | Analysis of plane stress | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online  Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Simple states of stress and strain | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Tension and compression stress | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Shear stress in bolts | x | X |  |  | x | X |  |  |  |  |  |  |  |  |
| 4 | Bending and shearing stresses in beams | x | X |  |  | x | X |  |  |  |  |  |  |  |  |
| 5 | Torsion stresses | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 6 | Deflection of Beams | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 7 | Analysis of thin-walled pressure vessels | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 8 | Analysis of plane stress | x | x |  |  | x | X |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Mid Term examination | A1 | a1,b1 |
| 2 | Semester work( quizzes, sheets, report) | A1 | c2,c3 |
| 3 | Final term examination | A1 | a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work | 2𝑛𝑑, 7𝑡ℎ , 9𝑡ℎ |
| 2 | Mid Term examination | 8𝑡ℎ |
| 3 | Final term examination | 15𝑡ℎ |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Mid-term examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference list |
| 1 | T. D. Gunneswara Rao and Mudimby Andal " Strength of Materials: Fundamentals and |
| 2 | Akira Todoroki " Fundamentals of Mechanics of Materials: Part 1 Stress, Strain, Torsion" 2017. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. |  |  | Facility |
| 1 | Lecture classroom |  |  |
| 2 | Seminar |  |  |
| 3 | White board |  |  |
| 4 | Data Show system |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Simple states of stress and strain | 2 | A1 | a1, b1 |
| 2 | Tension and compression stress | 2 | A1 | a1, b1 |
| 3 | Shear stress in bolts | 2 | A1 | a1, b1 |
| 4 | Bending and shearing stresses in beams | 2 | A1 | a1, b1 |
| 5 | Torsion stresses | 2 | A1 | a1, b1 |
| 6 | Deflection of Beams | 2 | A1 | c3 |
| 7 | Analysis of thin-walled pressure vessels | 2 | A1 | c2,c3 |
| 8 | Analysis of plane stress | 2 | A1 | c2,c3 |

Course Coordinator: Dr. A. E. Kabeel

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Introductions to Information Technology

(ENG206)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Introductions to Information Technology |
| Course Code | ENG206 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice web design project , |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A4.Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | a2. List the engineering-related business and management principles.  a3. Define contemporary engineering technologies and their applications in relation to engineering field & applications  c3. Utilize modern technologies related by different engineering fields |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1. Communicate effectively.  d2. Demonstrate efficient IT capabilities. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction to information systems | 4 | - | - |
| 2 | Software and hardware used in information systems | 6 | 4 | - |
| 3 | Communication and Networks | 4 | - | - |
| 4 | Computer Networking | 6 | - | - |
| 5 | The internet; the foundations, Resources and uses of the internet, Emphasizing practical skills for finding, Reading and authorizing materials | 4 | 4 | - |
| 6 | Privacy Security and Ethics | 4 | - | - |
| 7 | Web Design using HTML Language and applications | - | 20 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online  Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Introduction to information systems | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Software and hardware used in information systems | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Communication and Networks | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 4 | Computer Networking | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 5 | The internet; the foundations, Resources and uses of the internet, Emphasizing practical skills for finding,  Reading and authorizing materials | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Privacy Security and Ethics | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 7 | Web Design using HTML Language and  applications | x | x |  |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among  different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A4 | a2,a3,c3 |
| 2 | Semester work(quizzes, sheets, report) | A8/A4 | d1,d2/c3 |
| 3 | Final term examination | A4 | a2, c3,a3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th,14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weights |
| 1 | Mid-term examination | 20% |  |
| 2 | final examination | 60% |  |
| 3 | Semester work | 20% |  |
|  | Total | 100% |  |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Computing essentials timothy, O' leary and linda ,2014 . |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
| No. | Facility |
| 1 | Lecture classroom |
| 2 | Presenter |
| 3 | Computer lab. |
| 4 | White board |
| 5 | Data show system |
| 6 | Wireless internet |
| 7 | Sound system |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction to information systems | 4 | A4 | a2 |
| 2 | Software and hardware used in information systems | 4 | A4 | a2 |
| 3 | Communication and Networks | 4 | A4 | a3, c3 |
| 4 | Computer Networking | 4 | A4 | a3, c3 |
| 5 | The internet; | 4 | A4 | a3, c3 |
| 6 | Privacy Security and Ethics | 4 | A4 | a3, c3 |
| 7 | Web Design using HTML Language and applications | 4 | A8 | d1,d2 |

Course Coordinator: Dr. Amira Elsonbaty

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Technical Report Writing

(ENG207)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Technical Report Writing |
| Course Code | ENG207 |
| Year/Level | Level 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 1 | - | 2 |

2- Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 5 | Communicate effectively with a variety of audiences using a variety of forms, methods, and languages; cope with academic and professional issues in a critical and creative manner; and display leadership, business administration, and entrepreneurial abilities. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | a1. Define technical language and report writing.  a2.Write technical language and technical report writing through sequence steps (identify report section, present your report, cite reference and add figures and tables).  b1. Assess different ideas, views, and knowledge from a range of sources.  b2. Evaluate results of report models by analyzing percentage of plagiarism and rules of scientific report and rules of presentation.  c1. Prepare technical reports  d1. 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. | d1. Communicate effectively.  d2.Demonstrate efficient IT capabilities. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction to technical writing.   * Define a report, Types of reports, Aim * Common concepts: clarity of Writing, Consistency * Supporting Material * Language rules (voice, tense) and Style | 2 | - | - |
| 2 | Common components of a technical report   * Organization of report sections * Sections function and content | 2 | - | - |
| 3 | How to write a technical report   Identify layout, Determine Audience   Assign reference, add non text component   Mechanics of report writing.   Quantitative Writing | 2 | - | - |
| 4 | Equations, Tables and Figures | 1 | - | - |
| 5 | Literature citations | 1 | - | - |
| 6 | Using word processing for Writing Report | 1 | - | 8 |
| 7 | Creating slides with presentation graphics programs | 1 | - | 4 |
| 8 | MS Excel Application and power view report command | 2 | - | 8 |
| 9 | Database Report using MS SQL | 2 | - | 8 |
|  | Total | 14 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Introduction to technical writing.   * Define a report, Types of reports,   Aim   * Common concepts: clarity of Writing, Consistency * Supporting Material * Language rules   (voice, tense) and  Style | x | x |  | x | X |  |  |  |  |  |  |  |  |  |
| 2 | Common components of a technical report   * Organization of report sections * Sections function and content | x | x |  | x | X |  |  |  |  |  |  |  |  |  |
| 3 | How to write a technical report   * Identify layout,   Determine  Audience   * Assign reference, add non text component * Mechanics of report writing. * Quantitative Writing | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 4 | Equations, Tables and Figures | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 5 | Literature citations | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 6 | Using word  processing for Writing Report | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 7 | Creating slides with presentation graphics programs | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 8 | MS Excel Application  and power view report  command | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 9 | Database Report using  MS SQL | x | x |  |  | X |  |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of  students |

1. Student Evaluation :
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A5 | a1,a2 |
| 2 | Semester work(quizzes, sheets, report, presentation) | A5/A8 | c1,d1/d2 |
| 3 | Practical Examination | A5/A8 | c1/d1,d2 |
| 4 | Final term examination | A5 | b1,b2,a1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th,13th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | final examination | 60% |
| 3 | Practical examination | 10% |
| 4 | Semester work | 20% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | How to write technical report, 2010 by lutezhering. |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Presenter |  |
| 3 | Computer lab. |  |
| 4 | White board |  |
| 5 | Data show system |  |
| 6 | Wireless internet |  |
| 7 | Sound system |  |

Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Topic | Aims | Competencies | LO’s |
| 1 | Introduction to technical writing.   * Define a report, Types of reports, Aim * Common concepts: clarity of Writing, Consistency * Supporting Material * Language rules (voice, tense) and Style | 5 | A5 | a1 |
| 2 | Common components of a technical report   * Organization of report sections * Sections function and content | 5 | A5 | a2 |
| 3 | How to write a technical report   Identify layout, Determine Audience   Assign reference, add non text component   Mechanics of report writing.   Quantitative Writing | 5 | A5 | c1 |
| 4 | Equations, Tables and Figures | 5 | A5 | a2 |
| 5 | Literature citations | 5 | A5 | b1,d1 |
| 6 | Using word processing for Writing Report | 5 | A5 | b2 |
| 7 | Creating slides with presentation graphics programs | 5 | A8 | d1,d2 |
| 8 | MS Excel Application and power view report command | 5 | A8 | d1,d2 |
| 9 | Database Report using MS SQL | 5 | A5 | b2 |

Course Coordinator: Dr / hany hashish

Head of Department: Dr. Amira Elsonbaty

Date of Approval: 2022

Engineering Probability and Statistics

# (MTH301)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical EngineeringDepartment |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Engineering Probability and Statistics |
| Course Code | MTH301 |
| Year/Level | Level: 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | The ability to apply probability theories and hypothesis testing in analytic critical and systemic thinking to solve engineering problems of varying complexity and variation. |
| 6 | Analyze data from the intended tests to manage resources creatively |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1.Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Describe the relevant mathematical principles and theories in the discipline.  a2. Explain the scientific principles and theories that apply to the topic.  b1. Use math ideas and theories that are applicable to the field. |
|  | b3. Applying engineering basics that are relevant to the subject.  c2. Identify, formulate, and solve complex engineering problems by applying the concepts and the theories of sciences, appropriate to the discipline. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Probability theory | 4 | 4 | - |
| 2 | Discrete and continuous probability distributions | 6 | 6 | - |
| 3 | Statistics in engineering | 4 | 4 | - |
| 4 | Descriptive Statistics Sampling distributions | 2 | 2 | - |
| 5 | Estimation and confidence intervals | 4 | 4 | - |
| 6 | Hypothesis testing | 4 | 4 | - |
| 7 | Simple regression | 4 | 4 | - |
|  | Total | 28 | 28 |  |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Probability theory | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 2 | Discrete and continuous probability distributions | x | x |  |  | x |  | x |  |  |  |  |  |  |  |
| 3 | Statistics in engineering | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 4 | Descriptive Statistics  Sampling  distributions | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 5 | Estimation and confidence intervals | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 6 | Hypothesis testing | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 7 | Simple regression | x | x |  |  | x | x | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation:
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b3 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,c2 |
| 3 | Final term examination | A1 | a2,b1,b3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | E. Kreyszig "Advanced Engineering Mathematics" 11th edition, John Wiley and Sons,  Inc. 2009 |
| 2 | Andrew Metcalfe, [David Green,](https://www.routledge.com/search?author=David%20Green) [Tony Greenfield,](https://www.routledge.com/search?author=Tony%20Greenfield) [Mayhayaudin Mansor,](https://www.routledge.com/search?author=Mayhayaudin%20Mansor)  [Andrew Smith,](https://www.routledge.com/search?author=Andrew%20Smith) [Jonathan Tuke](https://www.routledge.com/search?author=Jonathan%20Tuke) " Statistics in Engineering  With Examples in MATLAB" 2nd Edition, Chapman and Hall/CRC (2019). |

1. Facilities required for teaching and learning:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. |  |  |  | Facility |
| 1 | Lecture classroom |  |  |  |
| 2 | Presenter |  |  |  |
| 3 | White board |  |  |  |
| 4 | Data show system |  |  |  |
| 5 | Sound system |  |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Probability theory | 1 | A1 | a1 |
| 2 | Discrete and continuous probability distributions | 6 | A1 | a2 |
| 3 | Statistics in engineering | 1 | A1 | b3 |
| 4 | Descriptive Statistics Sampling distributions | 1 | A1 | b1 |
| 5 | Estimation and confidence intervals | 1 | A1 | c2 |
| 6 | Hypothesis testing | 6 | A1 | c2 |
| 7 | Simple regression | 6 | A1 | c2 |

Course Coordinator: Dr Samar madin

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Physical Chemistry

CHE 301

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Physical Chemistry |
| Course Code | CHE 301 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Apply acquired knowledge of physical chemistry in real-world situations by applying theories in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 6 | Analyze data from the physical chemistry experiments to manage resources creatively. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying  engineering fundamentals, basic science and mathematics. | a2. Define the scientific principles and theories that apply to the physical chemistry.  b2. Apply scientific concepts and theories that are relevant to the physical chemistry.    c2. Solve complex engineering problems by applying the concepts and the theories of physical chemistry, appropriate to the 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, | a1. Recognize the principles of physical chemistry including chemical reaction equilibrium, chemical kinetic reactions and thermodynamics. |
| Heat Transfer, Momentum Transfer, Kinetics of Chemical Reactions, Reactor Design, Instrumentation and Control of Chemical Processes, and Process and Plant Design. | b1. Summarize the appropriate techniques relevant to physical chemistry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Gases (Ideal gas, real gas) | 4 | - | - |
| 2 | Solutions (true and colloidal solutions) Practical   The nature of Copper – Ammonia Complex in aqueous Solution | 4 | - | 4 |
| 3 | Chemical kinetics (Rate of reaction)  Practical   * Study of Homogeneous Catalytic Decomposition of H2O2 by Initial Rate Method * Catalytic decomposition H2O2 * Determination of The order of the reaction between H2O2 and HI | 10 | - | 20 |
| 4 | Chemical equilibrium | 4 | - | - |
| 5 | Surface chemistry (Adsorption)  Practical   Adsorption of Oxalic Acid on Charcoal | 4 | - | 4 |
| 6 | Chemical thermodynamic | 2 | - | - |
|  | Total | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Gases (Ideal gas, real gas) | x | X |  |  |  |  |  |  |  | x |  |  |  |  |
| 2 | Solutions (true and colloidal solutions)  Practical   The nature of Copper – Ammonia Complex in aqueous Solution | x | X |  |  |  |  |  |  |  |  |  |  |  | X |
| 3 | Chemical kinetics  (Rate of reaction)  Practical   * Study of Homogeneous   Catalytic  Decomposition of H2O2 by  Initial Rate  Method   * Catalytic decomposition   H2O2 | x | X |  |  | X |  |  |  |  |  |  |  |  | X |
|  |  Determination of The order of the reaction between H2O2 and HI |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Chemical equilibrium |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Surface chemistry  (Adsorption)  Practical   Adsorption of Oxalic Acid on  Charcoal | x | X |  |  |  |  |  |  |  |  |  |  |  | x |
| 6 | Chemical thermodynamic | x | X |  |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1/A1 | a1/a2,b2 |
| 2 | Semester work (sheets ,quizs , presentation ) | B1/A1 | a1/c2 |
| 3 | Practical Examination | B1/A1 | b1/c2 |
| 4 | Final term examination | A1/B1 | a2, b2/ a1, b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs , presentation ) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets, quizs , presentation ) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Atkins, P. W., Physical Chemistry, Oxford University Press, 9th. Ed., 2006. |
| 2 | Farrington Daniels and Robert A. Alberty, Physical Chemistry, John Wiley & Sons, 7th. Ed., 1987. |
| 3 | Bruno Linder, Elementary Physical Chemistry, World Scientific Publishing, 2010. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Gases (Ideal gas, real gas) | 1 | A1 | a2 |
| 2 | Solutions (true and colloidal solutions) | 1,6 | A1 | b2,c2 |
| Practical   The nature of Copper – Ammonia Complex in aqueous Solution |
| 3 | Chemical kinetics (Rate of reaction) | 6 | B1 | a1 |
|  | Practical   * Study of Homogeneous Catalytic Decomposition of H2O2 by Initial Rate Method * Catalytic decomposition H2O2 * Determination of The order of the reaction between H2O2 and HI |  |  |  |
| 4 | Chemical equilibrium | 6 | B1 | a1 |
| 5 | Surface chemistry (Adsorption) | 6 | B1 | a1,b1 |
| Practical   Adsorption of Oxalic Acid on Charcoal |
| 6 | Chemical thermodynamic | 1,6 | B1 | a1,b1 |

Course Coordinator: Dr. Mohamed fakeeh

Head of Department: Asso.prof.Hend Elsayed Gadow Date of Approval: 2022

Material Science and Metallurgy

CHE 302

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Material Science and Metallurgy |
| Course Code | CHE 302 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | ENG 205 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, related to materials and metallurgy engineering to required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 6 | Analyze data from intended metallurgy and material science tests in order to utilise resources creatively. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2. Explain the fundamentals of metallurgy and material science by looking at different sorts of components and crystal systems. |
|  | b2. Using metallurgical and material science principles and theories to evaluate the properties of point and line defects in solids in order to calculate the volume of a unit cell using lattice translation vectors and atomic density along directions, planes, and volumes in a unit cell.  c2. Address challenging engineering challenges by applying science concepts and theories to metallurgy and material science problems |
| 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 | d1. Engage in the recent technological changes and emerging fields relevant to materials science and material science to respond to the challenging role and responsibilities of a professional chemical engineer . |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Structure of metals and alloys(crystalline structure of metals-types of deformation) | 10 | 10 | - |
| 2 | Structure of ceramics and glasses (theories and applications) | 4 | 4 | - |
| 3 | Structure of polymers | 4 | 4 | - |
| 4 | Thermodynamics of condensed phase(equilibrium phase diagrams of binary systems, the iron carbon phase diagram, phase transformations in steel) | 4 | 4 | - |
| 5 | metals and alloys(Casting- Melting-  Forming Operations- Solidification) | 6 | 6 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Structure of metals and alloys(crystalline structure of metals types of deformation) | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Structure of ceramics and glasses (theories and applications) | x | x | X |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Structure of polymers | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Thermodynamics of condensed phase(equilibrium phase diagrams of binary systems, the iron carbon phase diagram, phase transformations in steel) | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 5 | metals and alloys(Casting- Melting- Forming  Operations-  Solidification) | x | x |  |  | x | X |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a2,b2 |
| 2 | Semester work (sheets, quizs , presentation ) | B2 /A1 | d1/c2 |
| 3 | Final term examination | A1/B2 | a2,b2/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Introduction to Materials Science for Engineers 8th Edition, 2014 |
| 2 | Advances in Materials Science and Engineering,2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Structure of metals and alloys(crystalline structure of metals-types of deformation) | 4 | A1 | a2,b2 |
| 2 | Structure of ceramics and glasses (theories and applications) | 4 | A1 | a2,c2 |
| 3 | Structure of polymers | 4 | B2 | d1 |
| 4 | Thermodynamics of condensed phase(equilibrium phase diagrams of binary systems, the iron carbon phase diagram, phase transformations in steel) | 6 | A1 | c2 |
| 5 | metals and alloys(Casting- Melting- Forming Operations- Solidification) | 6 | B2 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Fluid Mechanics

(ENG 301)

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Fluid Mechanics |
| Course Code | ENG301 |
| Year/Level | level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | ENG 102 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 1 | 1 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of Fluid Mechanics knowledge and specialized skills, as well as the ability to understand and apply physical concept knowledge in real-world situations by applying fluid mechanics basic theories. Also, to Apply knowledge of science and engineering concepts to study fluid properties, fluid statics and fluid dynamics and to abstract course knowledge that give him or her, the ability to think, identify, diagnose, and solve engineering problems of varying complexity and variation in real world as an engineer. |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice of fluid mechanics by taking full responsibility for one's own learning and development,  participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 8 | Consider the impact of fluid mechanics study in real world, and its strong relation with environment and almost of all the technology fields upgrades. |

1. Competencies

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Define concepts of energy, momentum equations and dimensional analysis (laminar and turbulent flow).    a2. Explain the basic principles of fluid mechanics engineering.    b1. Analyze various ideas and views for different forces on immersed bodies.    b2. Using scientific concepts and theories that are relevant to the fluid mechanics.    b3. Applying engineering basics that are relevant to the subject. |
| 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. | a1. Apply knowledge of Bernoulli and continuity equations for experiments of Venturi meter and losses in pipes.  a2. Analyze data in laboratory and in pipes and pumps field.    b1. Conduct basic experiments to learn about the basic characteristics and features of fluids for statics and dynamics branches. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Fluid properties, fluid statics, kinematics | 2 | 2 | 2 |
| 2 | Fluid dynamics including energy and Momentum equations | 4 | 2 | 2 |
| 3 | Dimensional analysis, Laminar flow, Turbulent flow and its applications | 2 | 2 | 2 |
| 4 | Forces on immersed bodies, Introduction to compressible flow | 4 | 2 | 2 |
| 5 | Applications to filtration and fluidization | 4 | 2 | 2 |
| 6 | Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes | 6 | 2 | 2 |
| 7 | Center of pressure, Flow measuring apparatus, multi-pump test (Pump characteristics) and losses in piping systems | 6 | 2 | 2 |
| Total | | 28 | 14 | 14 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and  movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Fluid properties, fluid statics, kinematics | X | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 2 | Fluid dynamics including energy and Momentum equations | X | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 3 | Dimensional analysis,  Laminar flow,  Turbulent flow and its applications | X | x |  |  | X |  | x |  |  |  |  |  |  |  |
| 4 | Forces on immersed bodies, Introduction to compressible flow | X | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 5 | Applications to filtration and fluidization | X | x |  |  | X |  |  |  |  | x |  |  |  |  |
| 6 | Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes | X | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 7 | Center of pressure, Flow measuring apparatus, multi-pump test (Pump characteristics) and losses in piping systems | x | x |  |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low, medium and high performance students. | Knowledge and skills transfer among different levels of students |

1. Student Evaluation :
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1,b2,b3 |
| 2 | Semester work(quizzes, sheets, report) | A1 | a1,b2 |
| 3 | Practical examination | A2 | b1,a2 |
| 4 | Final term examination | A1/A2 | a1,a2,b1,b2,b3/a1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd ,7th,9th |
| 3 | Practical examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation :

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Mid-term examination | 10% |
| 2 | final examination | 60% |
| 3 | Practical examination | 10% |
| 4 | Semester work | 20% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Gerhart, Philip M., Andrew L. Gerhart, and John I. Hochstein. Munson, Young and Okiishi's Fundamentals of Fluid Mechanics. John Wiley & Sons, 2016. |
| 2 | Schetz, J. A., & Fuhs, A. E. (Eds.). (2011). Fundamentals of fluid mechanics. John Wiley & Sons. |
| 3 | Young, D. F., Munson, B. R., Okiishi, T. H., & Huebsch, W. W. (2010). A brief introduction to fluid mechanics. John Wiley & Sons. |

1. Facilities required for teaching and learning:

|  |  |
| --- | --- |
|  | Facility |
| 1 | Lecture classroom |
| 2 | Seminar |
| 3 | Computer lab. |
| 4 | White board |
| 5 | Data Show system |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Fluid properties, fluid statics, kinematics | 1 | A1 | a1,a2 |
| 2 | Fluid Dynamics including Energy and Momentum equations | 1 | A1 | a1 |
| 3 | Dimensional analysis, laminar flow, turbulent flow and its applications | 1 | A1 | a1 |
| 4 | forces on immersed bodies, introduction to compressible flow | 4 | A1 | b1 |
| 5 | Applications to filtration and fluidization | 8 | A1 | b2,b3 |
| 6 | Laboratory course in Fluid Mechanics includes experiments on venture-meter, friction losses in pipes | 4,8 | A2 | a2 |
| 7 | Center of pressure, flow measuring apparatus, multi-pump test (Pump characteristics) and losses in piping systems | 4,8 | A2 | a1,b1 |

Course Coordinator: Dr / Motaz Mostafa

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Principles of Engineering Design

ENG 302

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Principles of Engineering Design |
| Course Code | ENG 302 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | ENG 103 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of Machine Design knowledge and specialized skills, as well as the ability to understand and apply physical concept knowledge in real-world situations by applying Machine Design basic theories. Also, to Apply knowledge of science and engineering concepts to study Machine Design, and to Design a system for component, process, and mechanical component to develop a complete mechanical system. |
| 3 | Use the techniques, skills, and current engineering tools required for engineering practice of Machine Design applications by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to developing and design machine parts and consider the impact of Machine Design study in real world, and its strong relation with environment and almost of all the technology fields upgrades. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying  engineering fundamentals, basic science and mathematics. | a3 State the principles of system design including elements design, process and the including element, process, and system related to disciplines.    b2 Combine different ideas, views, and knowledge from a range of sources for evaluation the characteristics and performance of components, systems and processes.    b3 Investigate the failure of structural components, systems, and processes. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Design definition  Classifications of machine design  Mechanical Elements Design  General considerations in Machine design  Phases and Interactions of the Design Process  Common Dimensioning Terminology  Standards and Codes | 2 | 2 | - |
| 2 | Forces and Stress Analysis  Load and Stress Analysis,  Stresses, strains and material properties  Stresses and strains Analysis | 6 | 6 | - |
| 3 | Principal Stresses and Shear Stresses  Hoop Stress, (Pressure vessels, and Pipelines)  Bearing Stress | 2 | 2 | - |
| 4 | Torsional Shear Stress  Impact Stress  Bending Stress in Straight Beams  Buckling of Columns | 4 | 4 | - |
| 5 | Power Screw  Multiple Threaded Screws  Terminology of Power Screw  Torque Requirement, Lifting and Lowering  Design of Screw and Nut, Design of Screw Jack | 4 | 4 | - |
| 6 | Flexible Drives  Belt Drives | 2 | 2 | - |
| 7 | Flat Belt Pulleys  Types of Pulleys for Flat Belts  Cast Iron Pulleys  Steel Pulleys  Wooden Pulleys  Rolling-Contact Bearings | 6 | 6 | - |
| 8 | Sliding Contact Bearings  Journal Bearings  Gear Drives | 2 | 2 |  |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Design definition  Classifications of machine design  Mechanical Elements Design  General considerations | x | X | X |  | X |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | in Machine design  Phases and Interactions of the Design Process  Common  Dimensioning  Terminology  Standards and Codes |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Forces and Stress Analysis  Load and Stress  Analysis,  Stresses, strains and material properties  Stresses and strains Analysis | x | X |  |  | X | X |  |  |  |  |  |  |  |  |
| 3 | Principal Stresses and Shear  Stresses  Hoop Stress, (Pressure vessels, and  Pipelines)  Bearing Stress | x | X |  |  | x | X | X |  |  |  |  |  |  |  |
| 4 | Torsional Shear Stress  Impact Stress  Bending Stress in  Straight Beams  Buckling of Columns | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 5 | Power Screw  Multiple Threaded  Screws  Terminology of  Power Screw  Torque Requirement,  Lifting and Lowering  Design of Screw and  Nut, Design of Screw  Jack | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 6 | Flexible Drives Belt Drives | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 7 | Flat Belt Pulleys  Types of Pulleys for  Flat Belts  Cast Iron Pulleys  Steel Pulleys  Wooden Pulleys  Rolling-Contact  Bearings |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 8 | Sliding Contact  Bearings  Journal Bearings Gear Drives | x | x |  |  | x | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a3,b2,b3 |
| 2 | Semester work | A1 | a3 |
| 3 | Final term examination | A1 | b2,b3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Budynas, R. G., & Nisbett, J. K. (2015). Shigley's mechanical engineering design. Mc Graw Hill. |
| 2 | Alred, G. J., Brusaw, C. T., & Oliu, W. E. (2019). Handbook of technical writing (No. 1, pp. 1-xxii). Bedford/St. Martins,. |
| 3 | Philpot, T. A. (2012). Mechanics of materials: an integrated learning system. |
| 4 | Laplante, P. A. (2018). Technical Writing: A Practical Guide for Engineers, Scientists, and Nontechnical Professionals. CRC Pres |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Design definition  Classifications of machine design Mechanical Elements Design General considerations in Machine design  Phases and Interactions of the Design Process  Common Dimensioning Terminology  Standards and Codes | 1 | A1 | a3 |
| 2 | Forces and Stress Analysis  Load and Stress Analysis,  Stresses, strains and material properties  Stresses and strains Analysis | 1 | A1 | b2 |
| 3 | Principal Stresses and Shear Stresses  Hoop Stress, (Pressure vessels, and Pipelines) Bearing Stress | 1 | A1 | a3 |
| 4 | Torsional Shear Stress  Impact Stress  Bending Stress in Straight Beams  Buckling of Columns | 3 | A1 | b2,b3 |
| 5 | Power Screw  Multiple Threaded Screws  Terminology of Power Screw  Torque Requirement, Lifting and Lowering  Design of Screw and Nut, Design of Screw Jack | 3 | A1 | b2,b3 |
| 6 | Flexible Drives  Belt Drives | 3 | A1 | b3 |
| 7 | Flat Belt Pulleys  Types of Pulleys for Flat Belts  Cast Iron Pulleys  Steel Pulleys  Wooden Pulleys  Rolling-Contact Bearings | 3 | A1 | b3 |
| 8 | Sliding Contact Bearings  Journal Bearings  Gear Drives | 3 | A1 | b3 |

Course Coordinator: Dr / Yasser Twfiq

Head of Department :Asso.prof.Amal Bahiry

Date of Approval: 2022

Engineering Economy

(ENG303)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical engineering Program |
| Department Offering the Program | Chemical engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Engineering Economy |
| Course Code | ENG303 |
| Year/Level | Level3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 1 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1. List the economic concepts related to characteristics in engineering analysis to improve the engineering process.  a2. Recognize business and management principles relevant to engineering for replacement and depreciation of equipment to reduce the cost of operations.  b1. Combine different ideas, views, and knowledge from a range of sources to evaluate the characteristics of project economic  c1. Assess economic, societal, and environmental dimensions and risk management in engineering design. |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | a2. List the engineering-related economy.  b1. Innovate economy methodical approaches when dealing with new and advancing technology.  c2 Use fundamental economy organizational abilities. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic concepts of engineering economy | 4 | 4 | - |
| 2 | Break even analysis | 4 | 4 | - |
| 3 | Time value of money | 6 | 6 | - |
| 4 | Depreciation and replacement analysis | 4 | 4 | - |
| 5 | Selection between alternatives | 6 | 6 | - |
| 6 | Productivity | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Basic concepts of engineering economy | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Break even analysis | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | Time value of money | x | x |  |  | x |  | X |  |  |  |  |  |  |  |
| 4 | Depreciation and replacement analysis | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 5 | Selection between alternatives | x | x |  |  | x |  | x |  |  |  |  |  |  |  |
| 6 | Productivity | x | x |  |  | x | X |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Mid Term exam | A3 | a1,a2 |
| 2 | Semester work(quizzes, sheets, report) | A3/A4 | a1, c1 /c2 |
| 3 | Final term examination | A3 /A4 | a2,b1,c1/a2,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work (quiz, report) | 6𝑡ℎ , 11𝑡ℎ |
| 2 | Mid Term examination | 8𝑡ℎ |
| 3 | Final term examination | 15𝑡ℎ |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Mid-term examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Engineering economic and financial accounting, A.R.Argasri and VVR McGrawHill,New Delhi,2006 |
| 2 | Industrial Engineering M.I.KHAN, New-Age publishers, New Delhi,2008 |
| 3 | Engineering Economics RajanMisra, University science press, New Delhi,2009 |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Seminar |  |
| 3 | White board |  |
| 4 | Data Show system |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic concepts of engineering economy | 2 | A4 | a2 |
| 2 | Break even analysis | 2 | A3 | a1 |
| 3 | Time value of money | 2 | A3 | a2 |
| 4 | Depreciation and replacement analysis | 2 | A4 | b1,c2 |
| 5 | Selection between alternatives | 2 | A3 | b1,c1 |
| 6 | Productivity | 2 | A3 | c1 |

Course Coordinator: Dr. Hany Hashish

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Numerical Methods in Engineering

# (MTH302)

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Numerical Methods in Engineering |
| Course Code | MTH302 |
| Year/Level | Level: 2 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre- request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying numerical theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1.Identify, formulate, and solve complex engineering problems by applying  engineering fundamentals, basic science and mathematics. | a1. Describe the relevant mathematical principles and theories in the discipline.    a2. Explain the scientific principles and theories that apply to the topic.      b1. Using math ideas and theories that are applicable to the field.    b2. Using scientific concepts and theories that are relevant to the profession.  c1. solve complex engineering problems by applying the concepts and the theories of mathematics    c2. Identify complex engineering problems by applying the concepts and the theories of sciences, appropriate to the discipline. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Numerical solution of linear and nonlinear systems | 4 | 4 | - |
| 2 | Numerical differentiation and integration | 6 | 6 | - |
| 3 | Curve fitting and interpolation | 10 | 10 | - |
| 4 | Numerical solution of initial value problems | 4 | 4 | - |
| 5 | Boundary and Eigen value problems | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Numerical solution of linear and nonlinear systems | X | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 2 | Numerical differentiation and integration | X | x |  |  | X |  | x |  |  |  |  |  |  |  |
| 3 | Curve fitting and interpolation | X | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 4 | Numerical solution of initial value problems | X | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 5 | Boundary and Eigen value problems | X | x |  |  | X | X |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student Evaluation :
   1. Student Evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work( quizzes, sheets, report) | A1 | a2,c1,c2 |
| 3 | Final term examination | A1 | b1,b2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation :

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Kiusalaas, Jaan. Numerical methods in engineering with Python 3. Cambridge university press, 2013. |
| 2 | B. S. Grewal "Numerical Methods in Engineering and Science" Mercury Learning and Information (2018). |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Presenter |  |
| 3 | White board |  |
| 4 | Data show system |  |
| 5 | Sound system |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Numerical solution of linear and nonlinear systems | 1 | A1 | a1 |
| 2 | Numerical differentiation and integration | 1 | A1 | a2 |
| 3 | Curve fitting and interpolation | 1 | A1 | b1 |
| 4 | Numerical solution of initial value problems | 1 | A1 | b2 |
| 5 | Boundary and eigen value problems | 1 | A1 | c1,c2 |

Course Coordinator: Dr. Samar Madin

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Chemical Engineering Principles II

CHE 303

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Chemical Engineering Principles II |
| Course Code | CHE 303 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 201 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |
| 10 | Apply research findings in chemical reactions to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3 Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | b1. Use math ideas and theories that are applicable to the field  b2.Apply scientific concepts and theories that are relevant to the Chemical Engineering  Principles.  c1. Identify complex engineering problems by applying the concepts and the theories of mathematics |
| 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. consideration other trades requirements | b4. Evaluate components, systems, and processes are evaluated for their characteristics and performance.  c1. Choose relevant mathematical and computer-based methodologies for problem modelling and analysis.  c3. Applying 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.. | b1. Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c2 .Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Simultaneous material and energy balances of complete process flow sheets. | 4 | 4 | - |
| 2 | Introduction of computer methods to solve chemical engineering problems. | 4 | 4 | - |
| 3 | Equation-based approach and Degrees of freedom analysis. | 4 | 4 | - |
| 4 | Conceptual design of chemical processes | 4 | 4 | - |
| 5 | Introduction to basic Chemical Engineering processes (e.g. humidification, binary distillation, extraction). | 8 | 8 | - |
| 6 | Computer-aided process design. | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Simultaneous material and energy balances of complete process flow sheets. | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 2 | Introduction of computer methods to solve chemical engineering problems. | x | x |  |  |  | X | x |  |  |  |  |  |  |  |
| 3 | Equation-based approach and Degrees of freedom analysis. | x | x |  |  |  | X |  |  |  |  |  |  |  |  |
| 4 | Conceptual design of chemical processes | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 5 | Introduction to basic Chemical Engineering processes (e.g. humidification, binary  distillation, extraction). | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 6 | Computer-aided process design. | x | x |  |  | X | X | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | b1,b2,c1 |
| 2 | Semester work(sheets, quizs) | A1/A2/A3 | c1/c1,c3/c2 |
| 3 | Final term examination | A3/A2 | b1, c2/ b4 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Felder and Rousseu, "Elementary principles of chemical processes", John Wiley and Sons Inc. 4th edition, 2015 |

1. Facilities required for teaching and learning:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Facility | No. |  | Facility |
| 1 | Lecture classroom | 4 | Data show system |  |
| 2 | Presenter | 5 | Sound system |  |
| 3 | White board |  | |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Simultaneous material and energy balances of complete process flow sheets | 10 | A1 | b1,b2,c1 |
| 2 | Introduction of computer methods to solve chemical engineering problems | 7 | A2 | c1 |
| 3 | Equation-based approach and Degrees of freedom analysis | 9,10 | A1 | c1 |
| 4 | Conceptual design of chemical processes | 9 | A3 | b1,c2 |
| 5 | Introduction to basic Chemical Engineering processes (e.g. humidification, binary distillation, extraction) | 10 | A2 | b4,c3 |
| 6 | Computer-aided process design | 7 | A2 | c1 |

Course Coordinator: Dr. Sohier Abo Bakr

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Chemical Engineering Thermodynamics

CHE 304

1- Basic Information:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Program Title | | | Chemical Engineering Program | |
| Department Offering the Program | | | Chemical Engineering Department | |
| Department Responsible for the Course | | | Chemical Engineering Department | |
| Course Title | | | Chemical Engineering Thermodynamics | |
| Course Code | | | CHE 304 | |
| Year/Level | | | Level 3 | |
| Specialization | | | Major | |
| Authorization Date of Course Specification | | | - | |
| Pre-request |  |  | - |  |
|  |  |  |  |  |
| Teaching hours | Lectures |  | Tutorial | Practical |
| 2 |  | - | 2 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of chemical engineering thermodynamics knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 4 | Use the techniques, skills, and current of chemical engineering thermodynamics tools required for practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Describe the relevant mathematical principles and theories in chemical engineering thermodynamics.  a2. Explain the scientific principles and theories that apply to chemical engineering thermodynamics.  b1. Use math ideas and theories that are applicable in chemical engineering thermodynamics. |
| 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. | a1. Recognize the principles of chemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance.  b1. Summarize the appropriate techniques relevant to chemical engineering thermodynamics.  c1. Create a process, component or system to carry out specialized chemical engineering thermodynamics. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Thermodynamic properties of homogeneous mixtures  Practical   * Calibration of the Calorimeter * Specific Heat Capacity of an Unknown Metal | 8 | - | 8 |
| 2 | Phase equilibria  Practical  Heat of Fusion of Ice | 6 | - | 6 |
| 3 | Electrolyte solutions  Practical  Heat of Solution | 2 |  | 4 |
| 4 | Chemical reactions equilibria  Practical  Heat of Neutralization | 12 |  | 10 |
|  | Total | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain  storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Thermodynamic  properties of | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
|  | homogeneous mixtures Practical   * Calibration of the   Calorimeter   * Specific Heat Capacity of an   Unknown  Metal | x | x |  |  | x |  |  |  |  |  |  |  |  | x |
| 2 | Phase equilibria  Practical  Heat of Fusion of Ice | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 3 | Electrolyte solutions  Practical  Heat of Solution | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 4 | Chemical reactions  equilibria Practical  Heat of Neutralization | x | x |  |  | x |  |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work (sheets, quizzes, presentation ) | B1 | c1 |
| 3 | Practical Examination | B1 | c1 |
| 4 | Final term examination | A1/B1 | a1,a2,b1 /a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets ,quizzes , presentation ) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets ,quizzes , presentation ) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Introduction to Chemical Engineering Thermodynamics.  (J. M. Smith, H. C. Van Ness, M. M. Abbott and M. T. Swihart),2018 |
| 2 | Fundamentals of Chemical Engineering Thermodynamics. (Kevin D. Dahm and Donald P. Visco Jr.),2018 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Thermodynamic properties of homogeneous mixtures | 1 | A1 | a1,a2 |
| Practical   * Calibration of the Calorimeter * Specific Heat Capacity of an Unknown Metal |
| 2 | Phase equilibria | 1 | A1 | a2,b1 |
| Practical  Heat of Fusion of Ice |
| 3 | Electrolyte solutions | 1 | B1 | b1,c1 |
| Practical  Heat of Solution |
| 4 | Chemical reactions equilibria | 1,4 | B1 | a1 |
| Practical  Heat of Neutralization |

Course Coordinator: Dr. Mohamed Elbindary

Head of Department: Ass.prof. Hend Elsayed Gadow Date of Approval: 2022

Analytical Chemistry

CHE 305

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Analytical Chemistry |
| Course Code | CHE 305 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of analytical chemistry engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge rom analytical chemistry in realworld situations by applying theories in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 6 | Analyze data from the analytical chemistry experiments to manage resources creatively. |
| 10 | Apply research findings in analytical chemistry in order to assess the results and draw conclusions about industrial operations. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2. Demonstrate the scientific principles and theories that apply to the analytical chemistry.  b2. Using scientific concepts and theories that are relevant to the analytical chemistry.  c2. Solve complex engineering problems by applying the concepts and the theories of sciences, appropriate to the analytical chemistry. |
| A6. Plan, supervise and monitor implementation of engineering projects,  taking into consideration other trades  requirements | a1.Demonstrate how to conduct a chemical analysis and characterization of typical engineering materials and components using standard methodologies.  b1. interpret data acquired from laboratory observation using graphs and curves  c2. Acquire entrepreneurial skills |
| B3. Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering. | d1.Apply computational techniques appropriate to analytical chemistry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic tools in analytical chemistry  Practical   * Preparation of Standard Solution   of solid salt   * Preparation of a Standard   Solution of concentrated Acid | 4 | - | 4 |
| 2 | Titrimetric Methods of Analysis  Practical   * Mohr’s method for determining chloride * EDTA standardization against metallic magnesium * Determination of magnesium using eriochrome black T indicator * Determination of aluminium using EBT as indicator (back – titration) | 8 | - | 10 |
| 3 | Gravimetric Methods of Analysis  Practical  Gravimetric Analysis | 4 | - | 6 |
| 4 | Evaluating Analytical Data | 8 | - | - |
| 5 | Instrumental chemical analysis  Practical   * Conductimetry * PH meters * Spectrophotometer | 4 | - | 8 |
| Total | | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Basic tools in analytical chemistry Practical   * Preparation of Standard Solution of solid salt * Preparation of a Standard Solution of concentrated   Acid | x | x |  |  | x |  |  |  |  |  |  |  |  | X |
| 2 | Titrimetric Methods of Analysis  Practical   * Mohr’s method for determining chloride * EDTA   standardization against metallic magnesium   * Determination of magnesium using eriochrome black T indicator * Determination of aluminium using EBT as indicator   (back –titration) | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 3 | Gravimetric Methods  of Analysis  Practical  Gravimetric Analysis | x | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 4 | Evaluating Analytical Data | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 5 | Instrumental chemical  analysis Practical   * Conductimetry * PH meters * Spectrophotometer | x | x |  |  |  |  |  |  |  | X |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1/A6 | a2,b2/a1 |
| 2 | Semester work (sheets ,quizzes , presentation ) | A1/A6 | c2 /c2 |
| 3 | Practical Examination | A1/A6/B3 | c2/c2/d1 |
| 4 | Final term examination | A1/A6 | a2/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets ,quizzes , presentation ) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets ,quizzes , presentation ) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | A Textbook of Analytical Chemistry Kindle Edition by Y. Anjaneyulu (Author), K. Chandrasekhar (Author),2019 |
| 2 | Analytical Chemistry 7th Edition, Purnendu K. Dasgupta (Author), Kevin A. Schug (Author), Gary D. Christian,2014 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic tools in analytical chemistry | 1 | A1 | a2,b2,c2 |
|  | Practical   * Preparation of Standard Solution of solid   salt   * Preparation of a Standard Solution of concentrated Acid |
| 2 | Titrimetric Methods of Analysis | 6 | A6 | a1 |
| Practical   * Mohr’s method for determining chloride * EDTA standardization against metallic magnesium * Determination of magnesium using eriochrome black T indicator * Determination of aluminium using EBT as indicator (back –titration) |
| 3 | Gravimetric Methods of Analysis | 6 | A6 | a1,c2 |
|  | Practical  Gravimetric Analysis |
| 4 | Evaluating Analytical Data | 10 | A6 | b1,c2 |
| 5 | Instrumental chemical analysis | 6,10 | B3 | d1 |
| Practical   * Conductimetry * PH meters * Spectrophotometer |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Process Dynamics and Control

CHE 306

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Process Dynamics and Control |
| Course Code | CHE306 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and current engineering tools required for process dynamics and control by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |
| 10 | Apply research findings chemical reactions on process dynamics and control to exhibit their properties in order to assess the results and draw conclusions about industrial operations . |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a1. Describe the relevant mathematical principles and theories in process dynamics and control.  a2. Explain the scientific principles and theories that apply to process dynamics and control  b1. Use math ideas and theories that are applicable in process dynamics and control. |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | b1. interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation. Analyze and interpret data.  c2. Acquire entrepreneurial skills. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Automatic control merits and basic features Practical | 2 | - | 2 |
|  | * Introduction and experiments demonstrating the principles of temperature measuring devices |
| 2 | Classification of control action (open-loop and closed-loop, feed-back and feed-forward, process and position control)  Practical   * Introduction and experiments demonstrating the principles of pressure measuring devices | 4 | - | 4 |
| 3 | Mathematical tools (Linearization, Laplace transforms and block diagram algebra)  Practical   * Introduction and experiments demonstrating the principles of flow and concentration measuring devices | 4 | - | 4 |
| 4 | Process dynamics (first, second and higher orders)  Practical   * Process control simulation for compressor. | 2 | - | 4 |
| 5 | Measuring and actuating elements  Practical   * Process control simulation for Heat exchanger. | 4 | - | 2 |
| 6 | Two-position controller and Three-term controller  Practical   * Process control simulation for Separator. | 4 | - | 4 |
| 7 | Controller mechanism and optimum setting  Practical   * Process control simulation for reactors. | 4 | - | 4 |
| 8 | System stability (algebraic and graphical methods).  Practical   * Process control simulation for reactors. | 4 | - | 4 |
| Total | | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Automatic control merits and basic  features Practical   * Introduction and experiments demonstrating the principles of temperature measuring devices | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 2 | Classification of control action (openloop and closed-loop, feed-back and feedforward, process and position control)  Practical   * Introduction and experiments demonstrating the principles of pressure measuring devices | x | x |  |  | X | X |  |  |  |  |  |  |  | X |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | Mathematical tools (Linearization, Laplace transforms and block diagram  algebra)  Practical   * Introduction   and experiments demonstrating the principles of flow and concentration measuring devices | x | x |  |  | X | x | X |  |  |  |  |  |  | X |
| 4 | Process dynamics (first, second and higher orders)  Practical   * Process control simulation for compressor. | x | x |  |  |  | x | X |  |  |  |  |  |  | X |
| 5 | Measuring and actuating elements  Practical   * Process control simulation for Heat exchanger. | x | x |  |  |  | x |  |  |  |  |  |  |  | x |
| 6 | Two-position controller and Threeterm controller  Practical   * Process control simulation for Separator. | x | x |  |  | x | x | X |  |  |  |  |  |  | X |
| 7 | Controller mechanism and optimum setting  Practical   * Process control simulation for reactors. | x | x |  |  | X | x |  |  |  |  |  |  |  | x |
| 8 | System stability (algebraic and graphical methods).  Practical   * Process control simulation for reactors. | x | x |  |  | x | x |  |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | a1,a2,b1 |
| 2 | Semester work (Quiz & sheets, reports) | A1/A6 | b1/c2 |
| 3 | Practical Examination | A1/A6 | a1/b1,c2 |
| 4 | Final term examination | A1 | a1,a2,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | George Stephanopoulos, Dynamics and Control of Process Systems, Pergamon Press Inc., 1st. Ed., 2001. |
| 2 | George Stephanopoulos, Chemical Process Control: An Introduction to Theory and Practice, PTR Prentice Hall, 1983. |
| 3 | Modern control Engineering, OGATA,2002 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Automatic control merits and basic features | 4 | A1 | a1 |
| Practical  Introduction and experiments demonstrating the principles of temperature measuring devices |
| 2 | Classification of control action (openloop and closed-loop, feed-back and feed-forward, process and position control) | 4 | A6 | b1 |
| Practical  Introduction and experiments  demonstrating the principles of pressure  measuring devices |
| 3 | Mathematical tools (Linearization, Laplace transforms and block diagram algebra) | 4,10 | A1 | a1,b1 |
| Practical  Introduction and experiments demonstrating the principles of flow  and concentration measuring devices |
| 4 | Process dynamics (first, second and higher orders) | 4 | A1 | a1,b1 |
| Practical  Process control simulation for compressor |
| 5 | Measuring and actuating elements | 4 | A1 | a1,a2 |
| Practical  Process control simulation for Heat exchanger. |
| 6 | Two-position controller and Three-term controller | 4,9 | A1 | a2 |
| Practical  Process control simulation for Separator. |
| 7 | Controller mechanism and optimum setting | 9 | A6 | b1 |
| Practical  Process control simulation for reactors |
| 8 | System stability (algebraic and graphical methods). | 10 | A6 | b1,c2 |
| Practical  Process control simulation for reactors. |

Course Coordinator: Asso.prof. Taha Farag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Operation Researches

(ENG 308)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Operation Researches |
| Course Code | ENG 308 |
| Year/Level | Level 3 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | MTH 302 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his or her role in promoting engineering and contributing to the profession's and community's development; by appreciating the importance of the environment, both physical and natural, and working to promote sustainability concepts; |
| 4 | Use the techniques, skills, and current engineering tools required for operations research by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 10 | Apply research findings chemical reactions on operations research to exhibit their properties in order to assess the results and draw conclusions about industrial operations . |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate | a1.Define operations research principles, basic characteristics, and properties, as well as their applications in chemical process industries like |
| findings, and use statistical analyses and objective engineering judgment to draw conclusions. | petroleum refining, natural gas processing, petrochemicals, electrochemistry, fertilizers, and ceramics, etc.  b3. Analyze and interpret data and apply it on operations research . |
| A3. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | a2. List the engineering operation research management principles  b2. Create methodical approaches related to operation research when dealing with new and advancing technology.  c2. Use essential project management related to operation research. |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | b1. interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.  c2.Acquire entrepreneurial skills. |

4-Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Models and methods of operations research in solving engineering and management problems. | 4 | 4 | - |
| 2 | Linear programming, simplex method, duality, sensitivity analysis | 4 | 4 | - |
| 3 | Transportation, assignment and transshipment models | 4 | 4 | - |
| 4 | Network flows models and integer programming | 4 | 4 | - |
| 5 | Probabilistic models in operations research problems | 4 | 4 | - |
| 6 | Queuing theory, Markov chain and decision analysis | 4 | 4 | - |
| 7 | Marko vain decision process and utility functions | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Models and methods of operations research  in solving engineering and management problems. | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 2 | Linear programming, simplex method, duality, sensitivity analysis | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | Transportation, assignment and transshipment models | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 4 | Network flows models and integer programming | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 5 | Probabilistic models in operations research problems | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 6 | Queuing theory, Markov chain and decision analysis | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 7 | Marko vain decision process and utility functions | x | x |  |  | x | X |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Wed communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A2/A6 | a1,b3/b1 |
| 2 | Semester work | A3/A6 | c2/c2 |
| 3 | Final term examination | A2/A3/A6 | a1, b3/a2,b2/ b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Wayne L. Winston, "operation research, applications and algorithms",4th edition , Brooks/cole, USA, 2004. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

10. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No | Topic | Aims | Competencies | LO’s |
| 1 | Models and methods of operations research in solving engineering and management problems. | 3,4 | A2 /A3 | a1/c2 |
| 2 | Linear programming, simplex method, duality, sensitivity analysis | 4 | A2 | b3 |
| 3 | transportation, assignment and transshipment models | 3 | A6 | b1 |
| 4 | network flows models and integer programming | 10 | A6 | b1,c2 |
| 5 | Probabilistic models in operations research problems | 10 | A3 | a2 |
| 6 | Queuing theory, Markov chain and decision analysis | 3,4 | A3 | b2 |
| 7 | Marko vain decision process and utility functions | 3,4 | A2 | a1,b3 |

Course Coordinator: Dr. Shoir Abo Bakr

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Reactor Design

CHE 401

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Reactor Design |
| Course Code | CHE 401 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 304 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 3 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system components and process to meet recent technological using computational system in reactor design . |
| 10 | Apply research findings in Reactor design to exhibit their properties in order to assess the results and draw conclusions about Reactor design. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements | a1. Demonstrate how to conduct a reactor design and characterization of typical reactor design materials and components using standard methodologies.    b1. interpret data acquired from laboratory observation using graphs and curves    c1. Acquire entrepreneurial skills |
| 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, | a1. Recognize 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.    c1. Create a process, component or system to carry out specialized engineering designs. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Fundamentals of thermodynamics and kinetics of chemical reactions | 3 | 2 | - |
| 2 | Analysis of batch, plug-flow and continuous stirred tank reactors for different types of reactions | 6 | 4 | - |
| 3 | Non ideal reactor analysis, including residence time distribution, back mixing and dispersion models | 3 | 2 | - |
| 4 | Kinetics of isothermal and non-isothermal ideal reactors. | 6 | 4 | - |
| 5 | Kinetics of heterogeneous or catalytic reactions | 3 | 2 | - |
| 6 | Design of different types of catalytic and noncatalytic reactors | 6 | 4 | - |
| 7 | Mass and energy transfer limitations in heterogeneous reaction systems | 6 | 4 | - |
| 8 | Catalyst effectiveness | 3 | 2 | - |
| 9 | Reactor stability and sensitivity to operating parameters | 3 | 2 | - |
| 10 | Optimization of reactor design and Factors affecting choice of reactors | 3 | 2 | - |
|  | Total | 42 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Fundamentals of thermodynamics and kinetics of chemical  reactions | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 2 | Analysis of batch, plug-flow and continuous stirred tank reactors for different types of reactions | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 3 | Non ideal reactor analysis, including residence time distribution, back mixing and dispersion models | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 4 | Kinetics of isothermal and non-isothermal ideal reactors. | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 5 | Kinetics of heterogeneous or catalytic reactions | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 6 | Design of different types of catalytic and non-catalytic reactors | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 7 | Mass and energy transfer limitations in heterogeneous reaction systems | x | x |  |  | x | x | X |  |  |  |  |  |  |  |
| 8 | Catalyst effectiveness | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 9 | Reactor stability and sensitivity to operating parameters | x | x |  |  | X | x | X |  |  |  |  |  |  |  |
| 10 | Optimization of reactor design and Factors affecting choice of reactors | x | x |  |  | X | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Midterm examination | B1,A6 | a1,b1 |  |
| 2 | Semester work (sheets, quizzes) | A6 | c1 |  |
| 3 | Final term examination | B1,A6 | a1,c1/a1,b1 |  |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work(sheets, quizzes) | 2nd -7th - 9th-14th | |
| 3 | Final term examination | 15th | |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Course notes  Lecture notes prepared by Ass. Prof. Dr./ Taha E. Farrag. |
| 2 | Introduction to Chemical Engineering Kinetics and Reactor Design, 2nd Edition. Charles G. Hill, Thatcher W. Root ISBN: 978-1-118-36825-1 May 2014, ©2014 |
| 3 | Chemical Reactor Design, 2nd Edition. Peter Harriott ISBN: 0-8247-0881-4 Copyright © 2003 by Taylor & Francis Group LLC |
| 4 | Chemical Reaction Engineering and Reactor Technology, Second Edition By Tapio O. Salmi, Jyri-Pekka Mikkola, Johan P. Wärnå Copyright Year 2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Fundamentals of thermodynamics and kinetics of chemical reactions | 10 | B1 | a1 |
| 2 | Analysis of batch, plug-flow and continuous stirred tank reactors for different types of reactions | 10 | A6 | a1,b1 |
| 3 | Non ideal reactor analysis, including residence time distribution, back mixing and dispersion models | 10 | A6 | a1,b1 |
| 4 | Kinetics of isothermal and non-isothermal ideal reactors. | 10 | A6 | a1,b1 |
| 5 | Kinetics of heterogeneous or catalytic reactions | 10 | A6 | a1,b1 |
| 6 | Design of different types of catalytic and noncatalytic reactors | 7 | B1 | c1 |
| 7 | Mass and energy transfer limitations in heterogeneous reaction systems | 7,10 | B1 | a1 |
| 8 | Catalyst effectiveness | 10 | A6 | a1,c1 |
| 9 | Reactor stability and sensitivity to operating parameters | 7 | B1 | c1 |
| 10 | Optimization of reactor design and Factors affecting choice of reactors | 7 | B1 | c1 |

Course Coordinator: Prof. Dr. / Taha E. Farrag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Heat Transfer

CHE 402

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Heat Transfer |
| Course Code | CHE 402 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | ENG 202 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and | b3. Analyze and interpret data  b4. Evaluate components, systems, and processes are evaluated for their characteristics and performance.  c2. Develop suitable experimentation and/or simulation. |
| objective engineering judgment to draw conclusions. | c3. Applying statistical analyses and objective engineering judgment to draw conclusions. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d1. Search for information to engage in lifelong self-learning discipline.  d2. Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services. |
| B4. Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems. | d1. Engage suitable national and international standards and codes to: design, operate, inspect and maintain heat transfer systems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction to heat transfer : conduction ,convection ,thermal radiation | 6 | - | - |
| 2 | The heat diffusion equation :Cartesian ,cylindrical ,spherical coordiates | 6 | - | - |
| 3 | One dimensional St.St conduction | 4 | - | - |
| 4 | External ,internal flow convection | 4 | - | - |
| 5 | heat exchangers  Practical   * Conduction ,Convection ,Radiation   Drop wise ,film condensation ,nucleate film boil , Heat exchanger | 8 | - | 28 |
| Total | | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem  solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Introduction to heat transfer : conduction ,convection ,thermal radiation | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 2 | The heat diffusion equation :Cartesian ,cylindrical ,spherical coordiates | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 | One dimensional St.St conduction | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 4 | External ,internal flow convection | x | x |  |  | x | X |  |  |  | X |  |  |  |  |
| 5 | heat exchangers  Practical   * Conduction ,Convection ,Radiation   Drop wise ,film condensation ,nucleate film boil , Heat exchanger | x | x |  |  | x | X | x |  |  |  |  |  |  | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A2 | b4 |
| 2 | Semester work (sheets, quizzes) | A10 | d1,d2 |
| 3 | Practical Examination | A2 | c2,c3 |
| 4 | Final term examination | A2 ,B4 | b3,b4 ,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets, quizs) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | John R. Puskar, Fuel and Combustion Systems Safety, Wiley, 2011. |
| 2 | Rajendra Karwa , "Heat and Mass Transfer", 1st edition, Springer, 2016 |
| 3 | Bruce G. Miller, David Tillman, Combustion Engineering Issues for Solid Fuel Systems, Academic Press, 2008. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction to heat transfer : conduction ,convection ,thermal radiation | 4 | A10 | d2 |
| 2 | The heat diffusion equation :Cartesian ,cylindrical ,spherical coordiates | 6 | A10 / A2 | d2, b4, c2, c3 |
| 3 | One dimensional St.St conduction | 4 | A10 | d2 |
| 4 | External ,internal flow convection | 4 | A10 | d1 |
| 5 | heat exchangers  Practical   * Conduction ,Convection ,Radiation   Drop wise , film condensation ,nucleate film boil , Heat exchanger | 7,6 | B4/A10 | d1/d2 |

Course Coordinator: Dr / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Mass Transfer

CHE 403

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Mass Transfer |
| Course Code | CHE 403 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | ENG 202 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in  lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1. Recognize the principles of chemical engineering including Mass Transfer.  b1. Summarize the appropriate techniques relevant to mas transfer  c1. 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 | d1 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 |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Molecular mass transport in fluids | 4 | 4 | - |
| 2 | Transport Phenomena and the basic equation of change | 4 | 4 | - |
| 3 | Molecular mass transport in liquids and biological solutions | 4 | 4 | - |
| 4 | Mass transport phenomena in solids | 2 | 2 | - |
| 5 | Mass transfer coefficient in laminar and turbulent flow | 4 | 4 | - |
| 6 | Inter-phase mass transport | 4 | 4 | - |
| 7 | Continuous two-phase mass transport processes | 6 | 6 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and  movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | lab |
| 1 | Molecular mass  transport in fluids | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Transport Phenomena and the basic equation of change | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | Molecular mass transport in liquids and biological solutions | x | x |  |  | x |  | x |  |  |  |  |  |  |  |
| 4 | Mass transport phenomena in solids | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 5 | Mass transfer coefficient in laminar and turbulent flow | x | x |  |  | x | X |  |  |  |  |  |  |  |  |
| 6 | Inter-phase mass transport | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 7 | Continuous two-phase  mass transport processes | x | x |  |  | x | x | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1 ,b1 |
| 2 | Semester work (sheets, quizzes, presentation ) | B1 | c1 |
| 3 | Final term examination | B1,B2 | a1,a2,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Gregory L. Rorrer, Robert E. Wilson, Fundamentals of Momentum, Heat & Mass Transfer, Wiley, 5th. Ed., 2007. |
| 2 | Frank P. Incropera, David P. DeWitt, Theodore L. Bergman, Adrienne S. Lavine, Fundamentals of Heat and Mass Transfer, Wiley, 6th. Ed., 2006. |
| 3 | Rajendra Karwa , "Heat and Mass Transfer", 1st edition, Springer, 2016 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Molecular mass transport in fluids | 4 | B1 | a1 |
| 2 | Transport Phenomena and the basic equation of change | 4 | B2 | d1 |
| 3 | Molecular mass transport in liquids and biological solutions | 4 | B1 | a1 |
| 4 | Mass transport phenomena in solids | 4 | B1 | a1 |
| 5 | Mass transfer coefficient in laminar and turbulent flow | 4 | B1 | b1,c1 |
| 6 | Inter-phase mass transport | 4 | B1 | b1,c1 |
| 7 | Continuous two-phase mass transport processes | 4 | B1 | b1,c1 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Corrosion Engineering

CHE 404

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Corrosion Engineering |
| Course Code | CHE 404 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 303 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Teaching hours | | Lectures | Tutorial | Practical |
| 1 | 2 | - |
|  |  | | | |
| No. | Aims | | | |
| 7 | Design a system, component, and process to meet recent technological advancements related to corrosion protection. | | | |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of corrosion engineering in chemical process industries. | | | |

2-Course Aims:

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1.Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2. Define the scientific principles and theories that apply to the corrosion engineering.  b2 Apply scientific concepts and theories that are relevant to the corrosion engineering. c2 Solve complex engineering problems by applying the concepts and the theories of sciences, appropriate to the corrosion engineering. |
| 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 | d1. Integrate in the recent technological changes and emerging fields relevant to corrosion engineering. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Theories and principles of corrosion | 1 | 2 | - |
| 2 | Types of corrosion (Localized corrosion, pitting, crevice corrosion , cavitations, stress corrosion cracking and corrosion fatigue) | 2 | 4 | - |
| 3 | metallurgical factors | 1 | 2 | - |
| 4 | welding problems | 1 | 2 | - |
| 5 | material selection | 1 | 2 | - |
| 6 | Inspection and nondestructive testing | 2 | 4 | - |
| 7 | chemical cleaning flue gas attack | 1 | 2 | - |
| 8 | corrosion testing evaluation and simulation | 2 | 4 | - |
| 9 | corrosion prevention ,monitoring, cathode protection and anodic protection | 1 | 2 | - |
| 10 | water treatment for boilers and condensers | 2 | 4 |  |
| Total | | 14 | 28 |  |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Theories and  principles of corrosion | X | X |  |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Types of corrosion (Localized corrosion, pitting, crevice corrosion , cavitations, stress corrosion cracking and corrosion fatigue) | x | X | X |  | X | X |  |  |  |  |  |  |  |  |
| 3 | metallurgical factors | x | X | x |  | X |  |  |  |  |  |  |  |  |  |
| 4 | welding problems | x | X | x |  | X |  | X |  |  |  |  |  |  |  |
| 5 | material selection | x | X | x |  | X |  | X |  |  |  |  |  |  |  |
| 6 | Inspection and nondestructive testing | x | X | x |  | X |  |  |  |  |  |  |  |  |  |
| 7 | chemical cleaning flue gas attack | x | X | x |  | X |  |  |  |  |  |  |  |  |  |
| 8 | corrosion testing evaluation and simulation | x | X | x |  | X | x |  |  |  |  |  |  |  |  |
| 9 | corrosion prevention ,monitoring, cathode protection and anodic protection | x | X | x |  | X | X |  |  |  |  |  |  |  |  |
| 10 | water treatment for boilers and condensers | x | X | x |  | X | x |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1,B2 | a2,b2,d1 |
| 2 | Semester work(sheets,quizs,presentation) | A1 | c2 |
| 3 | Final term examination | A1,B2 | ,a2, b2,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizs, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Talbot, D. E., & Talbot, J. D. (2018). Corrosion science and technology. CRC press. |
| 2 | Cicek, V. (2017). Corrosion engineering and cathodic protection handbook: with extensive question and answer section. John Wiley & Sons |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Theories and principles of corrosion | 8 | A1 | a2,b2 |
| 2 | Types of corrosion (Localized corrosion, pitting, crevice corrosion , cavitations, stress corrosion cracking and corrosion fatigue) | 8 | A1 | a2,b2 |
| 3 | metallurgical factors | 8 | B2 | d1 |
| 4 | welding problems | 8 | B2 | d1 |
| 5 | material selection | 7 | B2 | d1 |
| 6 | Inspection and nondestructive testing | 7 | B2 | d1 |
| 7 | chemical cleaning flue gas attack | 7 | B2 | d1 |
| 8 | corrosion testing evaluation and simulation | 7 | A1 | b2 |
| 9 | corrosion prevention  ,monitoring, cathode protection and anodic protection | 7 | A1 | c2 |
| 10 | water treatment for boilers and condensers | 7 | A1 | c2 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Project Management and Control

(ENG 408)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical engineering Department |
| Department Responsible for the Course | Basic science and Engineering Department |
| Course Title | Project Management and Control |
| Course Code | ENG 408 |
| Year/Level | level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 5 | Communicate effectively with a variety of audiences using a variety of forms, methods, and languages; cope with academic and professional issues in a critical and creative manner; and display leadership, business administration, and entrepreneurial abilities. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | a2.List the engineering-related business and management principles.  b1. Create methodical project management when dealing with new and advancing technology.  c2. Use fundamental organizational and project management abilities. |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | a1. Recognize business and management principles relevant to engineering; project planning and schedule, network based scheduling, critical path method (CPM), program evaluation and review technique (PERT), Probability aspect of project completion time, Project cost control, Resource allocation and forecasting funds requirements.    b1 Judge engineering decisions considering balanced costs, benefits, time from project cost control and forecasting funds requirements. |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1 Communicate effectively. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction to project management. | 2 | 2 | - |
| 2 | Project planning and scheduling. | 2 | 2 | - |
| 3 | Network based scheduling. | 2 | 2 | - |
| 4 | Critical path method. | 6 | 6 | - |
| 5 | Program evaluation& review technique (PERT) | 4 | 4 | - |
| 6 | Probability aspects of project completion time. | 2 | 2 | - |
| 7 | Project cost control. | 6 | 6 | - |
| 8 | Resource allocation | 2 | 2 | - |
| 9 | Forecasting funds requirement | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and  movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Introduction to project management. | x | x |  |  | X |  | x |  |  |  |  |  |  |  |
| 2 | Project planning and scheduling. | x | x |  |  | X |  | x |  |  |  |  |  |  |  |
| 3 | Network based scheduling. | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 4 | Critical path method. | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 5 | Program evaluation& review technique (PERT) | x | x |  |  |  | x | x |  |  |  |  |  |  |  |
| 6 | Probability aspects of project completion time. | x | x |  |  | X |  | X |  |  |  |  |  |  |  |
| 7 | Project cost control. | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 8 | Resource allocation | x | x |  |  | X |  | x |  |  |  |  |  |  |  |
| 9 | Forecasting funds requirement | x | x |  |  | X | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different level of students. |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Mid-term exam | A4, A6 | a2,b1,a1 |  |
| 2 | Semester work( quizzes, sheets, report) | A4,A8 | c2, d1 |  |
| 3 | Final term examination | A4,A6 | a2,a1,b1 |  |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work | 2𝑛𝑑, 3𝑟𝑑, 5𝑡ℎ, 10𝑡ℎ, 12𝑡ℎ |
| 2 | Mid Term examination | 8𝑡ℎ |
| 3 | Final term examination | 15𝑡ℎ |

* 1. weighting of Evaluation:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation method |  | Weights |
| 1 | Mid-term examination | 20% |  |
| 2 | Semester work | 20% |  |
| 3 | Final-term examination | 60% |  |
|  | Total | 100% |  |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Cleland, David. 2016. Flied guide to project management. New York: Wiley. |
| 2 | Smith, K.A. 2019. Project management and teamwork. New York: McGraw-Hill. |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Lecture classroom |  |
| 2 | Seminar |  |
| 3 | White board |  |
| 4 | Data Show system |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction to project management. | 2,5 | A4 | a2 |
| 2 | Project planning and scheduling. | 2,5 | A4 | b1,c2 |
| 3 | Network based scheduling. | 2,5 | A8 | d1 |
| 4 | Critical path method (CPM). | 2,5 | A6 | a1 |
| 5 | Program evalucation& review technique (PERT) | 2,5 | A6 | a1 |
| 6 | Probability aspects of project completion time. | 2,5 | A6 | a1 |
| 7 | Project cost control. | 2,5 | A6 | b1 |
| 8 | Resource allocation | 2,5 | A6 | b1 |
| 9 | Forecasting funds requirement | 2,5 | A6 | b1 |

Course Coordinator: Dr / Hamdy Abd Elaty

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Mass Transfer Operations

CHE 405

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Mass Transfer Operations |
| Course Code | CHE 405 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 403 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | d1. Collaborate effectively within multidisciplinary team.  d2. Work in stressful environment and within constraints.  d3. Motivate individuals. |
| 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. | b1.Utilize the principles of chemical engineering and techniques including chemical reaction equilibrium and thermodynamics; mass and energy balance; and transport phenomena to different separation processes.    c1. Create a process, component or system to carry out specialized engineering designs. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Mass transport in fluids | 2 | 2 | - |
| 2 | Mass transport phenomena in solids |
| 3 | Inter-phase mass transport |
| 4 | Continuous two-phase mass transport processes | 2 | 2 | - |
| 5 | Vapor-liquid equilibrium (VLE) | 2 | 2 | - |
| 6 | binary system distillation (plate and packed columns) | 6 | 6 | - |
| 7 | Gas- liquid and liquid- liquid extraction | 6 | 6 | - |
| 8 | solid-liquid extraction | 2 | 2 | - |
| 9 | Humidification and drying | 2 | 2 | - |
| 10 | Evaporation and crystallization | 2 | 2 | - |
| 11 | Membrane separation technology | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Mass transport in fluids | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 2 | Mass transport phenomena in solids | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 3 | Inter-phase mass transport | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 4 | Continuous two-phase  mass transport processes | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 5 | Vapor-liquid equilibrium (VLE) | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 6 | binary system distillation (plate and packed columns) | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 7 | Gas- liquid and liquid- liquid extraction | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 8 | solid-liquid extraction | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 9 | Humidification and drying | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 10 | Evaporation and crystallization | x | x |  |  | X | x | x |  |  |  |  |  |  |  |
| 11 | Membrane separation technology | x | x |  |  | X | x | x |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | b1 |
| 2 | Semester work (sheets, quizzes, reports ) | A7/B1 | d1,d2,d3/c1 |
| 3 | Final term examination | B1 | b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Gregory L. Rorrer, Robert E. Wilson, Fundamentals of Momentum, Heat & Mass Transfer, Wiley, 5th. Ed., 2007. |
| 2 | Frank P. Incropera, David P. DeWitt, Theodore L. Bergman, Adrienne S. Lavine, Fundamentals of Heat and Mass Transfer, Wiley, 6th. Ed., 2006. |
| 3 | Christie J. Geankoplis, "Transport Processes and Unit Operations", 3rd edition, Prentice-Hall International. Inc., 1978.. |
| 4 | Binay K. Dutta," Principles of Mass Transter and Separation Processes", PHI Learning Private Limited, New Delhi, 2007. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Mass transport in fluids | 4 | B1 | b1 |
| 2 | Mass transport phenomena in solids | 4 | B1 | b1 |
| 3 | Inter-phase mass transport | 4 | B1 | b1 |
| 4 | Continuous two-phase mass transport processes | 4 | B1 | b1 |
| 5 | Vapor-liquid equilibrium (VLE) | 4 | B1 | b1 |
| 6 | binary system distillation (plate and packed columns) | 4,7 | B1,A7 | c1,d1 |
| 7 | Gas- liquid and liquid- liquid extraction | 4,7 | B1,A7 | c1,d1 |
| 8 | Solid-liquid extraction | 4,7 | B1,A7 | c1,d2 |
| 9 | Humidification and drying | 4,7 | B1,A7 | c1,d3 |
| 10 | Evaporation and crystallization | 4,7 | B1,A7 | c1,d1 |
| 11 | Membrane separation technology | 4,7 | B1,A7 | c1,d2 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Bio Organic Chemistry

CHE 406

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Bio Organic Chemistry |
| Course Code | CHE 406 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 203 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of organic chemistry engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories in organic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 8 | Consider the impact of bioorganic chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. | a2.Demonstrate the bioorganic chemistry principles and reactions that apply to the chemical engineering industries.  b2. Using scientific concepts and fundamentals that are relevant to the bioorganic chemistry.  c2. Apply Bioorganic chemistry concepts that related some chemical engineering industries. |
| 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. | a1.Recognize the bioorganic compounds that utilize a full range of thermodynamics and kinetics of chemical reactions.  b1. Design new processes or products through utilization bioorganic chemical reactions. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Principles of bio chemistry | 4 | 4 | - |
| 2 | Carbohydrates | 6 | 6 | - |
| 3 | Amino acids | 4 | 4 | - |
| 4 | Proteins | 2 | 2 | - |
| 5 | Enzymes | 2 | 2 | - |
| 6 | Fatty acids | 4 | 4 | - |
| 7 | Oils and fats | 2 | 2 | - |
| 8 | Pharmaceutical compounds | 4 | 4 |  |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Principles of bio chemistry | x | x |  |  | X |  |  |  |  | X |  |  |  |  |
| 2 | Carbohydrates | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Amino acids | x | x |  |  | X | X |  |  |  | X |  |  |  |  |
| 4 | Proteins | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 5 | Enzymes | x | x |  |  | X |  |  |  |  | x |  |  |  |  |
| 6 | Fatty acids | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 7 | Oils and fats | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 8 | Pharmaceutical compounds | x | x |  |  | X | x |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A1 | b2,a2 |
| 2 | Semester work (sheets, quizzes ) | A1 | c2 |
| 3 | Final term examination | A1/B1 | a2/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes ) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Dean Appling,](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Dean+Appling&text=Dean+Appling&sort=relevancerank&search-alias=books) [Spencer Anthony-Cahill,](https://www.amazon.com/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Spencer+Anthony-Cahill&text=Spencer+Anthony-Cahill&sort=relevancerank&search-alias=books) [Christopher Mathews](https://www.amazon.com/s/ref=dp_byline_sr_book_3?ie=UTF8&field-author=Christopher+Mathews&text=Christopher+Mathews&sort=relevancerank&search-alias=books) "Biochemistry: Concepts and Connections" Pearson; 2nd edition (2018) |
| 2 | Victor W. Rodwell, David A. Bender, Kathleen M. Botham, Peter J. Kennelly, P. Anthony Weil "Harper's Illustrated Biochemistry, 31e, (2018) |
| 3 | Biochemistry – Wikipedia |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Principles of bio chemistry | 1 | A1 | b2 |
| 2 | Carbohydrates | 1 | A1 | a2 |
| 3 | Amino acids | 1 | A1 | a2 |
| 4 | Proteins | 1 | A1 | a2 |
| 5 | Enzymes | 1 | B1 | a1 |
| 6 | Fatty acids | 1 | B1 | a1 |
| 7 | Oils and fats | 8 | A1,B1 | c2,b1 |
| 8 | Pharmaceutical compounds | 8 | A1,B1 | c2,b1 |

Course Coordinator: Asso.prof. Khalid Samir

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Mechanical unit operation

CHE 407

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Mechanical Unit Operation |
| Course Code | CHE 407 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 304 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 appropriate mechanical unit operations. | a1. Learn the general principles of design techniques specific to filtration, size reduction, centrifugation, sedimentation, solid drying and crystallization.  b1. Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1. Incorporate economic, societal, global, environmental, and risk management factors into design. |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | c1. Prepare technical reports  d1. 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. | a1. Recognize 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.  b1. Summarize the appropriate techniques relevant to different industries.  c1. Create a process, component or system to carry out specialized engineering designs. |

1. Course Contents:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. |  | Topics | Lectures | Tutorial | Practical |
| 1 | Filtration |  | 2 | 2 | - |
| 2 | Size reduction |  | 2 | 2 | - |
| 3 | Screening and Size Classification | | 2 | 2 | - |
| 4 | Solid drying | | 4 | 4 | - |
| 5 | Crystallization | | 2 | 2 | - |
| 6 | Centrifugation | | 2 | 2 | - |
| 7 | Sedimentation | | 4 | 4 | - |
| 8 | Power consumption in gas /liquid contacting. Design principles for stirrer and model experiments for scale up. | | 2 | 2 |  |
| 9 | Computation methods in multistage and multicomponent systems and operations including particulate solids | | 8 | 8 | - |
|  | Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Filtration | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 2 | Size reduction | x | x |  |  | X |  |  |  |  | X |  |  |  |  |
| 3 | Screening and Size Classification | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 4 | Solid drying | x | x |  |  | X | x |  |  |  | X |  |  |  |  |
| 5 | Crystallization | x | x |  |  | X | x |  |  |  | X |  |  |  |  |
| 6 | Centrifugation | x | x |  |  | X | x |  |  |  | X |  |  |  |  |
| 7 | Sedimentation | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 8 | Power consumption in gas /liquid contacting. Design principles for stirrer and model experiments for scale up. | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 9 | Computation methods in multistage and multicomponent systems and operations including particulate solids | x | x |  |  | X |  |  |  |  | X |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3/B1 | a1/b1 |
| 2 | Semester work (sheets, quizs) | A3,A5,B1 | c1/c1,d1/c1 |
| 3 | Final term examination | B1 | a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Course notes  Lecture notes prepared by Ass. Prof. Dr. / Taha E. Farrag. |
| 2 | Recommended books  Felder, R.M., and R.W. Rousseau, “Elementary Principles of Chemical Processes,” 3rd ed., John Wiley, 2018. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Filtration | 1 | A3 | a1,c1 |
| 2 | Size reduction | 1 | A5 | c1 |
| 3 | Screening and Size Classification | 1 | A5 | c1 ,d1 |
| 4 | Solid drying | 1 | B1 | a1,b1 |
| 5 | Crystallization | 1 | A3 | a1,b1 |
| 6 | Centrifugation | 1 | A3 | a1,c1 |
| 7 | Sedimentation | 1 | A3 | a1,b1 |
| 8 | Power consumption in gas /liquid contacting. Design principles for stirrer and model experiments for scale up. | 7 | B1 | c1 |
| 9 | Computation methods in multistage and multicomponent systems and operations including particulate solids | 7 | B1 | c1 |

Course Coordinator: Prof. Dr. / Taha E. Farrag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Process Modeling and Simulation

CHE 408

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Process Modeling and Simulation |
| Course Code | CHE 408 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | MTH 302,CHE 405 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |

3 Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2. 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. b3. Analyze and interpret data.  b4. Evaluate components, systems, and processes are evaluated for their characteristics and performance. |
| B3. Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering. | c1. Apply numerical modeling methods appropriate to topics in chemical engineering. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Review of the basic principles of transport of momentum, heat, and mass with applied problems.  Practical   * Natural gas processing * Heat Exchanger | 16 | - | 16 |
| 2 | Numerical methods for solving more complex problems of transport phenomena and kinetics.  Practical  Chemical reaction | 12 | - | 12 |
| Total | | 28 |  | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Review of the basic principles of transport of momentum, heat, and mass with applied problems.  Practical   * Natural gas processing * Heat   Exchanger | x | x |  |  | X | x | X |  |  |  |  |  | x | x |
| 2 | Numerical methods for solving more complex problems of transport phenomena and kinetics.  Practical  Chemical reaction | x | x |  |  | x | x | X |  |  |  |  |  | x | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A2 | a2,b4 |
| 2 | Semester work (sheets, quizzes) | B3 | c1 |
| 3 | Practical Examination | B3 | c1 |
| 4 | Final term examination | A2 | b3,a2,b4 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work (sheets, quizs) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Fundamentals of Acoustics, Modelling, Simulation, Algorithms and Acoustic Virtual Reality , Michael Vorländer, Springer International, 2020 |
| 2 | Tanase G. Dobre and Jose G. Sanchez Marcano, “Chemical Engineering, Modeling, Simulation and Similitude ” Wiely , 2007 |
| 3 | Simulation Foundations, Methods and Applications Modelling and Simulation: Exploring Dynamic System Behaviour Louis G. Birta, Gilbert Arbez, Springer International Publishing, 2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |
| 4 | Computer lab |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Review of the basic principles of transport of momentum, heat, and mass with applied problems. | 7 | A2 | a2 |
| Practical   * Natural gas processing * Heat Exchanger | 7 | A2 | b4 |
| 2 | Numerical methods for solving more complex problems of transport phenomena and kinetics. | 7 | B3 | c1 |
| Practical  Chemical reaction | 7 | A2 | b3 |

Course Coordinator: Prof. Dr. Taha E. Farrag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Environmental Management

# (ENG401)

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic Science and Engineering Department |
| Course Title | Environmental Management |
| Course Code | ENG401 |
| Year/Level | level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 3 | - | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 3 | Recognize his or her role in promoting engineering and contributing to the profession's and community's development; by appreciating the importance of the environment, both physical and natural, and working to promote sustainability concepts; |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2 Understand the professional ethics and impacts of engineering solutions on society and environment.  a3 Recognizes the environmental and economic impact of various industries, waste minimization, and industrial facility remediation.  b1. Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1. 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. | a1. Describe quality assurance systems, codes of practice, and standards, as well as health and safety regulations and environmental concerns.  c1. Apply safe systems at work by taking the necessary precautions to manage hazards.  c3. Utilize modern technologies. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d1. Search for information to engage in lifelong self-learning discipline. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | The importance of studying environmental science  – modern technology and its effect on the environment | 12 | - | - |
| 2 | quality of the environment and development elements | 6 | - | - |
| 3 | sources of environmental pollution and method of control (air pollution – water pollution) | 12 | - | - |
| 4 | Solid wastes pollution – noise) – economics of environmental pollution control – legislations for the environment protection. | 12 | - | - |
|  | Total | 42 | - | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | The importance of studying  environmental science | x | x |  |  | X |  |  |  |  | x |  |  |  |  |
|  | – modern technology and its effect on the environment |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 | quality of the environment and development elements | x | x | X |  | X |  |  |  |  | x |  |  |  |  |
| 3 | sources of environmental pollution and method  of control (air pollution – water pollution) | x | x |  |  | X |  | x |  |  | x |  |  |  |  |
| 4 | Solid wastes pollution – noise) – economics of environmental pollution control – legislations for the environment protection. | x | x | X |  | X |  | x |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material. | Better access any time. |
| 2 | Asking small groups to do assignments; each composed of low, medium, and high performance students. | Knowledge and skills transfer among different levels of students. |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Mid Term Examination | A3,A4 | b1,a1 |
| 2 | Semester work(report, quizzes,  presentation) | A10/A4 | d1/c1,c3 |
| 3 | Final Term Examination | A3,A4,A10 | a2,a3,a1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Semester work | 2nd, 7th , 9th |
| 2 | Mid Term Examination | 8th |
| 3 | Final Term Examination | 15𝑡ℎ |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | evaluation method | Weights |
| 1 | Mid-term examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final-term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | د.زكريا طاحون , ادارة البيئة نحو الانتاج الأنظف, الهيئة المصرية العامة للكتاب,القاهرة,2007 |
| 2 | محمد اسماعيل خضر,مقدمة في علوم البيئة ,الهيئة العامة للكتاب ,القاهلرة 2012 |

1. Facilities required for teaching and learning:

|  |  |  |
| --- | --- | --- |
| No. |  | Facility |
| 1 | Seminar |  |
| 2 | Lecture Classroom |  |
| 3 | White Board |  |
| 4 | Data Show system |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | The importance of studying environmental science – modern technology and its effect on the environment | 2,3 | A10,A3 | d1,a2 |
| 2 | Quality of the environment and development elements | 2,3 | A10,A3,A4 | d1,b1,a1 |
| 3 | Sources of environmental pollution and method of control (air pollution – water pollution | 2,3 | A3/A4 | a3/c1 |
| 4 | Solid wastes pollution – noise) – economics of environmental pollution control – legislations for the environment protection. | 2,3 | A3,A4 | c1,c3 |

Course Coordinator: Dr. Ramadan Elkateb

Head of Department: Asso.prof.Amal Bahiry

Date of Approval: 2022

Liquefied Natural Gas

CHE 411

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Liquefied Natural Gas |
| Course Code | CHE 411 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 304 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular processes .    b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.    c1 Incorporate economic, societal, global, environmental, and risk management factors into design. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1.Think creatively in solving problems of design.  d2. Effectively manage tasks, time, and resources.  d3. Refer to relevant literatures. |
| 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 | d1. 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. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Refrigeration systems | 4 | 4 | - |
| 2 | Natural gas preparation and liquefaction | 6 | 6 | - |
| 3 | thermodynamic aspects of liquefaction | 4 | 4 | - |
| 4 | liquefaction plants | 6 | 6 | - |
| 5 | Properties of LNG | 4 | 4 | - |
| 6 | Vaporization losses and custody transfer. | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Refrigeration systems | x | x |  |  | x |  |  |  |  | X |  |  |  |  |
| 2 | Natural gas preparation and liquefaction | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | thermodynamic  aspects of liquefaction | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 4 | liquefaction plants | x | x |  |  | x | x |  |  |  | X |  |  |  |  |
| 5 | Properties of LNG | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 6 | Vaporization losses and custody transfer. | x | x |  |  | x |  | x |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A9 | d1,d2 |
| 2 | Semester work (sheets, quizs, reports) | A9/A3 | d1,d2,d3/c1 |
| 3 | Final term examination | A3 ,B2 | a1,b1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Saeid Mokhatab, John Mak, Jaleel Valappil and David A. Wood (Auth.), Handbook of Liquefied Natural Gas [1 ed.], Gulf Professional Publishing, 2014. |
| 1 | Paul Griffin, Liquefied Natural Gas :The Law and Business of LNG, Third Edition, 2017 |
| 2 | Xiuli Wang and Michael Economides, "Advanced Natural Gas Engineering", Gulf Publishing Company, Houston, Texas, 2009. |
| 3 | Arthur J. Kinday and William R. Parrish, "Fundamentals of Natural Gas Processing.", Taylor and Francis Group, LLC, 2006. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Refrigeration systems | 9 | A9 | d3 |
| 2 | Natural gas preparation and liquefaction | 9 | B2 | d1 |
| 3 | thermodynamic aspects of liquefaction | 8,9 | A9 | d1,d2 |
| 4 | liquefaction plants | 8,9 | A3 | b1,c1 |
| 5 | Properties of LNG | 9 | A3 | a1 |
| 6 | Vaporization losses and custody transfer. | 8,9 | A3 | b1 |

Course Coordinator: Dr. Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Air Pollution

CHE 412

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Air Pollution |
| Course Code | CHE 412 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

* + 1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

* + 1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular processes .  b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1 Incorporate economic, societal, global, environmental, and risk management factors into design. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1 Think creatively in solving problems of design.  d2 Effectively manage tasks, time, and resources.  d3 Refer to relevant literatures. |
| 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 | d1 Engage in recent technical advancements and developing disciplines related to air pollution in order to respond to the demanding role and obligations of a professional chemical engineer. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Source of pollutants | 4 | 4 | - |
| 2 | measurements and equipment design for removal of air pollutants | 4 | 4 | - |
| 3 | Effects of air pollutants | 4 | 4 | - |
| 4 | Dispersion of pollutants in the atmosphere | 4 | 4 | - |
| 5 | Particulate matter and its control equipment | 4 | 4 | - |
| 6 | Atmospheric photochemical reactions | 4 | 4 | - |
| 7 | Instrumentation and emission testing equipment | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Source of pollutants | x | x | x |  | X |  |  |  |  |  |  |  |  |  |
| 2 | measurements and equipment design for removal of air pollutants | x | x |  |  | X | x |  |  |  | X |  |  |  |  |
| 3 | Effects of air pollutants | x | x |  |  | X |  |  |  |  | X |  |  |  |  |
| 4 | Dispersion of pollutants in the atmosphere | x | x | x |  | X |  |  |  |  |  |  |  |  |  |
| 5 | Particulate matter and its control equipment | x | x |  |  | X |  |  |  |  | X |  |  |  |  |
| 6 | Atmospheric photochemical reactions | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 7 | Instrumentation and emission testing equipment | x | x |  |  | X |  |  |  |  | X |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A9 | d1,d2 |
| 2 | Semester work (sheets, quizs, reports) | A9/A3 | d1,d2,d3/c1 |
| 3 | Final term examination | A3 ,B2 | a1,b1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets ,quizzes ,presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Measurement, Modelling and Mitigation, Fourth Edition By Abhishek Tiwary, Ian Williams Copyright Year 2019 |
| 2 | Atmospheric Chemistry and Physics: From Air Pollution to Climate Change by Spyros N. Pandis and John H. Seinfeld | Apr 4, 2016 |
| 3 | M. Khare, Air Pollution - Monitoring, Health and Control, Intech, 2012. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  | |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Source of pollutants | 8 | A9 | d3 |
| 2 | measurements and equipment design for removal of air pollutants | 9 | A3 | a1 |
| 3 | Effects of air pollutants | 8 | A9 | d3 |
| 4 | Dispersion of pollutants in the atmosphere | 8 | A9 | d3 |
| 5 | Particulate matter and its  control equipment | 9 | A9,A3 | d1,b1 |
| 6 | Atmospheric photochemical reactions | 8 | B2 | d1 |
| 7 | Instrumentation and emission testing equipment | 9 | A9,A3 | d2,c1 |

Course Coordinator: Dr. Mohammed El-bindary

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Gas Engineering

CHE 413

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Gas Engineering |
| Course Code | CHE 413 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 304,CHE 403 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular processes .    b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.    c1 Incorporate economic, societal, global, environmental, and risk management factors into design. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1 Think creatively in solving problems of design.    d2 Effectively manage tasks, time, and resources.    d3 Refer to relevant literatures. |
| 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 | d1 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. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Characterization of natural gas systems | 4 | 4 | - |
| 2 | Properties of natural gas systems | 4 | 4 | - |
| 3 | Product specification | 2 | 2 | - |
| 4 | Natural gas phase behavior | 2 | 2 | - |
| 5 | Oil and gas separation technology | 2 | 2 | - |
| 6 | Methods used to remove liquids from gas in separators | 2 | 2 | - |
| 7 | Methods used to remove gas from oil in separator | 2 | 2 | - |
| 8 | Classification and common features of separators | 4 | 4 | - |
| 9 | Natural gas dehydration | 4 | 4 | - |
| 10 | Overview of sweetening, and liquefaction. | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Characterization of natural gas systems | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Properties of natural gas systems | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | Product specification | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Natural gas phase behavior | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 5 | Oil and gas separation technology | x | x |  |  | x |  | x |  |  | x |  |  |  |  |
| 6 | Methods used to remove liquids from gas in separators | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 7 | Methods used to remove gas from oil in separator | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 8 | Classification and common features of separators | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 9 | Natural gas dehydration | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 10 | Overview of sweetening, and liquefaction. | x | x | x |  | x |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A9 | d1,d2 |
| 2 | Semester work (sheets, quizs, reports) | A9/A3 | d1,d2,d3/c1 |
| 3 | Final term examination | A3 ,B2 | a1,b1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs, presentation ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs, presentation ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Deepa Honap, Pankaj Kurulkar, "Fundamentals of Natural Gas Processing", Scitus Academics Llc; UK ed. edition 2016. |
| 2 | Xiuli Wang and Michael Economides, "Advanced Natural Gas Engineering", Gulf Publishing Company, Houston, Texas, 2009. |
| 3 | Arthur J. Kinday and William R. Parrish, "Fundamentals of Natural Gas Processing", Taylor and Francis Group, LLC, 2006. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Characterization of natural gas systems | 9 | A9 | d3 |
| 2 | Properties of natural gas systems | 9 | A3 | a1 |
| 3 | Product specification | 9 | A3 | b1 |
| 4 | Natural gas phase behavior | 9 | A3 | a1 |
| 5 | Oil and gas separation technology | 9 | B2 | d1 |
| 6 | Methods used to remove liquids from gas in separators | 9 | A9 | d1 |
| 7 | Methods used to remove gas from oil in separator | 9 | A3 | a1,c1 |
| 8 | Classification and common features of separators | 9 | A3 | a1,c1 |
| 9 | Natural gas dehydration | 8,9 | A3 | a1,c1 |
| 10 | Overview of sweetening, and liquefaction. | 8,9 | A9 | d2 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Polymer Engineering

CHE 414

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Polymer Engineering |
| Course Code | CHE 414 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community and  value the importance of the environment, both physical and natural, and work to promote sustainability principles |
| 4 | Use techniques, skills and modern engineering tools necessary for engineering practice and assume full responsibility for own learning  and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular polymer products and processes including reactor and vessel design.  a2 Understand the professional ethics and impacts of engineering solutions on society and environment  a3 Recognizes the environmental and economic impact of polymer industry, waste minimization, and industrial facility remediation.  b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1 Incorporate economic, societal, global, environmental, and risk management factors into design.  c2 Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development. |
| 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. | a1 Recognize 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.  b1 Summarize the appropriate techniques relevant to polymer industry.  c1 Create a process, component or system to carry out specialized engineering designs related to polymer industry. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Polymer chemistry and types of polymerization reactions. | 4 | 4 | - |
| 2 | Polymerization techniques | 2 | 2 | - |
| 3 | measurement of molecular weight | 2 | 2 | - |
| 4 | Classification of polymers | 2 | 2 | - |
| 5 | plastics, elastomers | 4 | 4 | - |
| 6 | thermoplastics and thermosetting resins | 2 | 2 | - |
| 7 | Structure, mechanical and physical properties of polymers | 2 | 2 | - |
| 8 | manufacture of polymers | 2 | 2 | - |
| 9 | Polymer processing | 2 | 2 | - |
| 10 | Extrusion | 2 | 2 | - |
| 11 | Injection and blow molding | 2 | 2 | - |
| 12 | Manufacture and properties of some commercial polymers | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem    solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Polymer chemistry and types of polymerization reactions. | x | x |  |  | X |  |  |  |  | x |  |  |  |  |
| 2 | Polymerization techniques | x | x | x |  | X |  |  |  |  |  |  |  |  |  |
| 3 | measurement of molecular weight | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 4 | Classification of polymers | x | x |  |  | X |  |  |  |  | X |  |  |  |  |
| 5 | plastics, elastomers | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 6 | thermoplastics and thermosetting resins | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 7 | Structure, mechanical and physical properties of polymers | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 8 | manufacture of polymers | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 9 | Polymer processing | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 10 | Extrusion | x | x |  |  |  |  |  |  |  | x |  |  |  |  |
| 11 | Injection and blow molding | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 12 | Manufacture and properties of some commercial polymers | x | x | x |  | X |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
|  | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3/B1 | a1,a2/b1 |
| 2 | Semester work (sheets, quizs, presentation ) | A3/B1 | c1,c2/c1 |
| 3 | Final term examination | A3/B1 | a1,a3,b1/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs, presentation ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizs, presentation ) | 20% |
| 3 | Final term examination | 60% |
| Otal |  | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Anil Kumar, Rakesh K. Gupta " Fundamentals of Polymer Engineering" 3rd CRC Press, (2019). |
| 2 | [Stoyko Fakirov](https://onlinelibrary.wiley.com/action/doSearch?ContribAuthorStored=Fakirov%2C+Stoyko) " Fundamentals of Polymer Science for Engineers" Wiley‐VCH Verlag GmbH & Co. KGaA (2017). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Polymer chemistry and types of polymerization reactions. | 3 | A3 | a1,a2 |
| 2 | Polymerization techniques | 4 | B1 | a1,b1 |
| 3 | Measurement of molecular weight | 3 | A3 | a1 |
| 4 | Classification of polymers | 4 | B1 | b1,c1 |
| 5 | Plastics, elastomers | 4 | A3 | b1 |
| 6 | Thermoplastics and thermosetting resins | 3 | B1 | b1 |
| 7 | Structure, mechanical and physical properties of polymers | 3 | A3 | a1,a3 |
| D8 | manufacture of polymers | 4 | B1 | b1,c1 |
| 9 | Polymer processing | 4 | B1 | c1 |
| 10 | Extrusion | 4 | B1 | a1,b1 |
| 11 | Injection and blow molding | 4 | B1 | c1 |
| 12 | Manufacture and properties of some commercial polymers | 3,4 | A3 | b1,c1,c2 |

Course Coordinator: Dr. / Mohamed fakieh

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Engineering Materials Selection

CHE 415

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Engineering Materials Selection |
| Course Code | CHE 415 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 302 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community and  value the importance of the environment, both physical and natural, and work to promote sustainability principles |
| 4 | Use techniques, skills and modern engineering tools necessary for engineering practice and assume full responsibility for own learning  and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies |

4- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular materials and processes including reactor and vessel design.  a2 Understand the professional ethics and impacts of engineering solutions on society and environment  a3 Recognizes the environmental and economic  impact of materials industry, waste minimization, and industrial facility remediation.  b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1 Incorporate economic, societal, global, environmental, and risk management factors into design.  c2 Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development. |
| 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. | a1 Recognize 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.    b1 Summarize the appropriate techniques relevant to materials industry.    c1 Create a process, component or system to carry out specialized engineering designs related to materials industry. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction on the application of Engineering of materials science principles | 4 | 4 | - |
| 2 | The application of Engineering of materials science principles on the metals | 4 | 4 | - |
| 3 | The application of Engineering of materials science principles on the ceramics | 4 | 4 | - |
| 4 | The application of Engineering of materials science principles on the plastic Materials | 4 | 4 | - |
| 5 | Uses of different materials in different application | 8 | 8 | - |
| 6 | Study the corrosion, oxidation, and variation of properties with temperature. | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Introduction on the application of Engineering of materials science principles | x | x | X |  |  |  |  |  |  | x |  |  |  |  |
| 2 | The application of Engineering of materials science principles on the metals | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 3 | The application of Engineering of materials science principles on the ceramics | x | x |  |  | X | X |  |  |  |  |  |  |  |  |
| 4 | The application of Engineering of materials science principles on the plastic Materials | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 5 | Uses of different materials in different application | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 6 | Study the corrosion, oxidation, and variation of properties with temperature. | x | x |  |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3/B1 | a1,a2/b1 |
| 2 | Semester work (sheets, quizs, presentation ) | A3/B1 | c1,c2/c1 |
| 3 | Final term examination | A3/B1 | a1,a3,b1/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizs, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | James F. Shackelford, Introduction to Materials Science for Engineers, Prentice Hall, 7th Ed., 2019. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction on the application of Engineering of materials science principles | 3 | A3 | a1,a2 |
| 2 | The application of Engineering of materials science principles on the metals | 4 | B1 | b1,c1 |
| 3 | The application of Engineering of materials science principles on the ceramics | 4 | B1 | b1,c1 |
| 4 | The application of Engineering of materials science principles on the plastic materials | 4 | B1 | b1,c1 |
| 5 | Uses of different materials in different application | 3,4 | A3 | a3,b1,c1,c2 |
| 6 | Study the corrosion, oxidation, and variation of properties with temperature. | 3 | B1 | a1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Water Desalination

CHE 416

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Water Desalination |
| Course Code | CHE 416 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 402 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular processes .    b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.    c1 Incorporate economic, societal, global, environmental, and risk management factors into design. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1 Think creatively in solving problems of design.    d2 Effectively manage tasks, time, and resources.    d3 Refer to relevant literatures. |
| 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 | d1 Engage in recent technical advancements and developing disciplines related to water desalination in order to respond to the demanding role and obligations of a professional chemical engineer. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic concept of water desalination and combines water chemistry, scaling, corrosion, heat transfer principles and material behavior. | 6 | 6 | - |
| 2 | Design principles as applied to desalination processes. | 8 | 8 | - |
| 3 | Thermal (flash, vapor compression) and nonthermal (reverse-osmosis, electro -dialysis) desalination techniques. | 8 | 8 | - |
| 4 | Water properties and quality criteria and standards as well as corrosion behavior and its control in desalination plants. | 6 | 6 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Basic concept of water desalination and combines water chemistry, scaling, corrosion, heat transfer principles and material behavior. | x | x |  |  | X |  |  |  |  | x |  |  |  |  |
| 2 | Design principles as applied to desalination processes. | x | x |  |  | X |  |  |  |  |  |  |  |  |  |
| 3 | Thermal (flash, vapor compression) and non-thermal (reverse osmosis, electro dialysis) desalination techniques. | x | x |  |  | X | x |  |  |  |  |  |  |  |  |
| 4 | Water properties and quality criteria and standards as well as corrosion behavior and its control in desalination plants. | x | x |  |  | X | x | X |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A9 | d1,d2 |
| 2 | Semester work (sheets, quizs, reports) | A9/A3 | d1,d2,d3/c1 |
| 3 | Final term examination | A3 ,B2 | a1,b1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs , presentation ) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs , presentation ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | H.T. El-Dessouky, H.M. Ettouney, Fundamentals of Salt Water Desalination, Elsevier Science, 2019. |
| 2 | Noam Lior, Advances in water desalination, Wiley, 2018. |
| 3 | [Committee to Review the Desalination](http://gen.lib.rus.ec/search.php?req=Committee%20to%20Review%20the%20Desalination&column=author) and [Water Purification Technology Roadmap, National Research Co,](http://gen.lib.rus.ec/search.php?req=Water%20Purification%20Technology%20Roadmap,%20National%20Research%20Co&column=author) Review of the Desalination and Water Purification Technology Roadmap, 2016. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic concept of water desalination and combines water chemistry, scaling, corrosion, heat transfer principles and material behavior. | 8 | A3 | a1,b1 |
| 2 | Design principles as applied to desalination processes. | 8,9 | A3 | a1,b1,c1 |
| 3 | Thermal (flash, vapor compression) and nonthermal (reverse-osmosis, electro -dialysis) desalination techniques. | 9 | B2 | d1 |
| 4 | Water properties and quality criteria and standards as well as corrosion behavior and its control in desalination plants. | 9 | A9 | d1,d2,d3 |

Course Coordinator: Dr. / Yasser Tawfiq

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Polymer Processing

# CHE 417

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering department |
| Department Responsible for the Course | Chemical Engineering department |
| Course Title | Polymer Processing |
| Course Code | CHE 417 |
| Year/Level | Level 4 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 305 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community and  value the importance of the environment, both physical and natural, and work to promote sustainability principles |
| 4 | Use techniques, skills and modern engineering tools necessary for engineering practice and assume full responsibility for own learning  and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Learn the general principles of design techniques specific to particular polymer processes including reactor and vessel design.    a2 Understand the professional ethics and impacts of engineering solutions on society and environment    a3 Recognizes the environmental and economic  impact of materials industry, waste minimization, and industrial facility remediation.    b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.  c1 Incorporate economic, societal, global, environmental, and risk management factors into design.    c2 Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development. |
| 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. | a1 Recognize 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.    b1 Summarize the appropriate techniques relevant to Polymer Processing.    c1. Create a process, component or system to carry out specialized engineering designs related to Polymer Processing . |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Theory and practice of polymer processing | 4 | 4 | - |
| 2 | Non-Newtonian flow | 4 | 4 | - |
| 3 | Kinetics and structural development during solidification | 4 | 4 | - |
| 4 | Physical characterization of microstructure and macroscopic properties | 4 | 4 | - |
| 5 | Type of polymer processing (extrusion, injection molding, fiber, film, and rubber processing) | 8 | 8 |  |
| 6 | Component manufacturing and recycling issues, compounding and blending | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face  Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Theory and practice of polymer processing | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Non-Newtonian flow | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Kinetics and structural development during solidification | x | x | x |  |  |  |  |  |  |  |  |  |  |  |
| 4 | Physical characterization of microstructure and macroscopic properties | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 5 | Type of polymer processing (extrusion, injection molding, fiber, film, and rubber processing) | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Component manufacturing and  recycling issues, compounding and blending | x | x |  |  | x |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3/B1 | a1,a2/b1 |
| 2 | Semester work (sheets, quizs, presentation ) | A3/B1 | c1,c2/c1 |
| 3 | Final term examination | A3/B1 | a1,a3,b1/a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs, presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | %20 |
| 2 | Semester work(sheets, quizs, presentation) | %20 |
| 3 | Final term examination | %60 |
|  | Total | 100% |

1. List of References:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Reference List | | |
| 1 |  | Jean-François Agassant, Pierre Avenas, Pierre J. Carreau, Bruno Vergnes, Michel Vincent " Polymer processing Principles and modeling " 2nd Carl Hanser Verlag, Munich 2017. |  |
| 2 |  | Subramanian, Muralisrinivasan, Basics of polymers: fabrication and processing technology, Momentum Press, 2015. |  |
| 3 | Donald G. Baird, Dimitris I. Collias, "Polymer processing, principles and design", 2nd edition, John Wiley & Sons, Inc., 2014. | | |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Theory and practice of polymer processing | 3 | A3 | a1 |
| 2 | Non-Newtonian flow | 3 | A3 | a1,a2 |
| 3 | Kinetics and structural development during solidification | 3 | B1 | a1 |
| 4 | Physical characterization of  microstructure and macroscopic properties | 3 | A3 | a3,b1 |
| 5 | Type of polymer processing (extrusion, injection-molding, fiber, film, and rubber processing) | 4 | B1 | b1,c1 |
| 6 | Component manufacturing and recycling issues, compounding and blending | 4 | A3 | c1,c2 |

Course Coordinator: Dr. / Yasser Tawfiq

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

# Computer applications in Chemical Engineering

CHE 501

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Computer applications in Chemical Engineering |
| Course Code | CHE 501 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | ENG 104 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering.  . |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Recognize 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.  b1. Summarize the appropriate techniques relevant to different industries.    c1 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. | d1 Apply computational techniques appropriate to chemical engineering. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 2 | Equations of state  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 3 | Vapor- liquid Equilibrium  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 4 | Chemical reaction Equilibrium  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 5 | Mass Balances with recycle stream  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 6 | Chemical reactors  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
| 7 | MATLAB overview  Practical  Application of MATLAB for some problem of chemical Engineering | 4 | - | 4 |
|  | Total | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Introduction  Practical  Application of  MATLAB for some  problem of chemical  Engineering | x | x |  |  | X |  |  |  |  |  |  |  |  | X |
| 2 | Equations of state  Practical  Application of  MATLAB for some  problem of chemical  Engineering | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 3 | Vapor- liquid  Equilibrium  Practical  Application of  MATLAB for some  problem of chemical  Engineering | x | x |  |  |  | X |  |  |  |  |  |  |  | X |
| 4 | Chemical reaction  Equilibrium  Practical  Application of MATLAB for some problem of chemical  Engineering | x | x |  |  |  | X | x |  |  |  |  |  |  | X |
| 5 | Mass Balances with recycle stream Practical  Application of  MATLAB for some  problem of chemical Engineering | x | x |  |  | x |  | X |  |  |  |  |  |  | X |
| 6 | Chemical reactors  Practical  Application of  MATLAB for some  problem of chemical  Engineering | x | x |  |  | X | X | X |  |  |  |  |  |  | X |
| 7 | MATLAB overview  Practical  Application of  MATLAB for some  problem of chemical  Engineering | x | x |  |  | X | X |  |  |  |  |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1 |
| 2 | Semester work (sheets, quizs) | B1,B3 | c1,d1 |
| 3 | Practical Examination | B1,B3 | c1,d1 |
| 4 | Final term examination | B1/B3 | a1,b1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizs) | 2nd -7th - 9th |
| 3 | Practical Examination | 14th |
| 4 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work(sheets, quizs) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Hussein K. Abdel-Aal, Chemical Engineering Primer with Computer Applications , 2017,CRC Press. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Computer lab |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction | 7,9 | B1 | a1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |
| 2 | Equations of state | 7,9 | B1 | a1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |
| 3 | Vapor- liquid Equilibrium | 7,9 | B1 | a1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |
| 4 | Chemical reaction Equilibrium | 7,9 | B1 | a1 |
|  | Practical  Application of MATLAB for some problem of chemical Engineering |  |  |  |
| 5 | Mass Balances with recycle stream | 7,9 | B1 | c1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |
| 6 | Chemical reactors | 7,9 | B1 | b1,c1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |
| 7 | MATLAB overview | 7,9 | B3 | d1 |
| Practical  Application of MATLAB for some problem of chemical Engineering |

Course Coordinator: Prof. Dr. / Taha E. Farrag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Petrochemical Engineering

CHE 502

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Petrochemical Engineering |
| Course Code | CHE 502 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 101,CHE 201 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system components and process to meet recent technological using computional system in Petrochemical engineering. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Recognize the principles of Petrochemical engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations and process control.    b1 Summarize the appropriate techniques relevant to Petrochemical engineering.    c1 Create a process, component or system to carry out specialized Petrochemical 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 | d1 Engage in the recent technological changes and emerging fields relevant to petrochemicals engineering to respond to the challenging role and responsibilities of a professional chemical engineer |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Petroleum chemistry; occurrence and composition of crude oil | 2 | 2 | - |
| 2 | Distillation | 2 | 2 | - |
| 3 | catalytic and thermal cracking | 6 | 6 | - |
| 4 | Alkylation | 2 | 2 | - |
| 5 | Hydrogenation | 2 | 2 | - |
| 6 | Isomerization | 2 | 2 | - |
| 7 | Polymerization | 2 | 2 | - |
| 8 | Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products | 10 | 10 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Petroleum chemistry; occurrence and  composition of crude  oil | x | x | x | x | x |  |  |  |  |  |  |  |  |  |
| 2 | Distillation | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | catalytic and thermal cracking | x | x |  | X | x |  |  |  |  |  |  |  |  |  |
| 4 | alkylation | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 5 | hydrogenation | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 6 | isomerization | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 7 | polymerization | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 8 | Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products | x | x |  | x |  |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1 |
| 2 | Semester work (sheets, quizs ) | B1,B2 | c1,d1 |
| 3 | Final term examination | B1/B2 | b1,c1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | B. K. Bhaskararao "Petrochemicals: An Introduction" Mercury Learning and Information (2018). |
| 2 | Uttam Ray Chaudhuri "Fundamentals of Petroleum and Petrochemical Engineering" CRC Press; 1st edition (2016). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Petroleum chemistry; occurrence and composition of crude oil | 7 | B1 | a1 |
| 2 | Distillation | 7 | B1 | a1 |
| 3 | Catalytic and thermal cracking | 7 | B1 | b1,c1 |
| 4 | Alkylation | 7 | B1 | b1,c1 |
| 5 | Hydrogenation | 7 | B1 | b1,c1 |
| 6 | Isomerization | 7 | B1 | b1,c1 |
| 7 | Polymerization | 7 | B1 | b1,c1 |
| 8 | Techniques and economics of the production of basic and intermediate petrochemicals as well as some end products | 7 | B2 | d1 |

Course Coordinator: Dr. / Mohamed fakeh

Head of Department: Asso.prof. Hend Elsayed Gadow Date of Approval: 2022

Industrial Technologies in Chemical Engineering

CHE 503

1- Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Industrial Technologies in Chemical Engineering |
| Course Code | CHE 503 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 3 | Recognize his or her role in promoting engineering and contributing to the profession's and community's development; by appreciating the importance of the environment, both physical and natural, and working to promote sustainability concepts; |
| 9 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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.implementation of  engineering projects, taking into consideration other trades requirements | a2 Understand the professional ethics and impacts of engineering solutions on society and environment    a3 Recognizes the environmental and economic impact of various industries, waste minimization, and industrial facility remediation |
| b1 Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.    c1 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 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.  . | a1 Recognize 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.    b1 Summarize the appropriate techniques relevant to different industries.    c1 Create a process, component or system to carry out specialized engineering designs. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction of the main basics and concepts of chemical industries  Practical   Introduction on laboratory apparatus for some creation of some organic compounds | 2 | - | 2 |
| 2 | Industries on chemical creation of some aromatic compounds involving nitration and sulphonation.  Practical   * Synthesis of nitronaphthalene * Sulphonation processes of some aromatic compounds | 6 | - | 6 |
| 3 | Industries on chemical creation of some aromatic compounds involving halogenation and oxidation.  Practical   Videos showing some industries on halogenated and some organic compounds by oxidation process | 6 | - | 6 |
| 4 | Some chemical industries that concern with polymerization process  Practical   Visits to factories that concern with polymerization process | 6 |  | 6 |
| 5 | Flow charts of some chemical industries  Practical   Video learning of some movies on industries were studied through flow charts | 4 |  | 4 |
| 6 | Study of chemical industry on some knitting of some natural fibers as cotton and wool.  Practical   Discussion some problems on some chemical industries and solving | 4 |  | 4 |
| Total | | 28 |  | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Introduction of the main basics and concepts of chemical  industries  Practical   Introduction on laboratory apparatus for some creation of some organic compounds | x | x |  |  | X |  |  |  |  | X |  |  |  | X |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 2 | Industries on chemical creation of some aromatic compounds involving nitration and sulphonation.  Practical   * Synthesis of nitronaphthalene * Sulphonation processes of some aromatic compounds | x | x |  |  | X |  |  |  |  | X |  |  |  | X |
| 3 | Industries on chemical creation of some aromatic compounds involving halogenation and oxidation.  Practical   Videos showing some industries on halogenated and some organic compounds by oxidation process | x | x | X |  | X |  |  |  |  |  |  |  |  | X |
| 4 | Some chemical industries that concern with polymerization  process Practical   Visits to factories that concern with polymerization process | x | x |  |  | x |  |  |  |  | X |  |  |  | X |
| 5 | Flow charts of some chemical industries  Practical   Video learning of some movies on industries were studied through flow charts | x | x |  |  | X |  |  |  |  | X |  |  |  | X |
| 6 | Study of chemical industry on some knitting of some natural fibers as cotton and wool.  Practical   Discussion some problems on some chemical industries and solving | x | x |  |  | X |  |  |  |  | X |  |  |  | X |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1 |
| 2 | Semester work (sheets, quizs) | B1,A3 | c1 |
| 3 | Practical Examination | B1,A3 | c1 |
| 4 | Final term examination | B1/A3 | a1/a2,a3,b1 |

* 1. Evaluation Schedule:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method |  | Weeks |
| 1 | Midterm examination | 8th |  |
| 2 | Semester work(sheets, quizs) | 2nd -7th - 9th |  |
| 3 | Practical Examination | 14th |  |
| 4 | Final term examination | 15th |  |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 10% |
| 2 | Semester work(sheets, quizs) | 20% |
| 3 | Practical Examination | 10% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Omari V. Mukbaniani, Heru Susanto, Chemical Technology and Informatics in Chemistry with Applications,Alexander V. Vakhrushev, 2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction of the main basics and concepts of chemical industries | 3,9 | B1 | a1 |
| Practical   Introduction on laboratory apparatus for some creation of some organic compounds | B1 | c1 |
| 2 | Industries on chemical creation of some aromatic compounds involving nitration and sulphonation. | 3,9 | B1 | a1 |
| Practical   Synthesis of nitronaphthalene  Sulphonation processes of some aromatic compounds | B1 | c1 |
| 3 | Industries on chemical creation of some aromatic compounds involving halogenation and oxidation. | 3,9 | B1 | a1 |
| Practical   Videos showing some industries on halogenated and some organic compounds by oxidation process | B1 | b1 |
| 4 | Some chemical industries that concern with polymerization process | 3,9 | B1 | a1 |
| Practical   Visits to factories that concern with polymerization process | B1 | b1 |
| 5 | Flow charts of some chemical industries | 3,9 | A3 | a2,c1 |
| Practical   Video learning of some movies on industries were studied through flow charts | B1 | b1 |
| 6 | Study of chemical industry on some knitting of some natural fibers as cotton and wool. | 3,9 | B1 | a1 |
| Practical   Discussion some problems on some chemical industries and solving | A3 | a3,b1 |

Course Coordinator: Dr. / Yasser twfiq

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Project 1

CHE 509

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Project 1 |
| Course Code | CHE 509 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | - | 2 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 1 | Master a broad range of engineering knowledge and specialized skills, as well as the ability to apply acquired knowledge in real-world situations by applying theories and abstract thinking in analytic critical and systemic thinking to identify, diagnose, and solve engineering problems of varying complexity and variation. |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 6 | Analyze data from the intended tests to manage resources creatively. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | c1 Choose relevant mathematical and computerbased methodologies for problem modelling and analysis.    c2 Develop suitable experimentation and/or simulation . |
| c3 Applying 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. | c1 Incorporate economic, societal, global, environmental, and risk management factors into design.    c2 Applying engineering design procedures to generate cost-effective solutions while adhering to the principles and contexts of sustainable design and development |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | c1 Prepare technical reports    d1 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. | b1 interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation.    c1 Conduct troubleshooting in chemical engineering plants.    c2 Acquire entrepreneurial skills |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Application of principles of chemical engineering to chemical industries projects | 18 | - | 18 |
| 2 | Reports and presentations | 10 | - | 10 |
|  | Total | 28 | - | 28 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Application of principles of chemical engineering to chemical industries projects | x |  | x | x |  |  |  | x | x | x | x | x |  | x |
| 2 | Reports and  presentations |  |  |  | x |  |  |  | x | x | x | x |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No  . | Evaluation Method | Competencies | LO’s |
| 1 | Oral Examination | A5,A6 | b1,c1,c2,d1 |
| 2 | Semester work ( presentation, Report) | A2,A3 | c1,c2,c3 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Oral Examination | at the end of IE 510 |
| 2 | Semester work ( presentation, Report) | 2nd -7th - 9th -14th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Oral Examination | 50% |
| 2 | Semester work (presentation, Report) | 50% |
|  | Total | 100% |

1. List of References:

|  |  |  |
| --- | --- | --- |
| No. |  | Reference List |
| 1 | Subject studies |  |

Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Lab |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Application of principles of chemical engineering to chemical industries projects | 1,2,6 | A2,A3 | c1,c2,c3 |
| 2 | Reports and presentations | 1,2,6 | A5,A6 | c1,d1,b1,c2 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Plant Design

CHE 504

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Plant Design |
| Course Code | CHE 504 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 401 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A9. flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1 Think creatively in solving problems of design.  d2 Effectively manage tasks, time, and resources.  d3 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. | a1 Recognize 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. |
| b1 Summarize the appropriate techniques relevant to different industries.  c1 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. | c1 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain plant. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Process choice, synthesis and screening of alternatives | 4 | 4 | - |
| 2 | Project planning | 2 | 2 | - |
| 3 | Construction of a detailed flow sheet. | 2 | 2 | - |
| 4 | Material and energy balances | 2 | 2 | - |
| 5 | Conservation of material and energy flows | 4 | 4 | - |
| 6 | Detailed design of equipment: size, construction details, materials of construction, instrumentation and control | 4 | 4 | - |
| 7 | Process economics: capital cost estimation,  manufacturing cost estimation, profit forecast, return on investment - Sensitivity to errors in cost estimates | 4 | 4 | - |
| 8 | Venture analysis: the combined effect of technological and commercial uncertainties, the quantification of risk - Planning investment. | 4 | 4 | - |
| 9 | Safety and environmental issues | 2 | 2 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and  movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and  Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Process choice, synthesis and screening of alternatives | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Project planning | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 3 | Construction of a detailed flow sheet. | x | x |  |  |  | x |  |  |  |  |  |  |  |  |
| 4 | Material and energy balances | x | x |  |  |  | x | x | x |  |  |  |  |  |  |
| 5 | Conservation of material and energy flows | x | x |  |  | x | x | x | x |  |  |  |  |  |  |
| 6 | Detailed design of equipment: size, construction details, materials of construction, instrumentation and  control | x | x |  |  | x | x | x | x |  |  |  |  |  |  |
| 7 | Process economics:  capital cost estimation, manufacturing cost estimation, profit forecast, return on investment - Sensitivity to errors in cost estimates | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 8 | Venture analysis: the combined effect of technological and commercial uncertainties, the quantification of risk - Planning investment. | x | x |  | x |  |  |  |  |  |  |  |  |  |  |
| 9 | Safety and environmental issues | x | x |  | x |  |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1 |
| 2 | Semester work (sheets, quizs ,reports ) | A9,B1,B3 | c1,d2,d3 |
| 3 | Final term examination | A9,B4 | d1,d2 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs, reports ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs, presentation ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Don Green,](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Don+Green&text=Don+Green&sort=relevancerank&search-alias=books) [Marylee Z. Southard,](https://www.amazon.com/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Marylee+Z.+Southard&text=Marylee+Z.+Southard&sort=relevancerank&search-alias=books) "Perry's Chemical Engineers' Handbook", 9th Edition, McGraw-Hill Education, 2018. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Process choice, synthesis and screening of alternatives | 8 | A9 | d3 |
| 2 | Project planning | 9 | A9 | d3 |
| 3 | Construction of a detailed flow sheet  using a process simulator (currently HYSIS) | 7 | B1,B4 | c1,d1 |
| 4 | Material and energy balances | 7 | B1 | a1 |
| 5 | Conservation of material and energy flows | 7 | B1 | b1 |
| 6 | Detailed design of equipment: size, construction details, materials of construction, instrumentation and control | 7 | B4 | d1 |
| 7 | Process economics: capital cost estimation, manufacturing cost estimation, profit forecast, return on investment - Sensitivity to errors in cost estimates | 9 | A9 | d2 |
| 8 | Venture analysis: the combined effect of technological and commercial uncertainties, the quantification of risk - Planning investment. | 9 | A9 | d1 |
| 9 | Safety and environmental issues | 8 | B4 | d1 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Petroleum Refining Engineering

CHE 505

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Petroleum Refining Engineering |
| Course Code | CHE 505 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 405 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 4 | Use the techniques, skills, and current engineering tools required for petroleum refining engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally merge the petroleum refining engineering knowledge, understanding, and feedback to improve design, products and/or services. |
| 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. | a1 Recognize the principles of petroleum refining engineering including chemical reaction equilibrium and thermodynamics; mass and energy balance; transport processes; separation processes, mechanical unit operations and process control.  b1 Summarize the appropriate techniques relevant to petroleum refining.  c1 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 | d1 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. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Classification of Crude Oils, Composition of Crude Oils | 2 | 2 | - |
| 2 | Physical and Chemical Properties of Crude oil and Oil Products | 2 | 2 | - |
| 3 | Evaluation of Crude Oil | 2 | 2 | - |
| 4 | Crude Oil Pre-treatment, Fractionation of Crude  Oil (Atmospheric Vacuum Distillation, Light End Fractionation, Process Description) | 4 | 4 | - |
| 5 | Thermal Cracking and Coking Processes | 2 | 2 | - |
| 6 | Catalytic Operations (Processes and calculations) - (Fluid Catalytic Cracking,  Hydrocracking, Hydrotreating, Catalytic  Reforming, Isomerization, Alkylation, Catalytic  Dewaxing) | 4 | 4 | - |
| 7 | Chemical Treatment of Oil Products | 2 | 2 | - |
| 8 | Lubricating Oils (Specifications, Production Process, Calculations) | 2 | 2 | - |
| 9 | Solvent Refining (Solvent Deasphalting,  Solvent Extraction, Solvent Dewaxing, Wax Deoiling) | 2 | 2 | - |
| 10 | Oil Products – Properties and Specifications,  Description of Process Flow and Calculations- (Oil  Gases, Gasoline, Kerosene, Jet Fuel, Gas Oil,  Diesel Oil, Fuel Oil, Asphalt, Greases and Wax) | 4 | 4 |  |
| 11 | Safety and Environmental Aspects in Refining (Air  Quality, Sulfur Recovery, Wastes in Refinery  Units, Fugitive Emissions) | 2 | 2 |  |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem  solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Classification of  Crude Oils,  Composition of Crude  Oils | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Physical and Chemical Properties of Crude oil and Oil Products | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 3 | Evaluation of Crude Oil | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 4 | Crude Oil Pretreatment, Fractionation of  Crude Oil | x | x |  |  | x | x |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (Atmospheric  Vacuum Distillation,  Light End  Fractionation,  Process Description) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 5 | Thermal Cracking and Coking Processes | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Catalytic Operations (Processes and calculations) - (Fluid  Catalytic Cracking,  Hydrocracking,  Hydrotreating,  Catalytic Reforming,  Isomerization,  Alkylation, Catalytic  Dewaxing) | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 7 | Chemical Treatment of Oil Products | x | x | x | x |  |  |  |  |  |  |  |  |  |  |
| 8 | Lubricating Oils  (Specifications,  Production Process,  Calculations) | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 9 | Solvent Refining  (Solvent  Deasphalting,  Solvent Extraction,  Solvent Dewaxing,  Wax Deoiling) | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 10 | Oil Products –  Properties and  Specifications,  Description of  Process Flow and  Calculations- (Oil  Gases, Gasoline,  Kerosene, Jet Fuel,  Gas Oil, Diesel Oil,  Fuel Oil, Asphalt,  Greases and Wax) | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 11 | Safety and  Environmental  Aspects in Refining  (Air Quality, Sulfur  Recovery, Wastes in  Refinery Units,  Fugitive Emissions) | x | x | x |  | x |  |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1 |
| 2 | Semester work (sheets, quizs ) | A10,B1,B2 | c1,d1,d2 |
| 3 | Final term examination | B1 | a1,b1,c1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizs ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizs) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Y. A. Liu, Ai-Fu Chang, [Kiran Pashikanti](https://www.wiley.com/en-us/search?pq=%7Crelevance%7Cauthor%3AKiran+Pashikanti) "Petroleum Refinery Process Modeling:  Integrated Optimization Tools and Applications" (2018). |
| 2 | A. Kayode Coker "Petroleum Refining Design and Applications Handbook, Volume  1" Scrivener Publishing LLC (2018). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Classification of Crude  Oils, Composition of  Crude Oils | 4 | A10 | d1 |
| 2 | Physical and Chemical Properties of Crude oil and Oil Products | 4 | A10 | d1 |
| 3 | Evaluation of Crude Oil | 4 | B1 | b1 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 4 | Crude Oil Pre-treatment,  Fractionation of Crude  Oil (Atmospheric  Vacuum Distillation,  Light End Fractionation,  Process Description) | 9 | B1 | a1 |
| 5 | Thermal Cracking and Coking Processes | 9 | B1 | c1 |
| 6 | Catalytic Operations (Processes and calculations) - (Fluid  Catalytic Cracking,  Hydrocracking,  Hydrotreating, Catalytic  Reforming, Isomerization,  Alkylation, Catalytic  Dewaxing) | 9 | B1 | c1 |
| 7 | Chemical Treatment of Oil Products | 9 | A10 | d2 |
| 8 | Lubricating Oils  (Specifications,  Production Process,  Calculations) | 4 | B2 | d1 |
| 9 | Solvent Refining  (Solvent Deasphalting,  Solvent Extraction,  Solvent Dewaxing, Wax  Deoiling) | 4 | B2 | d1 |
| 10 | Oil Products – Properties and Specifications, Description of Process  Flow and Calculations-  (Oil Gases, Gasoline,  Kerosene, Jet Fuel, Gas  Oil, Diesel Oil, Fuel Oil,  Asphalt, Greases and  Wax) | 9 | B1 | c1 |
| 11 | Safety and Environmental  Aspects in Refining (Air  Quality, Sulfur Recovery,  Wastes in Refinery Units,  Fugitive Emissions) | 9 | B1 | b1 |

Course Coordinator: Dr. / Sohier Abo Bakr

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Quality Assurances and Engineering Reliability

ENG 415

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Basic science and engineering Department |
| Course Title | Quality Assurances and Engineering  Reliability |
| Course Code | ENG 415 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 2 | Work in and manage a diverse team of professionals from various engineering disciplines, taking responsibility for own and team performance; and Behave professionally and adhere to engineering ethics and standards. |
| 4 | Use the techniques, skills, and current engineering tools required for engineering practice by taking full responsibility for one's own learning and development, participating in lifelong learning, and demonstrating the ability to pursue postgraduate and research studies. |
| 6 | Analyze data from the intended tests to manage resources creatively. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. | a1 Describe quality assurance systems, codes of practice, and standards, as well as health and safety regulations and environmental concerns. a2 List the engineering-related business and management principles.      b1 Create methodical approaches when dealing with new and advancing technology.    c2 Use fundamental organizational and project management abilities.  c4 Apply quality assurance procedures and follow codes and standards. |
| A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | b1 interpret data derived from laboratory observation from equipment flow sheets, charts and curves to interpret data derived from laboratory observation. Analyze and interpret data.  c2 Acquire entrepreneurial skills. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | The meaning of standardization and its methods | 2 | 2 | - |
| 2 | Define of STM, CAS, ISO, GMP, quality control and quality assurance. | 4 | 4 | - |
| 3 | Standardization of gases and their applications according to standard | 2 | 2 | - |
| 4 | Standardization of liquids and their applications according to standard | 4 | 4 | - |
| 5 | Standardization of materials and their applications according to standard | 6 | 6 | - |
| 6 | Standardization of tools , pipe lines and their applications according to standard | 2 | 2 | - |
| 7 | Standardization of instruments and reactors and their applications according to standard | 2 | 2 | - |
| 8 | Methods of quality control | 4 | 4 | - |
| 9 | Reliability on product quality | 2 | 2 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | The meaning of standardization and its methods | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Define of STM, CAS, ISO, GMP, quality control and quality assurance. | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Standardization of gases and their applications according  to standard | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 4 | Standardization of liquids and their applications according  to standard | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 5 | Standardization of materials and their applications according  to standard | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Standardization of tools , pipe lines and their applications according to standard | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 7 | Standardization of instruments and reactors and their applications according  to standard | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 8 | Methods of quality control | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 9 | Reliability on product quality. | x | x |  |  | x | x |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A4 | a1,b1 |
| 2 | Semester work | A4,A6 | c4,c2 |
| 3 | Final term examination | A4,A6 | a2,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 4 | Final term examination | 60% |
|  | Total | 100% |

List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Quality assurance and quality control in the analytical chemical laboratory : a practical approach,](http://libgen.rs/book/index.php?md5=8D8640F473F7E7AB3600042E3A05A7F5) [Konieczka, Piotr](http://libgen.rs/search.php?req=Konieczka%2C+Piotr&column=author)[; Namieśnik, Jacek](http://libgen.rs/search.php?req=+Namie%C5%9Bnik%2C+Jacek&column=author) CRC Press, 2018 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Wireless internet |
| 3 | White board | 6 | Sound system |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | The meaning of standardization and its methods | 2,4 | A4 | a1 |
| 2 | Define of STM, CAS, ISO, GMP, quality control and quality assurance. | 2,4 | A4 | a2 |
| 3 | Gases applications according to standard | 6 | A4 | c2 |
| 4 | Liquids applications according to standard | 6 | A4 | c4 |
| 5 | Materials applications according to standard | 6 | A4 | c4 |
| 6 | Tools , pipe lines and their applications according to standard | 4 | A4 | b1 |
| 7 | Instruments and reactors and their applications according to standard | 4 | A4 | b1 |
| 8 | Methods of quality control | 4,6 | A6 | b1,c2 |
| 9 | Reliability on product quality. | 4,6 | A6 | b1,c2 |

Course Coordinator: Dr. Yasser Twik

Head of Department: Ass. Prof. Dr. Amal Bahiry

Date of Approval: 2022

Project 2

CHE 510

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Project 2 |
| Course Code | CHE 510 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 509 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 1 | - | 4 |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system, component, and process to meet recent technological advancements using computer systems in chemical engineering. |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |
| 10 | Apply research findings in chemical reactions to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. | d1. Collaborate effectively within multidisciplinary team.  d2 Work in stressful environment and within constraints.  d3 Motivate individuals. |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1 Communicate effectively.    d2 Demonstrate efficient IT capabilities. |
| A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations. | d1 Think creatively in solving problems of design.    d2 Effectively manage tasks, time, and resources.    d3 Refer to relevant literatures. |
| B3. Apply numerical modeling methods and/or computational techniques appropriate to chemical engineering. | c1 Apply numerical modeling methods and/or computational techniques appropriate to project of chemical engineering. |
| B4. Adopt suitable national and international standards and codes to: design, operate, inspect and maintain chemical engineering systems. | d1 Adopt suitable national and international standards and codes to: design, operate chemical engineering systems related to the project. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Investigations on the chemical industrial problems of Project I by written reports and team presentations. | 14 | - | 56 |
|  | Total | 14 | - | 56 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Investigations on the chemical industrial problems of Project I by written reports and team presentations. | x |  |  | x |  |  |  | x | x | x | x |  | x | x |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Oral Examination | A7,A8 | d1,d2,d3/d1,d2 |
| 2 | Semester work | A9 | d1,d2,d3 |
| 3 | Report evaluation | B3,B4 | c1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Oral Examination | at the end of IE 510 |
| 2 | Semester work | 2nd -7th - 9th- 14th |
| 3 | Report evaluation | After final exam by 2 weeks |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Oral Examination | 50% |
| 2 | Semester work | 25% |
| 3 | Report evaluation | 25% |
|  | Total | 100% |

1. List of References:

|  |  |  |
| --- | --- | --- |
| No. |  | Reference List |
| 1 | Subject studies |  |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  | |

Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Investigations on the chemical industrial problems of Project I by written reports and team presentations. | 7,8,10 | A7,A8,A9,B3,B4 | d1,d2,d3/d1,d2/d1,d2,d3/c1/d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Electroplating

CHE 511

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Electroplating |
| Course Code | CHE 511 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Teaching hours | | | Lectures |  |  | Tutorial | Practical | |
| 2 |  |  | 2 | - | |
| 2-Course Aims: | | |  |  | |  |  | |
| No. | |  |  | Aims | |  |  | |
| 8 | | Consider the impact of electroplating industries on society, economics, and the environment using fundamental knowledge of chemical process related to electroplating industries. | | | | | | |
| 9 | | Demonstrate current technical expertise related to electroplating by addressing process dynamic and control challenges in plant operations. | | | | | | |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2Understand the professional ethics and impacts of engineering solutions on society and environment    c1 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. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to electroplating. |
| 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 | d1 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain electroplating systems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Electrochemistry | 4 | 4 | - |
| 2 | Electrochemical cells | 6 | 6 | - |
| 3 | Surface preparation | 6 | 6 | - |
| 4 | Throwing power | 2 | 2 | - |
| 5 | Electrochemical baths | 4 | 4 | - |
| 6 | Factors affecting electroplating | 4 | 4 | - |
| 7 | temperature - bath concentration | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Electrochemistry | x | x | x |  | x | x |  |  |  |  |  |  |  |  |
| 2 | Electrochemical cells | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 3 | Surface preparation | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 4 | Throwing power | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 5 | Electrochemical baths | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 6 | Factors affecting electroplating | x | x | x |  |  |  |  |  |  | x |  |  |  |  |
| 7 | temperature - bath concentration | x | x |  |  | x | x |  |  |  |  |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3,B2 | a2 /d1 |
| 2 | Semester work(sheets, quizzes ,presentation) | A3,A10 | c1,d1 |
| 3 | Final term examination | A10,B2,B4 | d2/d1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes ,presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Zaki Ahmad, Principles of Corrosion Engineering and Corrosion Control, Butterworth - Heinemann, 3rd. Ed., 2019. |

1. Facilities required for teaching and learning:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Facility | No. |  | Facility |
| 1 | Lecture classroom | 4 | Data show system |  |
| 2 | Presenter | 5 | Sound system |  |
| 3 | White board |  | |  |

Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Electrochemistry | 8,9 | A10 | d1 |
| 2 | Electrochemical cells | 8,9 | A10 | d1 |
| 3 | Surface preparation | 8,9 | B2 | d1 |
| 4 | Throwing power | 8,9 | A3 | c1 |
| 5 | Electrochemical baths | 8,9 | A10 | d2 |
| 6 | Factors affecting electroplating | 8,9 | B4 | d1 |
| 7 | Temperature - bath concentration | 8,9 | A3 | a2 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow Date of Approval: 2022

Ceramics

CHE 512

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Ceramics |
| Course Code | CHE 512 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
|  | 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise related to ceramics industry by addressing process dynamic and control challenges in plant operations |
| 10 | Apply research findings in chemical reactions related to ceramic industry to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

2- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 | d1 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. | d1Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to ceramic industry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Definition of ceramics and its history. | 4 | 4 | - |
| 2 | Classification of ceramics according to ASTM and it’s according to its properties. | 6 | 6 | - |
| 3 | Methods of processing of nano ceramics and its characterization | 8 | 8 | - |
| 4 | Stander test method of ceramics. | 6 | 6 | - |
| 5 | Ceramic hazard and advanced applications | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Definition of ceramics and its history. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Classification of ceramics according to ASTM and it’s according to its properties. | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 3 | Methods of processing of nano ceramics and its characterization | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Stander test method of ceramics. | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Ceramic hazard and advanced applications | x | x |  | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B4,B2 | d1,d1 |
| 2 | Semester work(sheets, quizzes, presentation) | B4,B2 | d1,d1 |
| 3 | Final term examination | B4,B2 | d1,d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Materials Chemistry of Ceramic,](http://libgen.rs/book/index.php?md5=48655474B42E6381353BEF16087438F7) [Junichi Hojo,](http://libgen.rs/search.php?req=Junichi+Hojo&column=author) Springer Singapore, 2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Definition of ceramics and its history. | 10 | B4 | d1 |
| 2 | Classification of ceramics according to ASTM and it’s according to its properties. | 10 | B4 | d1 |
| 3 | Methods of processing of nano ceramics and its characterization | 9 | B2 | d1 |
| 4 | Stander test method of ceramics. | 10 | B4 | d1 |
| 5 | Ceramic hazard and advanced applications | 9 | B2 | d1 |

Course Coordinator: Dr. Yasser Twfiq

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Refractories

CHE 513

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Refractories |
| Course Code | CHE 513 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

3-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise related to refractories industry by addressing process dynamic and control challenges in plant operations |
| 10 | Apply research findings in chemical reactions related to refractories industry to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 | d1 Engage in the recent technological changes and emerging fields relevant to refractories 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to refractories industry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Glazes | 2 | 2 | - |
| 2 | Drying and firing | 4 | 4 | - |
| 3 | Hot forming and melt forming | 4 | 4 | - |
| 4 | Stone ware | 4 | 4 | - |
| 5 | Porcelain and gypsum | 4 | 4 | - |
| 6 | Enameling abrasives | 4 | 4 | - |
| 7 | Cement | 4 | 4 | - |
| 8 | Properties of refractories and Equilibrium diagrams. | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Glazes | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Drying and firing | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 3 | Hot forming and melt forming | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 4 | Stone ware | x | x |  |  |  |  |  |  |  | x |  |  |  |  |
| 5 | Porcelain and gypsum | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Enameling abrasives | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 7 | Cement | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 8 | Properties of refractories and  Equilibrium diagrams. | x | x | x |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B4,B2 | d1 /d1 |
| 2 | Semester work(sheets, quizzes, presentation) | B4,B2 | d1 /d1 |
| 3 | Final term examination | B4,B2 | d1 /d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes ,presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Ritwik Sarkar, "Refractory Technology Fundamentals and Applications" 1st edition, CRC Press, 2017. |
| 2 | Sengupta, Prasunjit, "Refractories for the Cement Industry" Springer International Publishing, 2019. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. |  | Topic | Aims | Competencies | LO’s |
| 1 | Glazes |  | 10 | B2 | d1 |
| 2 | Drying and firing | | 9 | B4 | d1 |
| 3 | Hot forming and melt forming | | 9 | B4 | d1 |
| 4 | Stone ware | | 10 | B2 | d1 |
| 5 | Porcelain and gypsum | | 10 | B2 | d1 |
| 6 | Enameling abrasives | | 10 | B2 | d1 |
| 7 | Cement | | 9 | B2 | d1 |
| 8 | Properties of refractories and Equilibrium diagrams. | | 9 | B4 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Printing

CHE514

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Printing |
| Course Code | CHE 514 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of printing on society, economics, and the environment using fundamental knowledge of chemical process related to electroplating industries. |
| 9 | Demonstrate current technical expertise related to electroplating by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2 Understand the professional ethics and impacts of engineering solutions on society and environment    c1 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. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally 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  challenging role and responsibilities of a professional chemical engineer | d1 Engage in the recent technological changes and emerging fields relevant to eprinting 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain printing systems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Printing inks, its types, and classification of it. | 4 | 4 | - |
| 2 | Printing on different materials, conditions of printing, and constrains on printing process. | 6 | 6 | - |
| 3 | Printing on textile, preparation and finishing | 6 | 6 | - |
| 4 | Printing on paper, preparation and finishing | 4 | 4 | - |
| 5 | Printing on plastics, preparation and finishing | 4 | 4 | - |
| 6 | Stability effect of different factors on printing quality | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Printing inks, its types, and classification of it. | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Printing on different materials, conditions of printing, and constrains on printing process. | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Printing on textile, preparation and finishing | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Printing on paper, preparation and finishing | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Printing on plastics, preparation and finishing | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 6 | Stability effect of different factors on printing quality | x | x | x |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3,B2 | a2 /d1 |
| 2 | Semester work(sheets, quizzes ,presentation) | A3,A10 | c1,d1 |
| 3 | Final term examination | A10,B2,B4 | d2/d1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [NIIR Board,](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=NIIR+Board&text=NIIR+Board&sort=relevancerank&search-alias=books) "The Complete Book on Printing Technology" national institute of industrial research (2017). |
| 2 | NIIR Board of Consultants & Engineers, "The Complete Book on Printing Technology with Process Flow Diagrams" Asia Pacific Business Press Inc, 2019. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Printing inks, its types, and classification of it. | 8,9 | A10 | d1 |
| 2 | Printing on different materials, conditions of printing, and constrains on printing process. | 8,9 | A10 | d2 |
| 3 | Printing on textile, preparation and finishing | 8,9 | A3,B2 | a2,c1,d1 |
| 4 | Printing on paper, preparation and finishing | 8,9 | A3,B2 | a2,c1,d1 |
| 5 | Printing on plastics, preparation and finishing | 8,9 | A3,B2 | a2,c1,d1 |
| 6 | Stability effect of different factors on printing quality | 8,9 | B4 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Painting Technology

CHE 515

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Painting Technology |
| Course Code | CHE 515 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
|  | 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of printing on society, economics, and the environment using fundamental knowledge of chemical process related to Painting industries. |
| 9 | Demonstrate current technical expertise related to painting technology by addressing process dynamic and control challenges in plant operations. |

3 -Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2Understand the professional ethics and impacts of engineering solutions on society and environment    c1 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. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services related to Painting 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 | d1 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain Painting systems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Paints compositions | 4 | 4 | - |
| 2 | Classification of paints | 4 | 4 | - |
| 3 | Primers and final coats | 4 | 4 | - |
| 4 | Surface preparation | 8 | 8 | - |
| 5 | Reaction of paint systems | 4 | 4 | - |
| 6 | Paints for corrosion resistance | 4 | 4 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and | movies    Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and | Research    Cooperative | Discovering | Modeling | Lab |
| 1 | Paints compositions | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Classification of paints | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Primers and final coats | x | x | x |  | x |  |  |  |  |  |  |  |  |  |
| 4 | Surface preparation | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Reaction of paint systems | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 6 | Paints for corrosion resistance | x | x |  | x |  |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3,B2 | a2 /d1 |
| 2 | Semester work(sheets, quizzes ,presentation) | A3,A10 | c1,d1 |
| 3 | Final term examination | A10,B2,B4 | d2/d1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | EIRI Board, "[Paint Technology Handbook with Formulations"](https://www.amazon.com/Paint-Technology-Handbook-Formulations-EIRI/dp/9380772912/ref=sr_1_5?dchild=1&qid=1631830514&refinements=p_28%3APaint+Technology+Handbook&s=books&sr=1-5) EIRI Board (2017). |
| 2 | [Himadri Panda,](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Himadri+Panda&text=Himadri+Panda&sort=relevancerank&search-alias=books) "Complete Handbook on Paints Varnish Resins Copolymers and Coatings wirh Manufacturing Process Formulations and Technology" Bio-Green Books (2017). |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Paints compositions | 8,9 | A10 | d1 |
| 2 | Classification of paints | 8,9 | A10 | d1 |
| 3 | Primers and final coats | 8,9 | B2 | d1 |
| 4 | Surface preparation | 8,9 | A10 | d2 |
| 5 | Reaction of paint systems | 8,9 | B4 | d1 |
| 6 | Paints for corrosion resistance | 8,9 | A3 | a2,c1 |

Course Coordinator: Dr. /Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Wastewater treatment

CHE 516

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Wastewater treatment |
| Course Code | CHE 516 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 8 | Consider the impact of Wastewater treatment on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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, Instrumentation and Control of Chemical Processes, and Process and Plant 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 . |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Water chemistry | 4 | 2 | - |
| 2 | Water sampling | 6 | 2 | - |
| 3 | Water analysis | 8 | 22 | - |
| 4 | Wastewater treatment technologies | 10 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Water chemistry | x | x |  |  | x | x |  |  |  |  |  |  |  |  |
| 2 | Water sampling | x | x |  |  | x | x |  |  |  | x |  |  |  |  |
| 3 | Water analysis | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 4 | Wastewater treatment technologies | x | x | x |  | x | x |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1,A4 | b1,c1,a1 |
| 2 | Semester work (sheets, quizzes, presentation) | B1,A4 | c1,c3 |
| 3 | Final term examination | B1/A4 | b1,c1/a1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets ,quizzes , presentation ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | R. A. Mansour, N. M. Aboeleneen & Nabil M. AbdelMonem, Adsorption of cationic dye from aqueous solutions by date pits: Equilibrium, kinetic, thermodynamic studies, and batch adsorber design, International Journal of Phytoremediation, 20,1062, 2018. |
| 2 | paulG.smith, JohnG. scott, Dictionary of water and waste management, 2ndedition,Elsevier butterworth.Heiemann,2005 |

Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Water chemistry | 6 | B1 | b1 |
| 2 | Water sampling | 6 | A4 | a1,c1,c3 |
| 3 | Water analysis | 8 | B1 | b1 |
| 4 | Wastewater treatment technologies | 8 | B1 | b1,c1 |

Course Coordinator: Dr. / Ramadan El kateb

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Synthetic Fibers

CHE 517

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Synthetic Fibers |
| Course Code | CHE 517 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise related to synthetic fibers industry by addressing process dynamic and control challenges in plant operations |
| 10 | Apply research findings in chemical reactions related to synthetic fibers industry to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 | d1Engage 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. | d1Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to synthetic Fibers industry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Classification of synthetic fibers | 4 | 4 | - |
| 2 | Properties of fibers | 4 | 4 | - |
| 3 | Polyester | 4 | 4 |  |
| 4 | Nylon 6 and Nylon 6, 6 | 4 | 4 | - |
| 5 | Polyacrylic | 2 | 2 |  |
| 6 | Amide fibers and Aramids | 4 | 4 | - |
| 7 | Glass fibers | 4 | 4 | - |
| 8 | Teflon | 2 | 2 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Classification of synthetic fibers | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Properties of fibers | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Polyester | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 4 | Nylon 6 and Nylon 6, 6 | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Polyacrylic | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 6 | Amide fibers and Aramids | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 7 | Glass fibers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 8 | Teflon | x | x | x |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Midterm examination | B4,B2 | d1/d1 |  |
| 2 | Semester work(sheets, quizzes, presentation) | B4,B2 | d1/d1 |  |
| 3 | Final term examination | B4,B2 | d1/d1 |  |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes ) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes ) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | J E McIntyre, Synthetic fibers, Woodhead Publishing, 2004 |
| 2 | High-performance Fibres, J. W. S. Hearle Woodhead Publishing Series in Textiles ISBN (1855735393, 9781855735392),2019 |
| 3 | Fiber Technology From Film to Fiber, 1st Edition ,By Hans A. Krassig Copyright Year,2019 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Classification of synthetic fibers | 10 | B4 | d1 |
| 2 | Properties of fibers | 10 | B4 | d1 |
| 3 | polyester | 9 | B2 | d1 |
| 4 | Nylon 6 and Nylon 6, 6 | 9 | B2 | d1 |
| 5 | polyacrylic | 9 | B2 | d1 |
| 6 | Amide fibers and Aramids | 9 | B2 | d1 |
| 7 | Glass fibers | 9 | B2 | d1 |
| 8 | Teflon | 9 | B2 | d1 |

Course Coordinator: Dr. / Yasser Tawfiq

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Gas Sweetening

CHE 518

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Gas Sweetening |
| Course Code | CHE 518 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | CHE 201,CHE 403 |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
|  | 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 8 | Consider the impact of gas sweeting industry on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 gas sweetening industry.    c1 Apply safe systems at work by taking the necessary precautions to manage hazards.    c3 Utilize modern technologies related to describe health and safety regulations and environmental concerns related to gas sweetening 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. | b1 Summarize the appropriate techniques relevant to describe health and safety regulations and environmental concerns related to gas Sweetening industry.    c1 Create a process, component or system to carry out specialized engineering designs related to gas Sweetening industry. |

4. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Basic process principles | 4 | 4 | - |
| 2 | Amine processes | 4 | 4 | - |
| 3 | Carbonate processes | 2 | 2 | - |
| 4 | Physical absorption methods of gas sweetening | 4 | 4 | - |
| 5 | Solid bed sweetening | 4 | 4 | - |
| 6 | Liquid sweetening | 4 | 4 | - |
| 7 | Sulfur production and tail gas conditioning. | 6 | 6 | - |
|  | Total | 28 | 28 | - |

5.Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Basic process principles | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 2 | Amine processes | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 3 | Carbonate processes | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Physical absorption methods of gas sweetening | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Solid bed sweetening | x | x |  |  | x |  |  |  |  |  |  |  |  |  |
| 6 | Liquid sweetening | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 7 | Sulfur production and tail gas conditioning. | x | x |  |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A4,B1 | a1,b1,c1 |
| 2 | Semester work (sheets, quizzes, presentation) | A4 | c1,c3 |
| 3 | Final term examination | A4,B1 | a1,b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, reports) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes ,reports) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Deepa Honap,](https://www.amazon.com/s/ref=dp_byline_sr_book_1?ie=UTF8&field-author=Deepa+Honap&text=Deepa+Honap&sort=relevancerank&search-alias=books) [Pankaj Kurulkar,](https://www.amazon.com/s/ref=dp_byline_sr_book_2?ie=UTF8&field-author=Pankaj+Kurulkar&text=Pankaj+Kurulkar&sort=relevancerank&search-alias=books) "Fundamentals of Natural Gas Processing", Scitus Academics Llc; UK ed. edition 2016. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Basic process principles | 8 | A4 | c3 |
| 2 | Amine processes | 6,8 | B1 | b1,c1 |
| 3 | Carbonate processes | 6,8 | B1 | b1,c1 |
| 4 | Physical absorption methods of gas sweetening | 6,8 | A4 | a1,c1 |
| 5 | Solid bed sweetening | 6,8 | B1 | b1,c1 |
| 6 | Liquid sweetening | 6,8 | B1 | b1,c1 |
| 7 | Sulfur production and tail gas conditioning. | 6,8 | A4 | a1,c1 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Paper Technology

CHE 519

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Paper Technology |
| Course Code | CHE 519 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of printing on society, economics, and the environment using fundamental knowledge of chemical process related to paper industries. |
| 9 | Demonstrate current technical expertise related to painting technology by addressing process dynamic and control challenges in plant operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a2 Understand the professional ethics and impacts of engineering solutions on society and environment    c1 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. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally merge the engineering knowledge, understanding, and feedback to improve 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 | d1 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain paper technology systems. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Raw materials of papers | 4 | 4 | - |
| 2 | fabrication processes of paper | 8 | 10 | - |
| 3 | Emulsion types | 4 | 2 | - |
| 4 | pulp formation | 4 | 4 | - |
| 5 | evaporation processes | 4 | 4 | - |
| 6 | Drying process | 4 | 4 | - |
|  | Total | 28 | 28 |  |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation  and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Raw materials of papers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 2 | fabrication processes of paper | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Emulsion types | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 4 | pulp formation | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 5 | evaporation processes | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 6 | Drying process | x | x | x | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A3,B2 | a2 /d1 |
| 2 | Semester work(sheets, quizzes ,presentation) | A3,A10 | c1,d1 |
| 3 | Final term examination | A10,B2,B4 | d2/d1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Monica Ek, Göran Gellerstedt, Gunnar Henriksson, Pulp and Paper Chemistry and Technology, Volume 2, Walter de Gruyter GmbH & Co., 2009. |
| 2 | G. A. Smook, Gary A. Smook, Handbook for Pulp & Paper Technologists ,3rd Edition, Angus Wilde Publications, Inc., 2020. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Raw materials of papers | 8 | A10 | d1 |
| 2 | fabrication processes of paper | 9 | A10 | d2 |
| 3 | Emulsion types | 8,9 | B4 | d1 |
| 4 | pulp formation | 8,9 | A3 | a2,c1 |
| 5 | evaporation processes | 8,9 | B2 | d1 |
| 6 | Drying process | 8,9 | B2 | d1 |

Course Coordinator: Dr. / Riham Atef

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Industrial Safety

CHE 520

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Industrial Safety |
| Course Code | CHE 520 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 8 | Consider the impact of industrial safety on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 industrial safety    c1 Apply safe systems at work by taking the necessary precautions to manage hazards.    c3 Utilize modern technologies related to describe health and safety regulations and environmental concerns . |
| 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. | b1 Summarize the appropriate techniques relevant to describe health and safety regulations and environmental concerns .    c1 Create a process, component or system to carry out specialized engineering designs for appropriate industrial safety. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Introduction in safety | 4 | 4 | - |
| 2 | Preventing emergencies in the process of industry | 4 | 4 | - |
| 3 | Human error | 4 | 4 | - |
| 4 | Identification and assessment of hazards, Fires and explosions | 6 | 6 | - |
| 5 | Case studies of hazard of plant | 6 | 6 | - |
| 6 | Miscellaneous topics to be covered by invited  Lecturers | 4 | 4 | - |
|  | Total | 28 | 28 |  |

Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Introduction in safety | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 2 | Preventing emergencies in the process of industry | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 3 | Human error | x | x |  |  | x |  |  |  |  | x |  |  |  |  |
| 4 | Identification and assessment of hazards, Fires and explosions | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 5 | Case studies of hazard of plant | x | x | x |  | x |  |  |  |  | x |  |  |  |  |
| 6 | Miscellaneous topics to be covered by invited  Lecturers | x | x | x |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A4 | a1,c3 |
| 2 | Semester work (sheets, quizzes, presentation) | A4 | c1,c3 |
| 3 | Final term examination | A4/B1 | a1,c1/b1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets ,quizzes , presentation ) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | J Maiti Pradip Kumar Ray, Industrial Safety Management, Springer Singapore,2018. DOI 10.1007/978-981-10-6328-2 |
| 2 | S. Z. Mansdorf, Handbook of Occupational Safety and Health,third edition, John Wiley & Sons. Copyright., 2019 |

1. Facilities required for teachinIndustrial Safety Managementg and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Introduction in safety | 8 | A4 | a1 |
| 2 | preventing emergencies in the process industry | 6,8 | A4 | c3 |
| 3 | Human error | 8 | A4 | c1 |
| 4 | Identification and assessment of hazards, Fires and explosions | 6,8 | A4 | c1 |
| 5 | Hazard of plant modification and case studies | 8 | B1 | b1,c1 |
| 6 | miscellaneous topics to be covered  by invited lecturers | 6,8 | B1 | b1,c1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Plasticizers

CHE 521

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Plasticizers |
| Course Code | CHE 521 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification |  |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
|  | 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise related to plasticizers industry by addressing process dynamic and control challenges in plant operations |
| 10 | Apply research findings in chemical reactions related to plasticizers industry to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 | d1 Engage in the recent technological changes and emerging fields relevant to plasticizers 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. | d1 Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to plasticizers industry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Study for the properties of plasticizers | 8 | 8 | - |
| 2 | Importance and  applications of plasticizers | 10 | 10 | - |
| 3 | Techniques of the addition of plasticizers to polymers | 10 | 10 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Study for the properties of plasticizers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 2 | Importance and applications of plasticizers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Techniques of the addition of plasticizers to polymers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Midterm examination | B2,B4 | d1/d1 |  |
| 2 | Semester work(sheets, quizzes, presentation) | B2,B4 | d1 /d1 |  |
| 3 | Final term examination | B2,B4 | d1/d1 |  |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes, presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation). | 20% |
| 3 | Final term examination. | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Wypych, George. Handbook of plasticizers. ChemTec Publishing, 2004. |
| 2 | Introduction to Plastics Engineering. Anshuman Shrivastava. Elsevier. 2018. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Study for the properties of plasticizers | 9,10 | B4 | d1 |
| 2 | Importance and  applications of plasticizers | 9,10 | B4 | d1 |
| 3 | Techniques of the addition of plasticizers to polymers | 9,10 | B2 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Foams

CHE522

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Foams |
| Course Code | CHE 522 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system components and process to meet recent technological using computional system in food processing. |
| 8 | Consider the impact of foam industry on society, economics, and the environment using fundamental knowledge of chemical process industries |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Recognize 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 in foam industry.  b1 Summarize the appropriate techniques relevant to foam industry.  c1 Create a process, component or system to carry out specialized foam industry 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 | d1 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 |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Chemical composition and raw materials of foams | 8 | 8 | - |
| 2 | Low and high density foams | 4 | 4 | - |
| 3 | Testing of foams | 8 | 8 | - |
| 4 | Additives improving properties of foams | 8 | 8 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem  solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Chemical composition and  raw materials of foams | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 2 | Low and high density foams | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Testing of foams | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 4 | Additives improving properties of foams | x | x | x | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1,c1 |
| 2 | Semester work(sheets, quizzes, presentation) | B1,B2 | c1,d1 |
| 3 | Final term examination | B1/B2 | a1,b1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes, presentation) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Defonseka, C. (2019). Flexible Polyurethane Foams. De Gruyter. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  | |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Chemical composition and raw materials of foams | 7,8 | B1 | a1 |
| 2 | Low and high density foams | 7,8 | B1 | b1,c1 |
| 3 | Testing of foams | 7,8 | B2 | d1 |
| 4 | Additives improving properties of foams | 7,8 | B2 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Rubber

CHE523

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Rubber |
| Course Code | CHE 523 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 9 | Demonstrate current technical expertise related to rubber industry by addressing process dynamic and control challenges in plant operations |
| 10 | Apply research findings in chemical reactions related to rubber industry to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 | d1 Engage in the recent technological changes for emerging fields relevant to rubber 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. | d1Adopt suitable national and international standards and codes to: design, operate, inspect and maintain related to rubber industry |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Natural rubber | 2 | 2 | - |
| 2 | Polyisoprene rubber | 2 | 2 | - |
| 3 | Synthetic rubbers | 8 | 8 | - |
| 4 | Types of elastomers | 8 | 8 | - |
| 5 | chemical vulcanization reaction | 6 | 6 | - |
| 6 | Acrylonitrile butadiene styrene (ABS) | 2 | 2 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Natural rubber | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 2 | Polyisoprene rubber | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Synthetic rubbers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 4 | Types of elastomers | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 5 | chemical  vulcanization reaction | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 6 | Acrylonitrile  butadiene styrene (ABS) | x | x | x | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high  performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Evaluation Method | Competencies |  | LO’s |
| 1 | Midterm examination | B2,B4 | d1/d1 |  |
| 2 | Semester work(sheets, quizzes, presentation) | B2,B4 | d1/d1 |  |
| 3 | Final term examination | B2,B4 | d1 /d1 |  |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work (sheets, quizzes) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Rubber Technology 3E: Compounding and Testing for Performance](https://www.amazon.com/Rubber-Technology-Compounding-Testing-Performance/dp/1569906157/ref=sr_1_2?dchild=1&qid=1631883708&refinements=p_28%3ARubber+Compounding&s=books&sr=1-2) by John S.  Dick | Nov 30, 2018 |
| 2 | Notes on Rubber-Cultivation: With Special Reference to Portuguese India (Classic  Reprint) Paperback – March 11, 2018 |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Natural rubber | 9,10 | B4 | d1 |
| 2 | Polyisoprene rubber | 9,10 | B4 | d1 |
| 3 | Synthetic rubbers | 9,10 | B4 | d1 |
| 4 | Types of elastomers | 9,10 | B4 | d1 |
| 5 | chemical vulcanization reaction | 9,10 | B2 | d1 |
| 6 | Acrylonitrile butadiene styrene (ABS) | 9,10 | B2 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Food processing technology

CHE 524

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Food Processing Technology |
| Course Code | CHE 524 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system components and process to meet recent technological using computional system in food processing. |
| 8 | Consider the impact of foam industry on society, economics, and the environment using fundamental knowledge of chemical process industries |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Recognize 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 in Food processing technology.  b1. Summarize the appropriate techniques relevant to Food processing technology  c1 Create a process, component or system to carry out specialized Food processing technology 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 | d1 Engage in the recent technological changes and emerging fields relevant to food processing technology to respond to the challenging role  and responsibilities of a professional chemical engineer |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | The requirement for food production. | 4 | 4 | - |
| 2 | The standardization and toxicology in food production. | 4 | 4 | - |
| 3 | Batch and continuous food production technology. | 4 | 4 | - |
| 4 | The selected materials in food production and packing. | 4 | 4 | - |
| 5 | The quality control in food technology | 4 | 4 | - |
| 6 | The requirement for obtained good quality and updated the processing according to constrains. | 4 | 4 | - |
| 7 | Future of food production technology | 4 | 4 | - |
| Total | | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | The requirement for food production. | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 2 | The standardization and toxicology in food production. | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Batch and continuous food production technology. | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 4 | The selected materials in food production and packing. | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 5 | The quality control in food technology | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 6 | The requirement for obtained good quality and updated the processing according to constrains. | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 7 | Future of food production technology | x | x |  | x | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1/B2 | a1,b1/d1 |
| 2 | Semester work(sheets, quizzes, presentation) | B1,B2 | c1, d1 |
| 3 | Final term examination | B1 | a1,b1,c1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes, presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Anal, A. K. (Ed.). (2017). Food processing by-products and their utilization. John Wiley & Sons. |
| 2 | Bekhit, A. E. D. A. (Ed.). (2017). Advances in Meat Processing Technology. CRC  Press |
| 3 | Varzakas, T., & Tzia, C. (Eds.). (2015). Handbook of food processing: food safety, quality, and manufacturing processes (Vol. 35). CRC Press. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | The requirement for food production. | 8 | B1 | a1 |
| 2 | The standardization and toxicology in food production. | 8 | B1 | a1 |
| 3 | Batch and continuous food production technology. | 7 | B1 | b1 |
| 4 | The selected materials in food production and packing. | 8 | B2 | d1 |
| 5 | The quality control in food technology | 7 | B1 | c1 |
| 6 | The requirement for obtained good quality and updated the processing according to constrains. | 7 | B1 | c1 |
| 7 | Future of food production technology | 8 | B2 | d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Introduction to combustion Phenomena

CHE 525

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Introduction to combustion Phenomena |
| Course Code | CHE 525 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 8 | Consider the impact of combustion Phenomena on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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 combustion Phenomena  c1 Apply safe systems at work by taking the necessary precautions to manage hazards.    c3 Utilize modern technologies related to describe health and safety regulations and environmental concerns related to combustion Phenomena . |
| 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. | b1 Summarize the appropriate techniques relevant to describe health and safety regulations and environmental concerns .    c1 Create a process, component or system to carry out specialized engineering designs related to combustion Phenomena. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Develops a foundation in combustion phenomena including transport and other mechanisms in homogeneous and heterogeneous combustion... | 6 | 6 | - |
| 2 | Environmental implications of combustion | 4 | 4 | - |
| 3 | Elementary modeling and preliminary design calculations in industrial and modern applications of combustion, such as hazardous waste incineration,  gas turbines, catalytic converters, and coal combustion systems | 10 | 10 | - |
| 4 | Regulatory concerns, stoichiometry,  thermochemistry, incinerators and air pollution control | 8 | 8 | - |
|  | Total | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Develops a foundation in combustion phenomena including transport and other mechanisms in homogeneous and heterogeneous combustion... | x | x | x | x | x |  |  |  |  | x |  |  |  |  |
| 2 | Environmental implications of combustion | x | x |  | x | x |  |  |  |  | x |  |  |  |  |
| 3 | Elementary modeling and preliminary design calculations in industrial and modern applications of combustion, such as hazardous waste incineration, gas turbines, catalytic converters, and coal combustion systems | x | x |  |  | x | x | x |  |  |  |  |  |  |  |
| 4 | Regulatory concerns, stoichiometry, thermochemistry, incinerators and air pollution control | x | x |  |  | x |  |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student evaluation method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | A4 | a1,c3 |
| 2 | Semester work (sheets, quizzes, presentation) | A4 | c1,c3 |
| 3 | Final term examination | A4/B1 | a1/b1,c1 |

Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes ) | 2nd -7th - 9th-14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work(sheets ,quizzes) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | [Internal Combustion Engine Fundamentals 2E,](https://www.amazon.com/Internal-Combustion-Engine-Fundamentals-2E/dp/1260116107/ref=sr_1_1?crid=3BKSPEJD56132&dchild=1&keywords=combustion&qid=1631883782&s=books&sprefix=combus%2Cstripbooks-intl-ship%2C293&sr=1-1)by John Heywood | May 1, 2018 |
| 2 | [Internal Combustion Engines: Applied Thermosciences,](https://www.amazon.com/Internal-Combustion-Engines-Applied-Thermosciences/dp/1119454506/ref=sr_1_2?crid=394NUOX17Q9B6&dchild=1&keywords=combustion+engine&qid=1631883856&s=books&sprefix=combustion+%2Cstripbooks-intl-ship%2C665&sr=1-2)by Allan T. Kirkpatrick | Nov 23, 2020. |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Develops a foundation in combustion phenomena including transport and other mechanisms in homogeneous and heterogeneous combustion. | 6,8 | A4 | c3 |
| 2 | Environmental implications of combustion | 8 | A4 | c1,a1 |
| 3 | Elementary modeling and preliminary design calculations in industrial and modern applications of combustion, such as hazardous waste incineration, gas turbines, catalytic converters, and coal combustion systems | 6,8 | B1 | b1,c1 |
| 4 | Regulatory concerns, stoichiometry, thermochemistry, incinerators and air pollution control | 8 | A4 | c1,a1 |

Course Coordinator: prof. Dr. Taha Farrag

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Selected Topics in Chemical Engineering

CHE 526

1-Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering Program |
| Department Offering the Program | Chemical Engineering Department |
| Department Responsible for the Course | Chemical Engineering Department |
| Course Title | Selected Topics in Chemical Engineering |
| Course Code | CHE 526 |
| Year/Level | Level 5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| 2 | 2 | - |

2-Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 7 | Design a system components and process to meet recent technological using computional system in Selected Topics in Chemical Engineering.. |
| 8 | Consider the impact of chemical process industry on society, economics, and the environment using fundamental knowledge of Selected Topics in Chemical Engineering.industries |

3- Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| 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. | a1 Recognize 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 in Selected Topics in Chemical Engineering.    b1. Summarize the appropriate techniques relevant to Selected Topics in Chemical Engineering.  c1 Create a process, component or system to carry out specialized Selected Topics in Chemical 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 | d1 Engage in the recent technological changes and emerging fields relevant to Selected Topics in Chemical Engineering to respond to the challenging role and responsibilities of a professional chemical engineering |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | Lectures | Tutorial | Practical |
| 1 | Special topics to be selected by the department to address new subjects in Chemical Engineering. | 28 | 28 | - |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Special topics to be selected by the department to address new subjects in  Chemical  Engineering. | x | x | x | x | x | x |  |  |  | x |  |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Evaluation Method | Competencies | LO’s |
| 1 | Midterm examination | B1 | a1,b1,c1 |
| 2 | Semester work(sheets, quizzes, presentation) | B1,B2 | c1,d1 |
| 3 | Final term examination | B1/B2 | a1,b1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Midterm examination | 8th |
| 2 | Semester work(sheets, quizzes, presentation) | 2nd -7th - 9th -14th |
| 3 | Final term examination | 15th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Midterm examination | 20% |
| 2 | Semester work (sheets, quizzes, presentation) | 20% |
| 3 | Final term examination | 60% |
|  | Total | 100% |

1. List of References:

|  |  |
| --- | --- |
| No. | Reference List |
| 1 | Nanomaterials Science and Applications, Deborah Kane, Adam Micolich, Peter Roger, 2016 by Taylor & Francis Group, LLC |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 4 | Data show system |
| 2 | Presenter | 5 | Sound system |
| 3 | White board |  |  |

1. Matrix of Competencies and LO’s:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Special topics to be selected by the department to address new subjects in Chemical Engineering. | 7,8 | B1/B2 | a1,b1,c1/d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Training 1

ENG 430

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering program |
| Department Offering the Program | Chemical Engineering department |
| Department Responsible for the Course | Chemical Engineering department |
| Course Title | Training 1 |
| Course Code | ENG 430 |
| Year/Level | Level:5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| - | - | 90 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 6 | Analyze data from the intended tests to manage resources creatively. |
| 7 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries. |

3-Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | a1 Define technical language and report writing.  b1 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. | d1 Collaborate effectively within multidisciplinary team.  d2 Work in stressful environment and within constraints.  d3 Motivate individuals. |
| A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. | d1 Communicate effectively.  d2 Demonstrate efficient IT capabilities. |
| 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. | b1 Summarize the appropriate techniques relevant to different industries.    c1 Create a process, component or system to carry out specialized engineering designs. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | weeks | Tutorial | Practical |
| 1 | Students in the field training of chemical engineering they will be expected to apply Principles of Chemical Engineering analysis | 2 | - | 60 |
| 2 | Reports and presentations will be emphasized in addition to the technical content | 1 | - | 30 |
|  | Total | 3 |  | 90 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Students in the field training of chemical engineering they will be expected to apply Principles of Chemical  Engineering analysis | x |  |  | x |  |  |  | x | x | x | x |  |  |  |
| 2 | Reports and presentations will be emphasized in addition to the  technical content | x |  |  | x |  |  |  | x | x | x | x |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No | Evaluation Method | Competencies | LO’s |
| 1 | Oral Examination | A5/A7 | a1,b1/d1,d2,d3 |
| 2 | Final report ( presentation, Report) | A8/B1 | d1,d2/b1,c1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Oral Examination | at the end of training |
| 2 | Final report ( presentation, Report) | 4th -8th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weights |
| 1 | Oral Examination | 50% |
| 2 | Final work (presentation, Report) | 50% |

Total

100

%

1. List of References:

|  |  |  |
| --- | --- | --- |
| No. |  | Reference List |
| 1 | Subject studies |  |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  |  |
| 4 | Industrial field |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Students in the field training of chemical engineering they will be expected to apply Principles of Chemical  Engineering analysis | 6,7 | A5/A7 | a1,b1/d1,d2, d3 |
| 2 | Reports and presentations will be emphasized in addition to the technical content | 6,7 | A8/B1 | d1,d2/b1,c1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

Date of Approval: 2022

Training (2)

ENG 530

1. Basic Information:

|  |  |
| --- | --- |
| Program Title | Chemical Engineering program |
| Department Offering the Program | Chemical Engineering department |
| Department Responsible for the Course | Chemical Engineering department |
| Course Title | Training 1 |
| Course Code | ENG 530 |
| Year/Level | Level:5 |
| Specialization | Major |
| Authorization Date of Course Specification | - |
| Pre-request | - |

|  |  |  |  |
| --- | --- | --- | --- |
| Teaching hours | Lectures | Tutorial | Practical |
| - | - | 90 |

1. Course Aims:

|  |  |
| --- | --- |
| No. | Aims |
| 8 | Consider the impact of chemical process industries on society, economics, and the environment using fundamental knowledge of chemical process industries |
| 9 | Demonstrate current technical expertise by addressing process dynamic and control challenges in plant operations. |
| 10 | Apply research findings in chemical reactions to exhibit their properties in order to assess the results and draw conclusions about industrial operations. |

1. Competencies :

|  |  |
| --- | --- |
| Competencies | Learning Outcomes (LO’S) |
| A5. Practice research techniques and methods of investigation as an inherent part of learning. | c1 Prepare technical reports    d1 Search for information to engage in lifelong self-learning discipline. |
| A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. | d1 Search for information to engage in lifelong self-learning discipline.    d2 Professionally 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 | d1 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. |

1. Course Contents:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topics | weeks | Tutorial | Practical |
| 1 | Students in the field training of chemical engineering they will be expected to apply design to solve a given real world problem. | 2 | - | 60 |
| 2 | Presentations will be emphasized in addition to the technical content. | 1 | - | 30 |
|  | Total | 3 | - | 90 |

1. Teaching and learning methods:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| No | Topics | Face  -  to  -  Face Lecture | Online Lecture | Flipped Classroom | Presentation and movies | Discussion | Problem solving | Brain storming | Projects | Site visits | Self  -  learning and Research | Cooperative | Discovering | Modeling | Lab |
| 1 | Students in the field training o[f chemical engineering they will be expected to apply design to solve a given real world problem. | x |  |  | x |  |  |  | x | x | x | x |  |  |  |
| 2 | Presentations will be emphasized in addition to the technical content. | x |  |  | x |  |  |  | x | x | x | x |  |  |  |

1. Teaching and learning methods for disable students:

|  |  |  |
| --- | --- | --- |
| No. | Teaching Methods | Reason |
| 1 | Presentation of the course in digital material | Better access any time |
| 2 | Web communication with students | Better communication with certain cases |
| 3 | Asking small groups to do assignments; each composed of low ,medium and high performance students | Knowledge and skills transfer among different levels of students |

1. Student evaluation:
   1. Student Evaluation Method:

|  |  |  |  |
| --- | --- | --- | --- |
| No  . | Evaluation Method | Competencies | LO’s |
| 1 | Oral Examination | A5/A10 | c1,d1/d1,d2 |
| 2 | Final report ( presentation, Report) | A5,B2 | c1,d1/d1 |

* 1. Evaluation Schedule:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation Method | Weeks |
| 1 | Oral Examination | at the end of training |
| 2 | Final report ( presentation, Report) | 4th |

* 1. weighting of Evaluation:

|  |  |  |
| --- | --- | --- |
| No. | Evaluation method | Weights |
| 1 | Oral Examination | 50% |
| 2 | Final work ( presentation, Report) | 50% |
|  | Total | 100% |

1. List of References:

|  |  |  |
| --- | --- | --- |
| No. |  | Reference List |
| 1 | Subject studies |  |

1. Facilities required for teaching and learning:

|  |  |  |  |
| --- | --- | --- | --- |
| No. | Facility | No. | Facility |
| 1 | Lecture classroom | 5 | Data show system |
| 2 | Presenter | 6 | Sound system |
| 3 | White board |  | |
| 4 | Industrial field |

1. Matrix of Competencies and LO’s :

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Topic | Aims | Competencies | LO’s |
| 1 | Students in the field training of chemical engineering they will be expected to apply design to solve a given real world problem. | 8,9,10 | A5, A10 | c1,d1/d1,d2 |
| 2 | Presentations will be emphasized in addition to the technical content. | 8,9,10 | A5, B2 | c1,d1 |

Course Coordinator: Asso.prof. Hend Elsayed Gadow

Head of Department: Asso.prof. Hend Elsayed Gadow

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