**Inter-disciplinary Diploma**

**“Petroleum &** **Natural Gas Engineering**”

**“PROGRAM SPECEFICATION”**

* **Basic Information**

**Program name: Inter-disciplinary Diploma in** *“Petroleum & Natural Gas Engineering”*

**Program nature:** Continuing Education in Petroleum & Natural Gas Engineering and Technology

**Department offers the program:** Inter-disciplinary Diploma

**Date of specification approval:**

* **Specific Information**

1. **Introduction**

The interdisciplinary diploma follows the postgraduate general regulations (credit hour system) 2013 – 2014 Faculty of Engineering, Cairo University. It is open to candidates who have B.Sc. in Petroleum, Chemical, Mechanical or Electrical Engineering working in the field of Petroleum & Natural Gas Industry. The program aims at harmonizing knowledge between students and familiarizing them with the engineering practice related to their profession.

1. **Program Mission**

The purpose of this program is to supply the Egyptian market with candidates familiar with basic elements of Petroleum & Natural Gas Engineering. Graduates will be able to develop career in Petroleum & NG industry.

1. **Program Objectives**

The proposed program has four main educational objectives. These can be summarized as follows:

The program aims to:

1. Provide a study opportunity which enables the candidates to acquire basic knowledge and understanding of engineering fundamentals relevant to Petroleum & NG Engineering profession.
2. Develop the appropriate intellectual skills required to help graduates to plan, design, analyze, execute and manage industrial Petroleum & NG projects.
3. Provide candidates with the practical and professional skills necessary for employment in the field of Petroleum & NG engineering and related fields.
4. Develop communication skills necessary for the profession that enable the graduates to work in multi-disciplinary teams and interact properly in the professional environment.
5. **Admission General Requirements: In Accordance with (Clause 5)**

a-The applicant must have a Bachelor of Science Degree in Petroleum, Chemical, Mechanical or Electrical Engineering at a school of engineering in an Egyptian University or an equivalent institute approved by the Supreme Council of Universities in Egypt.

b- The applicant shall complete all the documents required by the Graduate Studies Administration of the Faculty of Engineering.

c-The applicant shall fulfill any requirements or restrictions set by of the Steering Committee which possesses all the authorities of the Department Council in managing the diploma. The steering Committee is authorized to accept the registration of engineers from disciplines, other than the four disciplines mentioned above, after determining whether he/ she needs to study any qualifying courses or not.

d- Male applicants shall declare their military service status, whether they are discharged or postponed (for at least two years). Teaching assistants are exempted from this condition.

e- Acceptance of the applicant's Employer.

f- Regular payment of fees each semester.

1. **Graduate Attributes**

A graduate of the Interdisciplinary Diploma in “Petroleum & Natural Gas Engineering” should be able to:

1. Apply professionally the acquired knowledge in Petroleum & NG Technology practice.
2. Master the professional skills and the use appropriate technological tools suitable for Petroleum & NG Technology.
3. Identify professional problems and propose appropriate solutions.
4. Communicate effectively and lead teams through systemic professional work.
5. Demonstrate decision making skills in the light of the available information.
6. Deploy available resources in Petroleum & NG Technology & relevant industries effectively.
7. Exhibit awareness of his role in community development and saving the environment.
8. Reflect commitment to integrity, credibility and ethics in Petroleum & NG profession.
9. Recognize the necessity of self development and engage in continuous learning.
10. **General Standards**

**Intended Learning Outcomes (ILOs)**

**6-1. Knowledge and Understanding:**

After completing the program, the graduate should be able to:

1. Demonstrate understanding of basics and fundamentals related to the area of “Petroleum & Natural Gas Engineering and Technology”
2. Exhibit basic knowledge in Petroleum, Chemical, Mechanical and Electrical Engineering as related to Petroleum & NG Technology practice.
3. Recognize the impact of Petroleum & NG Technology practice on the environment.
4. Define the ethical and legal principles of Petroleum & NG Technology practice.
5. Describe the principles and fundamentals of quality control in Petroleum & NG Technology practice.

**6-2. Intellectual Skills:**

After completing the Diploma program in Petroleum & Natural Gas Engineering, the graduates should be able to:

1. Identify and analyze the data in the areas of Petroleum, Chemical, Mechanical and Electrical Engineering as related to Petroleum & NG Technology practice according to selected priorities.
2. Integrate knowledge from various engineering fields to solve Petroleum & NG Industry problems.
3. Perform preliminary research study and/or write scientific report about specific research problems in the field of Petroleum & NG Engineering.
4. Plan to improve performance of operations and processes in Petroleum & NG Industry.
5. Make specialized decisions in various areas of the profession.

**6-3. Professional skills:**

After completing the Diploma program in Petroleum & Natural Gas Engineering, the graduates should be able to:

1. Illustrate basic skills and conduct field studies and troubleshooting in the field of Petroleum & Natural Gas Engineering and relevant technologies.
2. Write and evaluate professional reports in the field of Petroleum & Natural Gas Technology.
3. Assess existing methods and tools in the area Petroleum & Natural Gas Industry.

**6-4. General and transferable skills:**

The graduate should be able to:

1. Communicate effectively in different forms.
2. Use IT to serve the development of professional practice.
3. Self-evaluate and determine personal educational needs.
4. Use different sources for acquiring information and knowledge.
5. Join efficiently in teamwork and manage time effectively.
6. Lead a team in a professional context.
7. Adopt continuous and self learning.
8. **Teaching and learning methods:**

* Lectures
* Practical classes
* Guided Self-reading
* Mini-research projects
* Interactive discussions
* Case studies
* Site visits

1. **Assessment Methods:**

* Written Examination
* Course work submission
* Short tests
* Oral presentations
* Individual projects
* Reports
* Graduation Project

1. **Structure and Components of the program:**
2. Program period: 2 years – 4 semesters.
3. Structure: As indicated in the Faculty Post Graduate By-laws.
4. **General Rules and Regulations**

The general rules for progression and completion of the program followthe Faculty Post Graduate By-laws, as indicated here-in-after:

**Steering Committee: In accordance with** (Clause 22)

The Interdisciplinary Diploma in Petroleum & Natural Gas Engineering is a multi-disciplinary diploma implemented under the supervision of a steering committee formed by the membership of the Faculty Vice-dean for post graduate affairs, the Program Main Coordinator (Dr. Sayed Ahmad El-Tayeb - Professor of Petroleum Engineering-Cairo University), the Program Executive Coordinator (Dr. Sahar ELMarsafy- Professor of Chemical Engineering – Cairo University) in addition to a number of leaders of the Natural Gas industry representing Egyptian General Petroleum Corporation, and the relevant holding and associated companies (These Leaders will be chosen by the Program Main Coordinator).

The main duty of this steering committee is to run the diploma, implement the rules and regulations mentioned in this curriculum and form a link between the requirements of the industrial establishments relevant to the oil and gas sector and the post graduate affairs department in the Faculty.

**Duration of Study: In accordance with** (Clause 27)

The time required to attain the Postgraduate Interdisciplinary Diploma shall not exceed four main semesters if the student is registered as a part-time student. The Faculty Council may approve, upon the proposal of the Steering Committee, the duration of study to be two main semesters only provided that he/she is enrolled as a full-time student.

**Study Requirements: In accordance with** (Clause 28)

The minimum credit hours for the Interdisciplinary Postgraduate Diploma in Petroleum & NG Industry shall not be less than 30 hours of courses of level 500 as indicated in the program courses here-in-after. A qualifying course; namely; "Introduction to Petroleum, Chemical, Mechanical and Electrical Engineering" shall count as part of these credit hours.

**Attendance: In accordance with** (Clause 16)

A student is ineligible to sit for exam in any course unless he/she attends at least 75% of the lectures. This procedure shall be based on a report from the course instructor to the Main Coordinator, approved by the Graduate Studies Committee and the Faculty Council.

**Registration Cancellation: In accordance with** (Clause 30)

The student's registration is cancelled in any of these cases:

1. If he/she fails a course twice.

2. If he/she does not pay the fees on time.

3. If he/she submits a request for withdrawal in accordance with Clause (14)

1. **Program Courses:**

**First Year (First term)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | Credit hours | Maximum Grades | | | Duration of written Exam, hours |
| Course  work | Written  exam | Total |
| PNGE 502 | Petroleum & Gas Reservoirs | 3 | 20 | 80 | 100 | 2 |
| PNGE 505 | Instrumentation and control | 3 | 20 | 80 | 100 | 2 |

**First Year (Second term)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | Credit hours | Maximum Grades | | | Duration of written Exam, hours |
| Course  work | Written  exam | Total |
| PNGE 501 | Fundamentals of Electrical Engineering | 3 | 20 | 80 | 100 | 2 |
| PNGE 503 | Production Technologies | 3 | 20 | 80 | 100 | 2 |
| PNGE 504 | Measurements, Transportation & Storage | 3 | 20 | 80 | 100 | 2 |

**Second Year (First term)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | Credit hours | Maximum Grades | | | Duration of written Exam, hours |
| Course  work | Written  exam | Total |
| PNGE 506 | Separation & Purification | 3 | 20 | 80 | 100 | 2 |
| PNGE 509 | NG Utilization | 3 | 20 | 80 | 100 | 2 |

**Second Year (Second term)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Code | Course Name | Credit hours | Maximum Grades | | | Duration of written Exam, hours |
| Course  work | Written  exam | Total |
| PNGE 507 | Natural Gas Processing | 3 | 20 | 80 | 100 | 2 |
| PNGE 508 | Petrochemical Processes | 3 | 20 | 80 | 100 | 2 |

1. **Contents of Courses**

**Fundamentals of Electrical Engineering (PNGE 501)**

Electrical circuits- Electronic circuits- Power and energy – Power factor - Power Quality- Electromechanical Energy Conversion- Electromagnetic- Protection systems- Earthing and grounding systems- Cathodic protection- Environmental effects of electromagnetic - Ethics and legislation - technical writing - field visit.

**Petroleum & Gas Reservoirs (PNGE 502)**

Rock nature – porosity and permeability – two-phase relative permeability – reservoir fluids properties – behavior of HC gases – single and two components phase diagram – dew and bubble points curves – classification and properties of oil and gas reservoirs – determination of oil and gas reserves by volumetric and material balance – prediction of oil and gas reservoirs performance - Ethics and legislation, technical writing, field visit.

**Production Technologies (PNGE 503)**

Introduction, well performance, static and flowing bottom hole pressures, tests of oil and gas wells, transient flow of reservoir fluids through porous media, oil and gas fields development, Ethics and legislation, technical writing, field visit.

**Measurements, Transportation & Storage (PNGE 504)**

Flow through pipe lines – horizontal flow equation – non horizontal flow equation – efficiency of pipe lines – arrangement of gas pipe lines in series and in parallel - Pipelines Installation - Pipelines Operation & Maintenance – Instrumentation – Pipeline Monitoring – purpose of underground storage – types of underground storage – criteria of selection of underground storage – Ethics and legislation, technical writing, field visit.

**Instrumentation and control (PNGE 505)**

Automatic control principles- open loop control- Closed loop Control- Elements of control systems - Digital logic Circuits- Fundamentals of Programmable Logic Controllers (PLC) – Sensors- Measurement Instruments- Electronic measurements- Signal analysis- Signal conditioning- Signal processing- Fundamentals of Supervisory Control and Data Acquisition (SCADA), Ethics and legislation, technical writing, field visit.

**Separations & Purification (PNGE 506)**

Classification of oil and separators. Estimating sizes and capacities of separators, absorption and adsorption, sulfur removal, dehydration, Ethics and legislation, technical writing, field visit.

**Natural Gas Processing (PNGE 507)**

Cryogenics and treating, liquefaction of Natural gas, separation of LPG, Separation of ethane, Ethics and legislation, technical writing, field visit.

**Petrochemical Processes (PNGE 508)**

Steam reforming of natural gas – hydrogen- methanol - ammonia - urea-steam cracking of ethane – ethylene - Ethylene Derivatives – Polyethylene – Poly Vinyl Chloride- Petrochemicals from propane - Petrochemical from butane - Chemical liquefaction of natural gas - Ethics and legislation - technical writing - field visit.

**NG Utilization (PNGE 509)**

Thermodynamics concepts, NG Processes facilities, cycles, I.C.E, Turbines, Compressors, Heat Exchanges, Ethics and legislation, technical writing, field visit.

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