

**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**

**2024**

## **Introduction:**

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

## **Concepts and terminology:**

**Academic Program Description:** The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

**Course Description:** Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

**Program Vision:** An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

**Program Mission:** Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

**Program Objectives:** They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

**Curriculum Structure:** All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

**Learning Outcomes:** A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

**Teaching and learning strategies:** They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

**Academic Program Description Form**

**University Name:** Diyala

**Faculty/Institute:** College of Engineering

**Scientific Department:** Department of Electrical Power and Machines Engineering

**Academic or Professional Program Name:** Bachelor

**Final Certificate Name:** Bachelor of science in Electrical Power and Machines Engineering

**Academic System:** Course

**Description Preparation Date:** 13/8/2024

**Completion Date:** 13/8/2024

**Signature:**

**Head of Department Name:**

Assit. prof. Dr. Balasim M. Hussein

**Date:** 13/8/2024

**Signature:**

**Scientific Associate Name:**

Assst. prof. Dr. Jabbar

**Date:** 13/8/2024



**The file is checked by:**

**Department of Quality Assurance and University Performance**

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

**Date:**

**Signature:**

**Approval of the Dean**

Prof. Dr. Anees A. Khaden

# TEMPLATE FOR PROGRAMME SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### PROGRAMME SPECIFICATION

This Program Specification provides a concise summary of the main features of the program and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It is supported by a specification for each course that contributes to the program.

|  |  |
|--|--|
| 1. Teaching Institution  | University of Diyala                             |
| 2. University Department/Centre  | College of Engineering                           |
| 3. Program Title   | Electrical Power and Machines Engineering        |
| 4. Title of Final Award  | BSc in Electrical Power and Machines Engineering |
| 5. Modes of Attendance offered   | Courses  |
| 6. Accreditation   | N/A  |
| 7. Other external influences   | None   |
| 8. Date of production/revision of this specification   | 17/09/2023                                       |
| 9. Aims of the Program   |  |
| <ul style="list-style-type: none"><li>• Prepare the students to engage theoretically and practically in Electrical Power and Machines Engineering profession in public and private sectors including, but not limited to, relevant governmental sectors, consulting firms, contracting companies, marketing and real estate investments.</li><li>• Prepare the students to Engage in ongoing professional development activities by pursuing graduate studies and/or other learning opportunities to respond to the arising challenges.</li><li>• Advance in responsibility and leadership in their careers and compete with their peers according to the profession ethics.</li><li>• Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically.</li><li>• Promote students with the necessary skills administration, time management, team-work, communication and language skills, soft computing and programming skills.</li></ul> |  |

- Providing students with scientific, practical and personal skills that enable them to solve practical problems and deal with them using scientific concepts.

## 10. Learning Outcomes, Teaching, Learning and Assessment Methods

- A 1- Acquiring knowledge of mathematics, computers, engineering and customary sciences, employing them and preparing the student for scientific research.
- A 2- The ability to diagnose engineering problems within the jurisdiction and know their causes and appropriate solutions.
- A 3- To familiarize students with the basic theories of power engineering, machines, electrical machines, power plants, and various industrial applications and applications.
- A4 - The student will be familiar with the basics of communication and control systems, electronics, digital technologies and their applications.
- A 5 - Knowledge of projects and leadership of work groups within the ethics of the profession and the principles of engineering economics.

### B. The skills goals special to the program.

- B1 - Empowering students with the basics of working on power systems, electromagnetic fields, high pressure, and skills of analysis and design programs for electrical networks.
- B2 - Skills of analyzing and designing electrical networks for transmission and distribution and designs of building networks, as well as enabling students to obtain knowledge of the practical framework in the field of energy types, energy transmission and distribution, operation and control.
- B3 - Enable students to obtain knowledge and understanding of conventional electric power generation, renewable energy of all kinds, and thermal power plants.
- B4 - Enabling students to obtain knowledge and understanding of fault diagnosis, protection and maintenance of devices and applications of machines, equipment and electric drivers.
- B5 - Empowering the student to manage, lead, and economic engineering projects and organize time, while adhering to the ethics of the engineering profession in solving problems encountered in the workplace and developing the ability for continuous self-learning.

### Teaching and Learning Methods

- Studying the theoretical and practical academic program for the specialty lessons
- The theoretical program is taught using the smart board, whiteboard or data show connected to the personal computer, discussing ideas and facts with the students.
- Adopting the study through virtual electronic classes as an aid to the real classes.
- The practical program of specialization lessons is carried out by conducting laboratory or field experiments, collecting measurements by small groups of students, and analyzing, discussing and displaying the measurements.



|  |
|--|
| Assessment methods   |
| <ul style="list-style-type: none"> <li>• Daily exams with practical and scientific questions.</li> <li>• Participation marks for difficult competition questions among students.</li> <li>• Assigning grades to homework assignments and reports assigned to them.</li> <li>• Monthly exams for the curriculum in addition to the final exam.</li> </ul>   |
| <p>C. Affective and value goals</p> <p>C1- Enhancing the ability to work collectively through practical groups in the laboratory, mini-projects and discussion panels</p> <p>C2- Comparing, criticizing, checking and developing the ideas of the proposed designs and modern technologies, while respecting the efforts of others and avoiding scientific theft</p> <p>C3 - The ability to suggest alternatives to approach engineering problems in an honest and sustainable manner, taking into account human rights and the environment and avoiding pollution and accidents</p> |
| Teaching and Learning Methods  |
| <ul style="list-style-type: none"> <li>• Providing students with the basics, additional topics, and field experiences related to the outcomes of thinking and analysis.</li> <li>• Forming discussion circles during or outside lectures to discuss scientific engineering topics that require thinking and analysis.</li> <li>• Asking students, a set of thinking questions during lectures, such as (what, how, when, why) for specific topics.</li> <li>• Giving students homework and periodic reports.</li> </ul>  |
| Assessment methods   |
| <ul style="list-style-type: none"> <li>• Daily exams with practical and scientific questions.</li> <li>• Participation marks for difficult competition questions among students.</li> <li>• Assigning grades to homework assignments and reports assigned to them.</li> <li>• Semester exams for the curriculum in addition to the final exam.</li> </ul>  |

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1- Ability to work with others disciplined within one work team, presenting ideas and discussing them orally, in writing and electronically

D2 - A full awareness of the moral and practical responsibility for the work that the student will practice after graduation

D3 - The ability to understand and communicate in English within the technical level related to the field of competence and the use of related engineering software.

#### Teaching and Learning Methods

- Through the Daily lectures by seminar and discussions
- discussion circles during lectures to discuss scientific engineering topics that require thinking and analysis.
- Asking students, a set of thinking questions during lectures, such as (what, how, when, why) for specific topics

#### Assessment Methods

- Evaluating the seminar and reports that submitted by students and providing them with the necessary feedback to improve their skills and self confidence

### 11. Program Structure

| Course No. | Course Title                           | Cr. Hours | Weekly hours |          |           |  |  |
|------------|--|-----------|--------------|----------|-----------|--|--|
|            |  |           | Lec.         | Tut.     | Lab.      |  |  |
| EP101      | Digital Techniques I                   | 3         | 2            | -        | 2         |  |  |
| EP102      | Digital Techniques II                  | 3         | 2            | -        | 2         |  |  |
| EP103      | Electrical Engineering Fundamentals I  | 4         | 3            | 1        | 3         |  |  |
| EP104      | Electrical Engineering Fundamentals II | 4         | 3            | 1        | 3         |  |  |
| EP105      | Engineering Mechanics I (Statics)      | 2         | 2            | -        | -         |  |  |
| EP106      | Engineering Mechanics II (Dynamics)    | 2         | 2            | -        | -         |  |  |
| EP107      | Physical Electronics                   | 2         | 2            | -        | -         |  |  |
| EP108      | Entertainment & Culture Activity       | 0         | -            | -        | 1         |  |  |
|            | <b>TOTAL for 1<sup>st</sup> Year</b>   | <b>20</b> | <b>16</b>    | <b>2</b> | <b>11</b> |  |  |
| EP201      | Electronics I                          | 3         | 2            | -        | 2         |  |  |
| EP202      | Electronics II                         | 3         | 2            | -        | 2         |  |  |
| EP203      | Electric Circuits Analysis I           | 2         | 2            | 1        | -         |  |  |
| EP204      | Electric Circuits Analysis II          | 2         | 2            | 1        | -         |  |  |
| EP205      | Advanced Programming                   | 2         | 1            | -        | 2         |  |  |
| EP206      | Machines I (DC)                        | 3         | 2            | -        | 2         |  |  |
| EP207      | Machines (Transformer) II              | 3         | 2            | -        | 2         |  |  |
| EP208      | Electro-Magnetics I                    | 2         | 2            | 1        | -         |  |  |
| EP209      | Electro-Magnetics II                   | 2         | 2            | 1        | -         |  |  |
| EP210      | Thermodynamics                         | 2         | 2            | -        | -         |  |  |
| EP211      | Power Plants                           | 2         | 2            | -        | -         |  |  |
| EP212      | Software Eng. Application              | 2         | 1            | -        | 2         |  |  |

|       |                                      |            |            |           |           |  |
|-------|--------------------------------------|------------|------------|-----------|-----------|--|
| EP213 | Entertainment & Culture Activity     | 0          | -          | -         | 1         |  |
|       | <b>TOTAL for 2<sup>nd</sup> Year</b> | <b>28</b>  | <b>22</b>  | <b>4</b>  | <b>13</b> |  |
| EP301 | Electric Power Engineering I         | 3          | 2          | 1         | 2         |  |
| EP302 | Electric Power Engineering II        | 3          | 2          | 1         | 2         |  |
| EP303 | Measurement & Instruments            | 2          | 2          | -         | -         |  |
| EP304 | Electronic Systems and Signals       | 2          | 2          | 1         | -         |  |
| EP305 | Communication Systems                | 2          | 2          | -         | -         |  |
| EP306 | High Voltage Engineering             | 3          | 2          | -         | 2         |  |
| EP307 | AC-Machines I (Synchronous)          | 3          | 2          | 1         | 2         |  |
| EP308 | AC-Machines II (Induction)           | 3          | 2          | 1         | 2         |  |
| EP309 | Power Electronics I                  | 3          | 2          | -         | 2         |  |
| EP310 | Power Electronics II                 | 3          | 2          | -         | 2         |  |
| EP311 | Control Theory I                     | 3          | 2          | -         | 2         |  |
| EP312 | Control Theory II                    | 3          | 2          | -         | 2         |  |
| EP313 | Electric Power Generation            | 2          | 2          | -         | -         |  |
| EP314 | Microcontroller                      | 2          | 2          | -         | -         |  |
| EP315 | Engineering Analysis                 | 3          | 3          | -         | -         |  |
| EP316 | Engineering Numerical Methods        | 3          | 3          | -         | -         |  |
| EP317 | Entertainment & Culture Activity     | 0          | -          | -         | 1         |  |
|       | <b>TOTAL for 3<sup>rd</sup> Year</b> | <b>43</b>  | <b>34</b>  | <b>5</b>  | <b>19</b> |  |
| EP401 | Power System Analysis I              | 3          | 2          | -         | 2         |  |
| EP402 | Power System Analysis II             | 3          | 2          | -         | 2         |  |
| EP403 | Power System Protection              | 3          | 2          | -         | 2         |  |
| EP404 | Electric Power Distribution          | 2          | 2          | -         | -         |  |
| EP405 | Electrical Design & sustainability   | 2          | 2          | -         | -         |  |
| EP406 | Special Machines                     | 3          | 2          | -         | 2         |  |
| EP407 | Electrical Drives                    | 3          | 2          | -         | 2         |  |
| EP408 | Administration & Leadership skills   | 2          | 2          | -         | -         |  |
|       | <b>TOTAL for 4<sup>th</sup> Year</b> | <b>21</b>  | <b>16</b>  | <b>0</b>  | <b>10</b> |  |
|       | <b>TOTAL</b>                         | <b>112</b> | <b>88</b>  | <b>11</b> | <b>53</b> |  |
|       |                                      |            | <b>151</b> |           |           |  |

### 13. Personal Development Planning

It is planned to develop the students' personalities by holding discussion circles with them and asking them for periodic reports and seminars throughout the four stages and on various topics to develop their personal development.

### 14. Admission criteria .

According to the rules and regulations of Ministry of Higher Education and Scientific Research.

## 15. Key sources of information about the program

- College website.
- The department's website and contact the department by email.



# TEMPLATE FOR COURSE SPECIFICATION

## HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

### COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

|  |  |
|--|--|
| 1. Teaching Institution                              | University of Diyala   |
| 2. University Department/Centre                      | College of Engineering   |
| 3. Course title/code                                 | EP417 / <b>Grounding</b>   |
| 4. Modes of Attendance offered                       | Class Lectures   |
| 5. Semester/Year                                     | 2 <sup>nd</sup> Semester – Fourth Year   |
| 6. Number of hours tuition (total)                   | 60 hours   |
| 7. Date of production/revision of this specification | 17/09/2023   |
| 8. Aims of the Course                                | Study the basic principles of electronics and the most important theories used |
|  |  |
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9. Learning Outcomes, Teaching ,Learning and Assessment Methods

#### A- Cognitive goals .

A1- Teaching the reasons for the using grounding.

A2- Awareness of the harm of un grounding system and danger of it on human.

A3- Knowing the basic and common types of grounding system and how they work, and comparing their benefits and harms, if any.

A4- Enable students to obtain knowledge and understanding of the design of grounding for generating plant and all parts of power system.

A5 – Learn student's how measuring soil resistivity , their mathematical calculations, and the instruments used with them.

#### B. The skills goals special to the course.

B1 - The student learns modern skills of measuring soil resistivity

B2 - Providing them with skills to solve practical problems related to the course using measurement instrument to use it in practice.

B3- Acquiring the necessary skills to design system grounding for any part of power system.

B4- Acquire necessary skills to protect human and electrical equipment's from electric shock

#### Teaching and Learning Methods

1- The teacher gives comprehensive theoretical lectures

2- The teacher requests frequent reports on the basic topics of the subject.

3- Using engineering software to understand the interrelationship of system elements with each other.

4- Using some educational videos and practical visits to the sites of renewable energy plants

#### Assessment methods

- Daily discussion to determine the extent of students' understanding of the material and to evaluate the daily contributions.
- Daily exams with various short scientific questions to understand the extent of their understanding of the material.
- Giving part of the semester's grade to homework assignments.
- Daily exams (Quiz) and monthly exams for the curriculum and the final exam

#### C. Affective and value goals

C1- Urging the student to understand the purpose of studying the subject in general.

C2- Urging the student to understand the operation of each function or code within the language.

C2- Urging the student to think about how to develop himself in the field of computers.

C4- Making the student able to deal with the calculator and how to use the programs.

#### Teaching and Learning Methods

- Providing students with the basics, additional topics, and field experiences related to the outcomes of thinking and analysis.
- Forming discussion circles during or outside lectures to discuss scientific engineering topics that require thinking and analysis.

- Asking students, a set of thinking questions during lectures, such as (what, how, when, why) for specific topics.

#### Assessment methods

- Daily exams with practical and scientific questions.
- Participation marks for difficult competition questions among students.
- Assigning grades to homework assignments and reports assigned to them.
- Semester exams for the curriculum in addition to the final exam.



D. General and rehabilitative transferred skills (other skills relevant to employability and personal development)

D 1- The skill of speaking in English within the specialty

D 2- The skill of using engineering software

D3- Awareness of the effects of the electric power system on humans, the environment, and sustainable alternatives

## 10. Course Structure

| Week                                      | Hours | ILOs   | Unit/Module or Topic Title  | Teaching Method  | Assessment Method                             |
|---|-------|--|---|------------------|---|
| 1 <sup>st</sup> and 2 <sup>nd</sup> weeks | 4     | To know the needing for neutral and neutral grounding..  | Introduction : Grounding concept, need for neutral and neutral grounding.                   | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 3 <sup>rd</sup> and 4 <sup>th</sup> weeks | 4     | Learn about Isolated and solidly grounded systems, resistance and reactance grounding, Peterson's coil grounding. Grounding of different neutral points in power systems.. | Neutral Point Grounding : types of grounding  | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 5 <sup>th</sup> and 6 <sup>th</sup> weeks | 4     | The student learns about Grounding electrodes, resistance of grounding rods.   | Grounding electrodes, resistance of grounding rods.   | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 7 <sup>th</sup> and 8 <sup>th</sup>       | 4     | Learn student's how measuring soil resistivity , their mathematical calculations, and the instruments used with them.  | Mathematical calculation of grounding resistance  | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 9 <sup>th</sup>                           | 2     | Learn about step and touch voltage   | Calculation of touch and step voltages. Touch and step voltages according to specifications | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 10 <sup>th</sup> and                      |       | Learn about step   | Calculation   | Lectures+        | Weekly & monthly                              |

|                                       |   |   |   |                  |   |
|---------------------------------------|---|---|---|------------------|---|
| 11 <sup>th</sup>                      | 4 | and touch voltage   | of touch and step voltages. Touch and step voltages according to specifications                           | videos           | tests+ assignments+ seminars                  |
| 12 <sup>th</sup> and 13 <sup>th</sup> | 4 | Awareness of the harm of ungrounding system and danger of it on human   | need for neutral and neutral grounding  | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |
| 14 <sup>th</sup> and 15 <sup>th</sup> | 4 | The student gets to know Practical Grounding Systems in Iraq: Grounding of 11/0.4 kV and 33/11 kV systems. Experience & problems. | Practical Grounding Systems in Iraq : Grounding of 11/0.4 kV and 33/11 kV systems. Experience & problems. | Lectures+ videos | Weekly & monthly tests+ assignments+ seminars |

|  |   |
|--|---|
| 11. Infrastructure   |   |
| 1. Books Required reading:   | Jinliang He, Rong Zeng. (2013). “methodology and technology for power system grounding ‘ IEEE Grean book. (2007). “Grounding of Industrial and Commercial Power Systems |
| 2. Main references (sources)   | Principles of power system V. K. Mehta.   |
| A- Recommended books and references (scientific journals, reports...).   | Any highly reputation international and local books, journal, or scientific magazine  |
| B-Electronic references, Internet sites...   | Recent webpages to updating the trends in technologies relevant to renewable energy   |
| 12. The development of the curriculum plan   |   |
| The Development of the curriculum consists of various practical examples of using diodes in daily used devices and gadgets |   |

