**Ministry of Higher Education and Scientific Research Scientific Supervision and Scientific Evaluation Apparatus**
**Directorate of Quality Assurance and Academic Accreditation**
**Accreditation Department**

# Academic Program and Course Description Guide

2026

## Academic Program Description Form

**University Name: Tikrit University**

**Faculty/Institute: Petroleum Process Engineering**

**Scientific Department: Petroleum and Gas Refining Engineering**

**Academic or Professional Program Name: Undergraduate - Bachelor of Science in Petroleum and Gas Refining Engineering**

**Final Certificate Name: Bachelor of Science in Petroleum and Gas Refining Engineering**

**Academic System: Annual**

**Description Preparation Date: 8/ 3 /2026**

**File Completion Date: 8 / 3 / 2026**

**Signature:**

**Head of Department name:**

**Asst. Prof. Qahtan Adnan Mahmood**

**Date: 11 / 3 / 2026**

**Signature:**

**Scientific Associate name:**

**lect. Hamad Khudhair Mohammed**

**Date: 11/ 3 / 2026**

**The file is checked by:**

**Department of Quality Assurance and University Performance**

**Director of the Quality Assurance and University Performance Department:**

**Lect. Adnan Ibrahim Ahmed**

**Date: 11 / 03 / 2026**

**Signature:**

**Asst. Prof. Ghassan H. Abdullah**

**Date: 11 / 3 / 2026**

**Approval of the Dean**

| 1. Program Vision |
| --- |
| Improving the department's educational level using the most recent ways. |
| |
| 2. Program Mission |
| Providing community service by developing the Petroleum sector in the governorate and across the nation. |
| |
| 3. Program Objectives |
| 1- Providing students with the fundamentals of scientific knowledge in the field of Petroleum and gas refining engineering, as well as developing their professional skills in the areas of analytical and creative thinking through the use of information technologies, data analysis, and modern experimental methods in problem formulation and solution.<br>2- Preparing well-qualified engineers to enhance petroleum process engineering operations and handle dealings with them in all aspects of life, particularly in the petroleum industry.<br>3- Conducting academic research to stay up with the world scientific process, as well as applied research to turn engineering knowledge and ideas into practical reality by solving the country's challenges in all domains.<br>4- Contributing to the country's reconstruction in the petroleum and petrochemical industries sectors by providing engineering consultations, preparing economic feasibility studies, project designs, and technical services.<br>5- Implementing scientific sobriety as a characteristic of this department in line with international rules and standards. |
| |
| 4. Program Accreditation |
| N. A. |
| |
| 5. Other external influences |

(Only different state institutions provide summer internship for third-year students.)

6 Program Structure

| Program Structure | Number of Courses | Credit hours | Percentage | Reviews• |
|---|---|---|---|---|
| Institution Requirements | 7 | 18 | 11% | / |
| College Requirements | 9 | 32 | 20% | / |
| College Requirements | 22 | 112 | 69% | / |
| Summer internship | 1 | / | / | / |
| Others | / | / | / | / |

* This can include notes whether the course is basic or optional.

7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | theoretical | practical |
| Four years | BSc-PGR | Bachelor of Science in Petroleum and Gas Refining Engineering | 176 | 56 |

8. Expected learning outcomes of the program

Knowledge

A1- Broad education to understand the impact of engineering solutions globally and economically.

A2: The ability to collaborate in interdisciplinary teams.

A3- The ability of applying cognitive sciences such as mathematics, as well as applied and pure sciences.

A4- The ability to use modern methods, skills, and engineering tools in the petroleum and petrochemical sectors.

A5- The ability to build petroleum and petrochemical facilities that satisfy the necessary requirements while remaining within realistic cost limits.

A6- The ability to develop and perform experiments, analyze data, and translate them practically.

Skills

B1- Developing and enhancing the student's ability to utilize design programs in their area of specialty.

B2- Developing and improving the student's ability to cope with new technology relevant to the course terminology.

B3- Improving the student's ability to face challenges and dilemmas and find acceptable answers to them.

B4- Developing and improving the student's ability to apply academic knowledge in real-world situations.

Ethics

C1- The ability to make decisions.
C2- Student-driven innovation methods.
C3: The student's ability to think.
C4- Collecting the necessary data to complete a certain subject.
C5. Encouraging students' creative thinking and keeping up with the most recent scientific approaches for teaching and learning.

9. Teaching and Learning Strategies

1. Introducing course syllabus to students (lectures).

2. Numerous examples are provided to demonstrate the basic principles.

3. A standardized problem-solving approach that can be applied to any problem.

4. Use figures, drawings, and graphs to offer extensive explanations and reinforce what the learner is reading.

5. At the conclusion of each chapter, self-assessment exams with answers are provided to measure learning progress.

6. Discussing and solving many problems in tutorial sessions, which enables collaboration with one or more colleagues to share ideas and debate the content.

7. Assigning activities, such as drafting research papers, to help students develop self-learning and presenting abilities.

8. Conducting quizzes.

9. Taking semester and final examinations on the designated dates.

10. Informing students about how grades are calculated for students during the semester and their exam results, and discussing failures and successes.

11. Informing students of the textbooks and reference books they need in the course and make a questionnaire for previous years in order to improve the curriculum, improve the performance of teaching staff, and raise the scientific level of the student.

12. Training students in various state institutions (third stage).

10. Evaluation methods

1. Monthly and final exams.

2. Short assessment and classroom involvement.

3. Submitting homework, research papers, and scientific reports.

4. Laboratory work.

| 11. Faculty | | | | | | |
|---|---|---|---|---|---|---|
| Faculty Members | | | | | | |
| Academic Rank | Specialization | | Special Requirements/Skills (if applicable) | | Number of the teaching staff | |
| | General | Special | | | Staff | **Lecturer** |
| Professor | 1 | 2 | | | 1 | 2 |
| Assistant Professor | 1 | 5 | | | 6 | - |
| Lecturer | - | 10 | | | 8 | 2 |
| Assistant Lecturer | 4 | 4 | | | 8 | - |

| Professional Development |
|---|
| Mentoring new faculty members |
| Preparation programs in the form of open lectures and seminars with training workshops that include:<br>1. Introducing new faculty members to the university's vision, mission, organizational structure, policies and procedures.<br>2. Enabling new faculty members to obtain a better understanding of their rights and obligations in addition to the rights and duties of students.<br>3. Providing new faculty members with detailed information about the facilities and services of the university, college, and department.<br>4. Introducing new faculty members to the quality of the academic program and program accreditation.<br>5. Introducing new faculty members to learning resources and scientific research programs. |
| Professional development of faculty members |
| 1. Using current teaching methods and techniques.<br>2. Sharing experiences with academics from various institutions and universities.<br>3. Help evaluate, construct, and analyze the curriculum.<br>4. Continuous course assessment based on comments from instructors and students.<br>5. Be open to new experiences. |

| 12. Acceptance Criterion |
| --- |
| 1. High school graduates (applied branch).<br>2. Admission is open to both male and female.<br>3. The Central Admissions Department of the Ministry of Higher Education and Scientific Research determines the minimal acceptance grades.<br>4. The desire of the student or guardian to study in the department. |
| 13. The most important sources of information about the program |
| 1. textbooks.<br>2. The teaching staff.<br>3. Workshops, seminars and conferences.<br>4. Websites and electronic library.<br>5. The local market and its needs. |
| 14. Program Development Plan |
| 1. Continuously updating the curriculum to keep pace with the curricula of international and established universities and the needs of the local market.<br>2. Increase interest in the practical aspect by providing modern educational laboratory equipment and opening new laboratories.<br>3. Providing modern textbooks and reference books from international publisher to the department's library.<br>4. Incorporating scientific and technological developments at the global level into school curricula and practical experiences.<br>5. Design and implement development programs in the form of open lectures and seminars with training workshops for teaching and professional staff.<br>6. Make memorandums of understanding with state institutions in the field of exchanging experiences and conducting scientific research and studies. |

| Program Skills Outline | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Required program Learning outcomes | | | | | | | | | | | |
| Year/Level | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 4 | PPE 405 | Petroleum pollution and its control | basic | * | * | * | * | * | * | * | * | * | * | * | * |
| | | | | | | | | | | | | | | | |

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

# الوصف الاكاديمي
# المرحلة الرابعة

# Course Description Form

| 1. Course Name: |
|---|
| English language IV |
| 2. Course Code: |
| PPE 409 |
| 3. Semester / Year: |
| first and second semester |
| 4. Description Preparation Date: |
| 20/4/2025 |
| 5. Available Attendance Forms: |
| In person |
| 6. Number of Credit Hours (TOTAL) / Number of Units (TOTAL) |
| 60 hours – 2 units |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: Ahmed Mahmood Shihab<br>Email: ahmed.m.shihab@tu.edu.iq |
| 8. Course Objectives |

| | |
|---|---|
| **Course Objectives** | •Expand vocabulary knowledge and develop learning strategies.<br>• Enhance all four language skills: reading, writing, listening and speaking.<br>• Expose students to different cultures and perspectives |
| 9. Teaching and Learning Strategies | |
| **Strategy** | **Discussion**: students exchange opinions and thoughts about certain subject.<br>**Cooperative learning**: students work in team to complete assignment.<br>**Problem – Solving**: students apply critical thinking skills to solve the problem. |

| 10. Course Structure | | | | | |
|---|---|---|---|---|---|
| **Week** | **Hours** | **Required Learning Outcomes** | **Unit or subject name** | **Learning method** | **Evaluation method** |
| 1 | 2 hours | General tense, compound words, applying for hobs. | No place like home | Theoretical | Class participation |
| 2 | 2 hours | General tense, compound words, applying for hobs | No place like home | Theoretical | Quizzes |
| 3 | 2 hours | Present perfect, hot verbs, exclamations | Been there, done that! | Theoretical | Self-assessment |
| 4 | 2 hours | Present perfect, hot verbs, exclamations | Been there, done that! | Theoretical | Direct questions |
| 5 | 2 hours | Narrative tense, showing interest and surprise. | What a story! | Theoretical | Self-assessment |
| 6 | 2 hours | Narrative tense, showing interest and surprise. | What a story! | Theoretical | Class participation |
| 7 | 2 hours | Question and negative, prefixes, linking ideas | Nothing but the truth | Theoretical | Quizzes |
| 8 | 2 hours | Question and negative, prefixes, linking ideas | Nothing but the truth | Theoretical | Self-assessment |
| 9 | 2 hours | Form future, hot verbs, telephone conversation | An eye to the future | Theoretical | Direct questions |
| 10 | 2 hours | Exam | Exam | Theoretical | Exam |
| 11 | 2 hours | Form future, hot verbs, telephone conversation | An eye to the future | Theoretical | Class participation |
| 12 | 2 hours | Expressions of quantity, business expressions | Making it big | Theoretical | Quizzes |
| 13 | 2 hours | Expressions of quantity, business expressions | Making it big | Theoretical | Self-assessment |
| 14 | 2 hours | Model verbs, hot verbs, exaggeration and understatement | Getting on together | Theoretical | Direct questions |
| 15 | 2 hours | Exam | Exam | Theoretical | Exam |
| 16 | 2 hours | Model verbs, hot verbs, exaggeration and understatement | Getting on together | Theoretical | Class participation |
| 17 | 2 hours | Relative clause, adverbs, describing places | Going to extremes | Theoretical | Quizzes |
| 18 | 2 hours | Relative clause, adverbs, describing places | Going to extremes | Theoretical | Self-assessment |
| 19 | 2 hours | Expressions habit, homonymous, make your point | Things ain't what they used to be! | Theoretical | Direct questions |
| 20 | 2 hours | Expressions habit, homonymous, make your point | Things ain't what they used to be! | Theoretical | Exam |

| | | | | | |
|---|---|---|---|---|---|
| 21 | 2 hours | Medal auxiliary, synonyms, | Risking life and limb | Theoretical | Class participation |
| 22 | 2 hours | Medal auxiliary, synonyms, | Risking life and limb | Theoretical | Quizzes |
| 23 | 2 hours | Hypothesizing, word pairs, have you ever wondered | In your dreams | Theoretical | Self-assessment |
| 24 | 2 hours | Hypothesizing, word pairs, have you ever wondered | In your dreams | Theoretical | Direct questions |
| 25 | 2 hours | Articles, hot words | It's never too late | Theoretical | Self-assessment |
| 26 | 2 hours | Articles, hot words | It's never too late | Theoretical | Class participation |
| 27 | 2 hours | Writing skills | Writing skills | Theoretical | Quizzes |
| 28 | 2 hours | General | Grammar | Theoretical | Self-assessment |
| 29 | 2 hours | Pronunciation, vocabulary | Speaking skills | Theoretical | Direct questions |
| 30 | 2 hours | Exam | Exam | Theoretical | Exam |

| 11. Course Evaluation | |
|---|---|
| Distributing the score out of 100 according to the tasks assigned to the student such as daily exams, reports …….. | |
| 12. Learning and Teaching Resources | |
| Required textbooks (curricular books, if any) | Headway Plus upper intermediate – Student Book and Activity |
| Main references (sources) | Grammar in use |
| Recommended books and references (scientific journals, reports …) | Grammar in use |
| Electronic References, websites | https://www.youtube.com/watch?v=l85akX7Pu60 |

# Course Description Form

| 1. Course Name: |
|---|
| Process control |
| 2. Course Code: |
| PPE403 |
| 3. Semester / Year: |
| year |
| 4. Description Preparation Date: |
| 20/4/2025 |
| 5. Available Attendance Forms: |
| |
| 6. Number of Credit Hours (Total) / Number of Units (Total) |
| (5 hr ) in each semester / (6 units) |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: qahtan adnan Mahmood<br>Email: qahtan.adnan@tu.edu.iq |
| 8. Course Objectives |

| | |
|---|---|
| **Course Objectives** | 1. Provide the students with the required basics principles of Laplace Transform<br>2. Study dynamic behavior of first order system<br>3. Determine time constant and steady state constant for system<br>4. Understand dynamic behavior of interacting and non-interacting system<br>5. Study dynamic behavior of first order system<br>6. Understand block diagrams of system<br>7. Determine parameters of controller<br>8. Understand behavior of all types of controller and affect them on system<br>9. Study the stability of the system with controller |

| | |
|---|---|
| | 10- Deal with frequency response analysis and bode diagrams |

## 9. Teaching and Learning Strategies

| | |
|---|---|
| **Strategy** | I divided the students into groups to encourage student's participation in the exercises and discussion during solving the problems. Make a report concerning the subject of the lectures, and do seminars to present the work. Show movies to simplify the understanding of materials and make science visits to oil refinery |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 5 | Laplace Transform of many function | Laplace Transform | Theoretical + practical | Exam + reports |
| 2 | 5 | Inversion by Partial Fractions | Inversion by Partial Fractions | Theoretical + practical | Exam + reports |
| 3 | 5 | Further Properties of Transforms | Further Properties of Transforms | Theoretical + practical | Exam + reports |
| 4 | 5 | Forcing functions | Forcing functions | Theoretical + practical | Exam + reports |
| 5 | 5 | Dynamic behavior of level tank | Dynamic behavior of first order system | Theoretical + practical | Exam + reports |
| 6 | 5 | Dynamic behavior of heating tank and CSTR | Dynamic behavior of first order system | Theoretical + practical | Exam + reports |
| 7 | 5 | Physical Examples of First Order System | Physical Examples of First Order System | Theoretical + practical | Exam + reports |
| 8 | 5 | How to calculate the time constant ($\tau$) for first order system | How to calculate the time constant ($\tau$) for first order system | Theoretical + practical | Exam + reports |
| 9 | 5 | Response of first order systems in series | Response of first order systems in series | Theoretical + practical | Exam + reports |
| 10 | 5 | Interacting and Non-Interacting System | Interacting and Non-Interacting System | Theoretical + practical | Exam + reports |
| 11 | 5 | Linearization of non-linear systems | Linearization of non-linear systems | Theoretical + practical | Exam + reports |
| 12 | 5 | Time delay system | Time delay system | Theoretical + practical | Exam + reports |
| 13 | 5 | Second order system | Second order system | Theoretical + practical | Exam + reports |
| 14 | 5 | Response of second order system | Response of second order system | Theoretical + practical | Exam + reports |
| 15 | 5 | Process dynamic by computer - MATLAB | Process dynamic by computer - MATLAB | Theoretical + practical | Exam + reports |

| | | | | | |
|---|---|---|---|---|---|
| 16 | 5 | The Control System | The Control System | Theoretical + practical | Exam + reports |
| 17 | 5 | Development of block Diagram | Development of block Diagram | Theoretical + practical | Exam + reports |
| 18 | 5 | Controllers and Final Control Element | Controllers and Final Control Element | Theoretical + practical | Exam + reports |
| 19 | 5 | Classification of industrial automatic controller | Classification of industrial automatic controller | Theoretical + practical | Exam + reports |
| 20 | 5 | Proportional controller (P) | Proportional controller (P) | Theoretical + practical | Exam + reports |
| 21 | 5 | Proportional-Integral controller (PI) | Proportional-Integral controller (PI) | Theoretical + practical | Exam + reports |
| 22 | 5 | Proportional-Integral-Derivative (PID) controller | Proportional-Integral-Derivative (PID) controller | Theoretical + practical | Exam + reports |
| 23 | 5 | Overall transfer function of a closed- loop control system | Overall transfer function of a closed- loop control system | Theoretical + practical | Exam + reports |
| 24 | 5 | Block Diagram Reduction | Block Diagram Reduction | Theoretical + practical | Exam + reports |
| 25 | 5 | Stability Analysis | Stability Analysis | Theoretical + practical | Exam + reports |
| 26 | 5 | Frequency Response Analysis | Frequency Response Analysis | Theoretical + practical | Exam + reports |
| 27 | 5 | Bode Diagrams | Bode Diagrams | Theoretical + practical | Exam + reports |
| 28 | 5 | The Instrumentation and Control Diagrams | The Instrumentation and Control Diagrams | Theoretical + practical | Exam + reports |
| 29 | 5 | Methods of Tuning Controller | Methods of Tuning Controller | Theoretical + practical | Exam + reports |
| 30 | 5 | The Control System | The Control System | Theoretical + practical | Exam + reports |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .....etc

## 12. Learning and Teaching Resources

| | |
|---|---|
| Required textbooks (curricular books, if any) | Process Systems Analysis and Control, Third Edition, Donald R. Coughanowr Steven E. LeBlanc |
| Main references (sources) | |
| Recommended books and references (scientific journals, reports…) | |
| Electronic References, Websites | |

# Course Description Form

| |
|---|
| 1. Course Name: |
| Unit operation |
| 2. Course Code: |
| PPE 407 |
| 3. Semester/ Year: |
| Annual |
| 4. Description Preparation Date: |
| 20/4/2025 |
| 5.AvailableAttendanceForms: |
| Weekly attendance |
| 6.Number of Credit Hours(Total)/Number of Units (Total) |
| 150 hr / 6 units |
| 7.Courseadministrator'sname(mention all ,if more than one name) |
| Name: Dr. Hiba alla abdolkarem<br>Email : hiba.all@tu.edu.iq |
| 8. Course Objectives |

| | |
|---|---|
| **Course Objectives** | 1- The course's objectives include Recognize how the unit works. Recognize the benefits of the technique and the particle size reduction. experiment with emulsification at a petroleum refinery. Understand how fluid flows via packed columns and granular beds, how to treat waste water from refineries using the sedimentation process, and how to design sedimentation basins. Knowing the agitation and mixing process can help you construct the mixer tank that the petroleum sector uses. Understand the fluidization . Understand the filtration process, Membrane Separation processes. Centrifugal separations process from fundamentals to industrial application.. Drying process. Crystallization process |

| |
|---|
| 9. Teaching and Learning Strategies |

| | |
|---|---|
| **Strategy** | 1. Presenting the course vocabulary to the students (lectures).<br>2. Assigning students assignments, such as writing research papers, so that students acquire skills for self-learning and presentation.<br>3. Conducting sudden exams.<br>4. Oral exams via e-learning platforms.<br>5. Conducting the semester and final exams on the specified dates.<br>6. Informing students of how students' grades are calculated during the semester, their exam results, and discussing failures and successes.<br>7. Informing students of the curriculum books and auxiliary books that they |

| | |
|---|---|
| | need in the course vocabulary during a questionnaire for the previous years to improve the curriculum, improve the performance of the teachers, and raise the level of the student. |

10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 5 | Introduction of unit operation | Introduction of unit operation | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 2 | 5 | Introduction of particle size reduction and enlargement, different ways of size reduction, criteria for size reduction, theories of size reduction / milling | Particle Size Reduction and Enlargement ,Emulsification | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 3 | 5 | Advantages of size reduction, factors related to nature of raw materials affecting size reduction, emulsification | Particle Size Reduction and Enlargement ,Emulsification | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 4 | 5 | Introduction of motion of particles in a fluid, drag coefficients | Motion of Particles in a Fluid | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 5 | 5 | Total force on a particle , terminal falling velocities , | Motion of Particles in a Fluid | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | Drag coefficient & terminal velocity, Trial and error method for determination of terminal velocity , terminal velocity in Stokes law range and Newton's law range, example | Motion of Particles in a Fluid | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 7 | 5 | Introduction in Flow of fluid through granular beds and packed columns, Pressure drop in laminar flow | Flow of fluid through granular beds and packed columns | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 8 | 5 | Turbulent flow, Friction factor, General Equation | Flow of fluid through granular beds and packed columns | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 9 | 5 | Non – spherical particles,example of flow fluid through granular beds, Darcy's law and permeability | Flow of fluid through granular beds and packed columns | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 10 | 5 | Introduction in sedimentation, objective & application ,theory for sedimentation , mechanics of particle motion in fluids , frictional drag coefficient , Sphere object , Terminal or Settling Velocity | Sedimentation | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 11 | 5 | Stokes settling velocity ,Stoke’s law has several limitations ,settling velocity of dust particles,hindered settling, flocculating particles , sedimentation basins, collecting efficiency, typical design values for sedimentation basins | Sedimentation, | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |

| | | | | | |
|---|---|---|---|---|---|
| 12 | 5 | Example of sedimentation tank design, advantages of circular basin, disadvantages of circular basin, sedimentation tank components, details of influent structure,example of design tank | Sedimentation, | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 13 | 5 | Introduction in agitation and mixing, purpose of agitation,factors affecting the designing of the agitator flow patterns in agitated ves agitator | Agitation and mixing | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 14 | 5 | Agitation of liquids, tank with impeller and baffle, design considerations, example in mixing tank design | Agitation and mixing | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 15 | 5 | Types of impeller, power number curves for various type of impeller, power consumption,example | Agitation and mixing | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 16 | 5 | Introduction in fluidization, Pressure , minimum fluidizing velocity | Fluidization | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 17 | 5 | Example of fluidization of solid by gas, advantages and disadvantages of fluidization | Fluidization | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 18 | 5 | Types of fluidization , condition for fluidization ,application of fluidization | Fluidization | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |

| | | | | | |
|---|---|---|---|---|---|
| 19 | 5 | Introduction in filtration, types of operation, filtration theory | Filtration | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 20 | 5 | Flow of filtrate through the cloth and cake combined, washing of the filter cake, types of filtration equipment | Filtration | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 21 | 5 | Gravity filtration equipment, discontinuous pressure filter, advantages and disadvantages of pressure filter,example of filtration design | Filtration | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 22 | 5 | Introduction in membrane separation processes, classification of membrane, the nature of synthetic membranes | Membrane Separation Processes | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 23 | 5 | General equation , cross-flow microfiltration,example of membrane design | Membrane Separation Processes | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 24 | 5 | Desalination, osmosis, reverse osmosis, advantages and limitations / disadvantages, membrane modules and plant configuration ,example of membrane | Membrane Separation Processes | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 25 | 5 | Introduction in centrifugal separations, using of centrifuge, centrifugal pressure | Centrifugal Separations | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |

| | | | | | |
|---|---|---|---|---|---|
| 26 | 5 | Separation of immiscible liquids of different densities,sedimentation in a centrifugal field ,example in centrifugal separations processes | Centrifugal Separations | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 27 | 5 | Introduction in drying, purposes of drying, general methods of drying,vapor pressure of water& humidity | Drying | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 28 | 5 | Rate of drying , example of drying processes | Drying | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 29 | 5 | Equipment for drying, selection of dryers | Drying | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |
| 30 | 5 | Introduction in crystallization, crystallization fundamentals , phase equilibria ,solubility and saturation, example of Crystallization processes | Crystallization | Theoretical and practical | Timely questions ,extra-curricular assignments, quizzes and monthly exams and do laboratory experiments |

| 11. Course Evaluation | |
|---|---|
| Distributing the score out of 100 according to the tasks assigned to the student such as daily exams, reports …..... | |
| **12. Learning and Teaching Resources** | |
| Required textbooks (curricular books, if any) | Chemical Engineering – volume 2, Fifth Edition 2008 , Particle Technology and Separation Processes |
| Main references (sources) | Chemical Engineering Design volume 6. Fourth Edition ,Coulson and Richardson's |
| Recommended books and references (scientific journals, reports …) | Unit operations of chemical engineering Fifth Edition .Peter Harriott |
| Electronic References, websites | |

# Course Description Form

| 1. Course Name: |
|---|
| Management and economics of petroleum projects. |
| 2. Course Code: |
| PPE 404 |
| 3. Semester / Year: The fourth |
| |
| 4. Description Preparation Date: |
| 20/4/2025 |
| 5. Available Attendance Forms: |
| |
| 6. Number of Credit Hours (Total) / Number of Units (Total) |
| |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: Luay Ahmed khamees<br>E-mail: luaykhamees75@tu.edu.iq |
| 8. Course Objectives |

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|---|---|
| **Course Objectives** | • Preparing students with basic knowledge about the oil industry.<br>• Preparing students with a wide knowledge of oil projects.<br>• Preparing students who possess the skill of choosing the appropriate oil operations and making the appropriate decision. |
| 9. Teaching and Learning Strategies | |
| **Strategy** | |

10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
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|---|---|---|---|---|---|
| 1 | 2 | World supply and demands | Introduction | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 2 | 2 | Properties of crude oils and properties of petroleum, and statement of properties affecting the prices of crude oil and petroleum | Oil Economics | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 3 | 2 | Fundamentals of the oil economy | Oil Economics | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 4 | 2 | Principles, methods and techniques in engineering economics analysis | Engineering Economics | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 5 | 2 | Principles, methods and techniques in engineering economics analysis | Engineering Economics | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 6 | 2 | Principles, methods and techniques in engineering economics analysis | Engineering Economics | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 7 | 2 | Optimization techniques and their use in the oil industry | Project Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 8 | 2 | Costs and alternatives to drilling and exploration | Project Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 9 | 2 | Statement of economic costs in drilling oil and gas wells | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 10 | 2 | Oil reserves and methods of calculation | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 11 | 2 | Oil reserves and methods of calculation | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 12 | 2 | Description of the types of oil extraction and production, the most economical cost | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 13 | 2 | Description of the types of oil extraction and production, the most economical cost | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 14 | 2 | Conventional and unconventional oil operations | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 15 | 2 | Crude oil and petroleum prices and their impact on the selection of oil operations | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 16 | 2 | Production processes and how to choose the optimal method | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 17 | 2 | Production processes and how to choose the optimal method | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 18 | 2 | The oil facility on which crude oil passes after leaving the well. | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 19 | 2 | Gas separation and crude oil processing equipment in the field | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 20 | 2 | The most important natural gas processing operations and its relationship to its market value | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 21 | 2 | Natural Gas Processing: Recovery, Separation and Fractionation of NGL | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 22 | 2 | Distribution of oil fields in Iraq and mentioned the greatest production and reserves. | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 23 | 2 | Distribution of oil refineries in Iraq and statement of the quantities of production of each of them. | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 24 | 2 | Crude Oil Refining: Physical Separation | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 25 | 2 | Crude Oil Refiner: Chemical Conversion | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 26 | 2 | Introducing the operations carried out on oil in order to improve its Properties and improve its price in the global market. | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 27 | 2 | Introducing the operations carried out on oil in order to improve its Properties and improve its price in the global market. | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 28 | 2 | Comparison of oil and gas transport routes | Petroleum Projects Management | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 29 | 2 | Oil industries and the challenge of preserving the environment | Economics and management of oil projects | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 30 | 2 | The most important exporting and importing countries of crude oil<br>And introducing the most important international oil companies | Oil economy | theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 11. Course Evaluation |
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| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .....etc |

| 12. Learning and Teaching Resources | |
|---|---|
| Required textbooks (curricular books, if any) | |
| Main references (sources) | |
| Recommended books and references (scientific journals, reports…) | |
| Electronic References, Websites | |

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|---|---|
| Required textbooks (curricular books, if any) | Petroleum Economics and Engineering |
| Main references ( sources) | 1- Plant design and economics.<br>2- Properties of Petroleum Fluids/ McCain. Fourth Edition.<br>3- Characterization of petroleum products by Riazi |
| Recommended books and references ( scientific journal, report) | 1-Handbook of Petroleum Refining Processes by Meyers<br>2- Fundamentals of Petroleum Refining by Fahim |
| Electronic References , Websites | /https://www.arab-oil-naturalgas.com<br>https://www.sciencedirect.com/search?qs=oil |

# Course Description Form

| 1. Course Name: |
|---|
| Petroleum pollution and its control |
| 2. Course Code: |
| PPE 405 |
| 3. Semester / Year: |
| year |
| 4. Description Preparation Date: |
| 20/4/2025 |
| 5. Available Attendance Forms: |
| Theoretical lectures in a class |
| 6. Number of Credit Hours (Total) / Number of Units (Total) |
| 60 / 4 |
| 7. Course administrator's name (mention all, if more than one name) |
| Name: muzher Mahdi ibrahem<br>Email:samuzhermahdi@tu.edu.iq |
| 8. Course Objectives |

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|---|---|
| **Course Objectives** | • gain knowledge about pollutants of petroleum industry<br>• gain knowledge about the treatment methods of petroleum industry<br>• gain knowledge about the design of the treatment units |
| 9. Teaching and Learning Strategies | |
| **Strategy** | Lectures. Daily exams. Reports. Guizes. Home work. Final exam |

10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 2 | A1 | Introduction to petroleum pollution | Theoretical lecture | Short assessment and classroom involvement |
| 2 | 2 | A1 | Measurement of pollutants and their concentrations | Theoretical lecture | Short assessment and classroom involvement |
| 3 | 2 | A1 | Particulate matters and methods of measuring their concentration | Theoretical lecture | Short assessment and classroom involvement |
| 4 | 2 | A2 | Particle size distribution and treatment devices | Theoretical lecture | Submitting homework, research papers, and |

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| | | | | | scientific reports. |
| 5 | 2 | A2 A3 A4 | Gravitational settling chamber | Theoretical lecture | Short assessment and classroom involvement |
| 6 | 2 | A2 A3 A4 | Gravitational settling chamber | Theoretical lecture | Short assessment and classroom involvement |
| 7 | 2 | A2 A3 A4 A5 A6 | cyclones | Theoretical lecture | Monthly exams. |
| 8 | 2 | A2 A3 A4 A5 A6 | Scrubbers | Theoretical lecture | Short assessment and classroom involvement |
| 9 | 2 | A2 A3 A4 A5 A6 | Scrubbers | Theoretical lecture | Submitting homework, research papers, and scientific reports. |
| 10 | 2 | A2 A3 A4 A5 A6 | Scrubbers | Theoretical lecture | Short assessment and classroom involvement |
| 11 | 2 | A2 A3 A4 A5 A6 | Filters | Theoretical lecture | Short assessment and classroom involvement |
| 12 | 2 | A2 A3 A4 A5 A6 | Filters | Theoretical lecture | Submitting homework, research papers, and scientific reports. |
| 13 | 2 | A2 A3 A4 A5 A6 | ESP | Theoretical lecture | Short assessment and classroom involvement |
| 14 | 2 | A2 A3 A4 A5 A6 | Gaseous polltants | Theoretical lecture | Monthly exams |
| 15 | 2 | A2 A3 A4 A5 A6 | Incineration | Theoretical lecture | Short assessment and classroom involvement |
| 16 | 2 | A2 A3 A4 A5 A6 | Design of combustion chamber | Theoretical lecture | Short assessment and classroom involvement |
| 17 | 2 | A2 A3 A4 A5 A6 | Dispersion of air pollutants | Theoretical lecture | Short assessment and classroom involvement |
| 18 | 2 | A2 A3 A4 A5 A6 | Dispersion of air pollutants | Theoretical lecture | Short assessment and classroom involvement |
| 19 | 2 | A2 A3 A4 A5 A6 | Adsorption | Theoretical lecture | Submitting homework, research papers, and scientific reports. |
| 20 | 2 | A2 A3 A4 A5 A6 | Absorption | Theoretical lecture | Short assessment and classroom involvement |
| 21 | 2 | A2 A3 A4 A5 A6 | Nitrogen oxides removal | Theoretical lecture | Monthly exams |
| 22 | 2 | A2 A3 A4 A5 A6 | Sulfer oxides removal | Theoretical lecture | Short assessment and classroom involvement |
| 23 | 2 | A2 A3 A4 A5 A6 | Sulfer oxides removal | Theoretical lecture | Short assessment and classroom involvement |
| 24 | 2 | A2 A3 A4 A5 A6 | Chemical treatment of water | Theoretical lecture | Short assessment and classroom involvement |
| 25 | 2 | A2 A3 A4 A5 A6 | DAF and API | Theoretical lecture | Submitting homework, research papers, and scientific reports. |
| 26 | 2 | A2 A3 A4 A5 A6 | filtration | Theoretical lecture | Monthly exams |
| 27 | 2 | A2 A3 A4 A5 A6 | Biological treatment units | Theoretical lecture | Short assessment and classroom involvement |
| 28 | 2 | A2 A3 A4 A5 A6 | Biological treatment units | Theoretical lecture | Submitting homework, research papers, and scientific reports. |
| 29 | 2 | A2 A3 A4 A5 A6 | Oil spill | Theoretical lecture | Short assessment and classroom involvement |
| 30 | 2 | A2 A3 A4 A5 A6 | Disasters of petroleum industry | Theoretical lecture | Final exam |

| 11. Course evaluation | |
|---|---|
| Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports..... etc | |
| 12. Learning and teaching resources | |
| Required text book (curricural books, if any | Wastewater Engineering: Treatment and Resource Recovery 5th Edition. by Inc. Metcalf & Eddy (Author), George Tchobanoglous (Author), H. Stensel (Author), Ryujiro Tsuchihashi (Author), Franklin Burton (Author) |
| Main references (sources) | Air Pollution, Its Origin and Control Book by Cecil Francis Warner and Kenneth Wark. Harber and Row publisher. New yourk (Author), Ryujiro Tsuchihashi (Author), Franklin Burton (Author) |
| Recommended books and references(scientific journals, reports…) | Air Pollution Control Theory by Martin Crawford (Author). McGraw-Hill, 1976.<br>Air Pollution Control Equipment: Selection, Design, Operation and Maintenance (Environmental Science and Engineering). by Louis Theodore and Anthony J. Buonicore<br>Basic principles of wastewater treatment, Marcos Von Sperling. IWA publishing |
| Electronic references, websites | |

# Course Description Form

| 1. Course Name: | |
|---|---|
| Specilized Peroleum Processses | |
| 2. Course Code: | |
| PPE 401 | |
| 3. Semester/ Year: | |
| Annual | |
| 4. Description Preparation Date: | |
| 20/4/2025 | |
| 5.Available Attendance Forms: | |
| Weekly attendance | |
| 6.Number of Credit Hours(Total)/Number of Units (Total) | |
| 120 hr / 6 units | |
| 7.Courseadministrator'sname(mention all ,if more than one name) | |
| Name: Lec. Rafa jamal<br>Email : Rafa jamal @tu.edu.iq | |
| 8. Course Objectives | |
| **Course Objectives** | **1. Providing students with the basics of scientific knowledge in the field of petroleum processes and improving their professional abilities in the direction of analytical and creative thinking through the use of information technologies, data analysis and modern experimental methods in formulating and solving problems.**<br>**2. Preparing well-qualified engineers to advance the activities of Petroleum and Gas Refining Engineering and the ability to manage dealing with them in all aspects of life, especially in the field of petroleum refining industry.**<br>**3. Conducting scientific research of an academic nature to keep pace with the global scientific march and research of an applied nature to translate engineering knowledge and its theories into action by addressing the problems that the country suffers from in the field of petroleum refining industry.**<br>**4. Contribute in one way or another in terms of design, supervision, follow-up and advice for the reconstruction of the country in the petroleum refining industry, with the provision of engineering consultancy, the preparation of economic feasibility studies, project** |

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| | **designs and the provision of technical services.**<br>**5. Rooting scientific sobriety and making it a feature of this department in accordance with international controls and standards.**<br>**6. Providing students with the basics of scientific knowledge about different units of petroleum refining processes like Hydrogenation, Hydrocracking, Alkylation, Ctalaytic Reforming and other processes**<br>**7. Preparing well-qualified engineers to understand, operate, and develop of different units in petroleum refineries.** |

## 9. Teaching and Learning Strategies

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| **Strategy** | The teaching and learning strategy was developed in order to obtain comprehensive information to cover educational applications and thus achieve the basic objective of the targeted curriculum:<br>1. Present the course content to students.<br>2. Assign homework to students and demand it in a structured manner.<br>3. Conduct pop-up exams during lectures.<br>4. Conduct midterm and final exams on the specified dates.<br>5. Inform students of how grades are calculated during the semester, their exam results, and discuss successes and failures.<br>6- Informing students of the textbooks and auxiliary books they need for the curriculum, with regular curriculum development through a survey of previous years to improve the curriculum, enhance faculty performance, and raise student achievement.<br>7- Showing scientific films related to the curriculum materials. |

## 10. Course Structure

| Week | Hours | Required Learning Outcomes | Unit or subject name | Learning method | Evaluation method |
|---|---|---|---|---|---|
| 1 | 4 | Introduction of petroleum processes units | Introduction of petroleum processes | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 2 | 4 | Learn about the naphtha reforming process, including operating conditions and facilitating factors. | Naphtha reforming process 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

| | | | | | |
|---|---|---|---|---|---|
| 3 | 4 | Learn about the naphtha reforming process, including specialized equipment and devices. | Naphtha reforming process 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 4 | 4 | Learn about the isomerization process and its operating conditions. | Isomerization process 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 5 | 4 | Learn about the isomerization process, including its catalysts, specialized devices and equipment. , | Isomerization process 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 6 | 4 | Learn about the steam reforming process, including operating conditions, auxiliary factors, and specialized devices and equipment. | Steam reforming process | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 7 | 4 | Learn about the hydrogenation process and its operating conditions. | Hydrotrating process 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 8 | 4 | Learn about the hydrogenation process, including its catalysts, specialized devices and equipment. | Hydrotrating process 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 9 | 4 | Learn about alternative desulfurization processes to hydrogenation, such as oxidation and extraction. | Alternative desulfurization processes to hydrogenation 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 10 | 4 | Learn about alternative desulfurization processes to hydrogenation, such as adsorption, biological processes, and others. | Alternative desulfurization processes to hydrogenation 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 11 | 4 | Learn about the hydrocracking process, including its operating conditions. | Hydrocracking process 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 12 | 4 | Learn about the hydrocracking process, including its catalysts, specialized equipment, and devices. | Hydrocracking process 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 13 | 4 | Learn about the fluidized catalytic cracking process, including operating conditions, catalysts, and specialized equipment and devices. | Fluidized catalytic cracking process | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 14 | 4 | Identify the types of thermal cracking operations, including operating conditions, specialized equipment, and devices. | Thermal cracking process | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 15 | 4 | Learn about the thermal cracking process by delayed cocking, including operating conditions and specialized equipment. | Thermal cracking process by delayed cocking | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 16 | 4 | Learn about the fluid cocking process, including operating conditions, specialized equipment, and devices. | Thermal cracking process by fluid cocking | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 17 | 4 | Learn about the flexi cocking process, including operating conditions, specialized equipment, and devices. | Thermal cracking process by flexi cocking | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 18 | 4 | Learn about the hydrogen production process, including operating conditions | Hydrogen production processes 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 19 | 4 | Learn about the hydrogen production process, including auxiliary factors, and specialized equipment and devices. | Hydrogen production processes 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 20 | 4 | Learn about the alkylation process, including its different types and operating conditions. | Alkylation process | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 21 | 4 | Learn about the alkylation process using sulfuric acid, including operating conditions, specialized devices and equipment. | Alkylation process using sulfuric acid | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 22 | 4 | Learn about the alkylation process using hydrofluoric acid, including operating conditions, specialized equipment, and devices. | Alkylation process using hydrofluoric acid | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 23 | 4 | Learn about the alkylation process using a solid catalyst, including operating conditions, specialized equipment, and devices. | Alkylation process using a solid catalyst (Alkyclean process) | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 24 | 4 | Learn about the polymerization process, including operating conditions, catalysts, and specialized equipment and devices. | Polymerization process | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 25 | 4 | Learn about modern clean fuel production technologies, including operating conditions, enabling factors, and specialized equipment and devices. | Clean fuel production technologies | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 26 | 4 | Identify the processes of removing aromatic compounds from kerosene and improving its specifications, including operating conditions, auxiliary factors, and specialized devices and equipment. | Processes of removing aromatic compounds from kerosene | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 27 | 4 | Learn about the processes of producing lubricating oils and removing asphalt compounds from them, including operating conditions, auxiliary factors, and specialized devices and equipment. | Processes of producing lubricating oils (deasphalting process) | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 28 | 4 | Learn about the processes of producing lubricating oils and removing wax compounds from them, including operating conditions, auxiliary factors, and specialized devices and equipment. | Processes of producing lubricating oils (dewaxing process) | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |
| 29 | 4 | Identify the upgrading processes of residue and heavy oil, including the types of processes and operating conditions. | Residue and heavy oil upgrading processes 1 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

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| 30 | 4 | Learn about residue and heavy oil upgrading processes, including equipment, devices, and process designs. | Residue and heavy oil upgrading processes 2 | Theoretical | Real-time questions, extracurricular assignments, quizzes and monthly exams |

## 11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily exams, reports ……..

## 12. Learning and Teaching Resources

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| Required textbooks (curricular books, if any) | Text book: Fundamentals of petroleum refining by Fahim, 2010. |
| Main references (sources) | 1- Petroleum refining & economics by Gary<br>2- Petroleum refining by Parakash<br>3- Petroleum Refining Engineering by Nelson |
| Recommended books and references (scientific journals, reports ...) | Fuel Journal<br>Journal of Fuel Processing Technology |
| Electronic References, websites | **s://www.arab-oil-naturalgas.com/?amp=1,**<br>**https://www.elsevier.com/** |

# Course Description Form

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| **1.** Course Name: |
| **Plant & Equipment Design** |
| **2.** Course Code: |
| **PPE 402** |
| 3. Semester / Year: |
| Year |
| 4. Description Preparation Date: |
| 20/4/2025 |
| **5.** Available Attendance Forms: |
| |
| **6.** Number of Credit Hours (Total) / Number of Units (Total) |
| (150 hr) total semester/ (6 units) |
| **7.** Course administrator's name (mention all, if more than one name) |
| **Name: Amer Talal Nawaf** **Email:** Amer.talal@tu.edu.iq |
| **10. Course Objectives** |

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| • Ability to read oil process flow diagrams and piping and instrumentation diagrams (P&IDs).<br>• Capability to draw oil process flow diagrams, piping diagrams, and control schematics.<br>• Performing fixed and operational cost calculations for oil plants, in addition to profitability analysis.<br>• Conducting design calculations for oil equipment and utility systems.<br>• Preparing comprehensive design reports, including both basic design and detailed designs of oil equipment. | **Course Objectives** |
| **10. Teaching and Learning Strategies** | |
| **An educational strategy has been developed to ensure that students acquire comprehensive knowledge covering the curriculum prepared for the subject, and to achieve the primary objective of the syllabus. The strategy is detailed as follows:**<br><br>1- Presenting the course syllabus to the students.<br>2- Assigning homework to students and systematically collecting it.<br>3- Conducting surprise quizzes during lectures.<br>4- Administering midterm and final exams on scheduled dates.<br>5- Informing students about the grading criteria throughout the semester, sharing their exam results, and discussing both | Strategy |

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| shortcomings and successes.<br>6- Providing students with the required core textbooks and supplementary materials related to the course syllabus, alongside periodic curriculum updates based on surveys from previous years to enhance the curriculum, improve instructors' performance, and raise the students' academic level.<br>7- Showing educational films relevant to the course materials. | |

**10. Course Structure**

| Assessment Method | Learning Method | Unit or Topic Name | Expected Learning Outcomes | Hours | Week |
|---|---|---|---|---|---|
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Introduction to Plant Design | Identifying the Steps of Laboratory Design | 3 | First |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Process Flow Diagrams (PFDs) | Identifying the Types of Drawings Used in Petroleum Operations and the Methods of Creating Them | 3 | Second |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Control and Operation of Oil Refineries | Understanding the Control and Operation of Oil Refineries | 3 | Third |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Services Used in Oil Refineries | Understanding the Services Utilized in Oil Refineries | 3 | Fourth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Equipment Location in Oil Projects | Understanding the Methods for Equipment Location in Oil Projects | 3 | Fifth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | General Design Considerations | Understanding General Design Considerations | 3 | Sixth |
| Pop Quizzes, Homework Assignments, | Theory + Discussion | How to Select the Location of an Oil | Understanding the Methods for Selecting the | 3 | Seventh |

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| Short Tests, and Monthly Exams | | Project | Location of an Oil Project | | |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Optimal Design | Understanding Optimal Design | 3 | Eighth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Computer-Aided Design (CAD) | Understanding Design Methods Using Computer-Aided Tools | 3 | Ninth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Pilot Plants | Understanding the Benefits of Pilot Plants | 3 | Tenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Selection of Manufacturing Materials for Oil Projects | Understanding the Selection of Manufacturing Materials for Oil Projects | 3 | Eleventh |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design Reports | Understanding How to Prepare Design Reports | 3 | Twelfth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Economic Feasibility Studies | Understanding How to Prepare Economic Feasibility Studies for Oil Projects | 3 | Thirteenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Cost Estimation for Oil Projects | Understanding How to Estimate Costs for Oil Projects | 3 | Fourteenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Designs of Pipes and Pumps | Understanding the Designs of Pipes and Pumps | 3 | Fifteenth |
| Pop Quizzes, | Theory + | Designs of Pipes and | Understanding | 3 | Sixteenth |

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|---|---|---|---|---|---|
| Homework Assignments, Short Tests, and Monthly Exams | Discussion | Pumps | Pipe and Pump Designs | | |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Pipe Specifications and Connections | Understanding Pipe Specifications and Their Connections | 3 | Seventeenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Types of Pumps and Their Performance | Understanding the Types of Pumps and Their Performance | 3 | Eighteenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Oil Tanks and Their Types | Understanding Oil Tanks and Their Types | 3 | Nineteenth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Principles of Tank Design | Understanding the Principles of Tank Design | 3 | Twentieth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design of Gas-Liquid Separator Tank | Understanding How to Design Gas-Liquid Separator Insulation | 3 | Twenty-first |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design of Heat Transfer Equipment – Furnaces | Understanding the Design of Heat Transfer Equipment – Furnaces | 3 | Twenty-second |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Condenser Design | Understanding How to Design a Condenser | 3 | Twenty-third |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly | Theory + Discussion | Types and Design of Boilers | Understanding the Types and Design of Boilers | 3 | Twenty-fourth |

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|---|---|---|---|---|---|
| Exams | | | | | |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design Data Sheets | Understanding Design Data Sheets | 3 | Twenty-fifth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design Considerations for Distillation Towers | Understanding the Design Considerations for Distillation Towers | 3 | Twenty-sixth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Principles of Evaporation | Understanding the Principles of Evaporation | 3 | Twenty-seventh |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design of Absorption Tower | Understanding the Designs of Absorption Towers | 3 | Twenty-eighth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Design of Stripping Towers | Understanding the Design of Stripping Towers | 3 | Twenty-ninth |
| Pop Quizzes, Homework Assignments, Short Tests, and Monthly Exams | Theory + Discussion | Safety in the Oil Industry | Understanding Safety in the Oil Industry | 3 | Thirtieth |

**11. Course Evaluation**

**Monthly Exams: 25%**
**Daily Quizzes, Homework (in-class and take-home): 10%**
**Laboratory Work and Case Studies: 15%**
**Final Exam: 50%**

**12. Teaching and Learning Resources**

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| **Text book:** 1- Chemical Engineering Vol.6, Coulson and Richards.<br>**2-** Chemical Engineering Vol.2, Coulson and Richards | 1. Books Required reading: |

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| 1- Perry's Chemical Engineering Handbook<br>2- Fundamentals of Heat and Mass Transfer - Incropera/DeWitt/others - Sixth Edition.<br>3- Mass Transfer: Fundamentals & Applications by Yunus Cengel and Afshin Ghajar. | 2. Main references (sources) |
| 1- Heat and Mass transfer by Shandra.<br>2- Process heat transfer by Kern.<br>3- International Journal of Heat and Mass Transfer.<br>4- International Journal of Heat and Fluid Flow.<br>5-International Communications in Heat and Mass Transfer.<br>6-Experimental Thermal and Fluid Science.<br>7-Previews of Heat and Mass Transfer. | A- Recommended books and references (scientific journals, reports…). |
| /https://www.pinterest.com/pin/331436853811137117<br>https://www.amazon.com/Fundamentals-Heat-Transfer-Frank-Incropera/dp/0471457280 | B-Electronic references, Internet sites… |

# Course Description Form

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| 1. Course Name: | |
| Gas Technology | |
| 2. Course Code: | |
| PPE 408 | |
| 3. Semester/ Year: | |
| Annual | |
| 4. Description Preparation Date: | |
| 20/4/2025 | |
| 5.Available Attendance Forms: | |
| Weekly attendance | |
| 6.Number of Credit Hours (Total)/Number of Units (Total) | |
| 60 hr / 4 units | |
| 7.Course administrator's name (mention all, if more than one name) | |
| Name: Lect. Farah Qahtan | |
| 8. Course Objectives | |
| Course Objectives | This course aims to provide students with the fundamental scientific knowledge in the field of gas technology and to enhance their professional capabilities toward analytical and creative thinking. This is achieved through the use of information technologies, data analysis, and modern experimental methods in formulating and solving engineering problems.<br>• To prepare qualified engineers capable of contributing to petroleum and gas refining activities, and equipped with the skills to manage and operate within various aspects of the gas industry.<br>• To conduct scientific research of both academic and applied nature, keeping pace with global scientific progress and translating engineering knowledge and theories into practical applications that address national challenges in the gas industry.<br>• To contribute, directly or indirectly, to the design, supervision, monitoring, and consulting processes for the reconstruction and development of the national gas industry, including the provision of engineering consultations, feasibility studies, project designs, and other technical services.<br>• To establish and promote scientific rigor as a defining characteristic of the department, in accordance with international standards and regulations. |

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| | • To provide students with fundamental scientific knowledge regarding gas composition, types of gases, gas production, properties, and industrial applications.<br>• To familiarize students with the scientific and technical fundamentals of various gas plant units, including gas-oil separation, acid gas treatment, dehydration, and natural gas liquids (NGL) recovery units.<br>• To prepare well-qualified engineers capable of understanding, operating, and developing different processing units in gas treatment facilities. |

9. Teaching and Learning Strategies

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| Strategy | The main strategy to be adopted aims to encourage student participation in class exercises while simultaneously enhancing and expanding their critical thinking skills. This will be achieved through interactive classroom sessions and educational programs. The following steps will be implemented to strengthen learning strategies:<br>• Employing appropriate teaching methods that suit the students' level and allow for open discussion and participation.<br>• Utilizing modern and advanced instructional tools to deliver the maximum amount of knowledge to students.<br>• Presenting the course topics and content through structured lectures.<br>• Assigning students various tasks—such as writing research papers—to help them develop self-learning and presentation skills.<br>• Conducting unannounced quizzes to encourage consistent study habits.<br>• Holding oral examinations through e-learning platforms.<br>• Administering midterm and final examinations according to the academic schedule.<br>• Informing students about the grading criteria throughout the semester, discussing exam results, and addressing both achievements and shortcomings.<br>• Introducing students to the main textbooks and supplementary references required for the course topics. |

10. Course Structure

| Week | Hours | required Learning Outcomes | Unit or Subject Name | Learning Method | Evalution Method |
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| 1 | 2 | Explain the historical evolution of the gas industry and its technological progress. | Historical Overview of Gas Engineering and Its Development | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly |

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| | | | | | reports. |
| 2 | 2 | Identify different natural gas sources, compositions, and production methods. | General Definitions, Natural Gas Sources, Composition, and Production | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 3 | 2 | Distinguish between various classifications and types of natural gas. | Classification of Natural Gas | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 4 | 2 | Describe the main uses, advantages, and economic importance of natural gas. | Uses, Advantages, and Economic Aspects of Natural Gas | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 5 | 2 | Identify the physical and chemical properties of natural gas and LPG. | Properties of Natural Gas and LPG (Part 1) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 6 | 2 | Apply gas property knowledge through practical examples. | Properties of Natural Gas and LPG (Part 2) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |

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| 7 | 2 | Interpret the phase behavior and equilibrium characteristics of natural gas systems. | Phase Behavior of Natural Gas | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 8 | 2 | Understand the principles and key concepts of gas processing operations. | Basic Concepts of Natural Gas Processing | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 9 | 2 | Explain the fundamentals of gas–oil separation processes. | Gas–Oil Separation (Part 1) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 10 | 2 | Analyze different types and designs of gas separators. | Gas–Oil Separation (Part 2) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 11 | 2 | Describe vaporization processes used in condensate stabilization units. | Condensate Stabilization (Part 1) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 12 | 2 | Explain fractionation operations and their role in condensate stabilization. | Condensate Stabilization (Part 2) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |

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| 13 | 2 | Understand chemical absorption processes (amines and carbonate) for gas sweetening. | Acid Gas Treatment (Part 1) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 14 | 2 | Describe physical absorption methods and design considerations. | Acid Gas Treatment (Part 2) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 15 | 2 | Explain hybrid absorption methods (e.g., Sulfinol process) and their applications. | Acid Gas Treatment (Part 3) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 16 | 2 | Understand solid adsorption methods (iron sponge, molecular sieves, ZnO) for gas purification. | Acid Gas Treatment (Part 4) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 17 | 2 | Explain membrane-based and cryogenic gas treatment techniques. | Acid Gas Treatment (Part 5) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 18 | 2 | Describe Claus and SCOT processes for sulfur recovery and associated design aspects. | Sulfur Recovery Processes | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |

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| 19 | 2 | Determine the water content of natural gas using analytical methods. | Natural Gas Dehydration (Part 1) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 20 | 2 | Explain hydrate formation and prevention techniques in gas systems. | Natural Gas Dehydration (Part 2) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 21 | 2 | Understand absorption dehydration (glycol process) and design parameters. | Natural Gas Dehydration (Part 3) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 22 | 2 | Describe adsorption dehydration (solid bed systems) and design considerations. | Natural Gas Dehydration (Part 4) | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 23 | 2 | Explain the main processes used for natural gas liquids (NGL) recovery. | NGL Recovery | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 24 | 2 | Analyze gas flaring systems, operation, and flare design in refineries. | Gas Flaring in Refineries | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |

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| 25 | 2 | Describe storage methods and design aspects for natural gas and petroleum products. | Gas and Petroleum Products Storage | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 26 | 2 | Explain transportation methods and safety considerations for gas and petroleum products. | Gas and Petroleum Products Transportation | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 27 | 2 | Understand gas compression principles, operation, and design. | Natural Gas Compression | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 28 | 2 | Identify and evaluate environmental risks associated with gas processing operations. | Environmental Aspects of Gas Processing | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 29 | 2 | Apply safety principles and procedures in natural gas and LPG facilities. | Safety Guidelines for Gas and LPG Plants | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |
| 30 | 2 | Recognize cylinder types, safety measures, and explosion limits of compressed gases. | Compressed Gas Cylinder Safety and Explosion Limits | Theoretical | Instant questions, out of class assignments, short quizzes and monthly exams and Quarterly reports. |

| 11. Course Evaluation | |
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| Distributing the score out of 100 according to the tasks assigned to the student such as daily exams, reports …….. | |
| 12. Learning and Teaching Resources | |
| Required textbooks (curricular books, if any) | • Handbook of Natural Gas Transmission and Processing Principles and Practices Fourth Edition 2019, Saeid Mokhatab, William A. Poe, John Y. Mak |
| Main references (sources) | • Fundamentals of Natural Gas Processing, Third Edition 3rd Edition, 2019by Arthur J. Kidnay, William R. Parrish, Daniel G. McCartney.<br>• Advanced Natural Gas Engineering Xiuli Wang, XGAS, Michael Economides |
| Recommended books and references (scientific journals, reports …) | • Journal of natural gas science and engineering<br>• Natural gas industry B<br>• Energy and fuels<br>• Fuel<br>• Fuel processing technology |
| Electronic References, websites | https://www.arab-oil-naturalgas.com/category/arabic-natural-gas-articles/ |