*Republic of Iraq*

*Ministry of Higher Education & Scientific Research Supervision and Scientific Evaluation Directorate Quality Assurance and Academic Accreditation International Accreditation Dept.*

Academic Program Specification Form for The Academic

*University: Diyala*

*College: Engineering*

*Number Of Departments in The College: 01*

*Date Of Form Completion :17/9/2023*

Prof. Dr. Anees A. Khadom

The Dean

Date :17/9/2023

Signature

Assist. prof. Dr. Jabbar Q. Jabbar

Dean ’s Assistant for Scientific Affairs

Date :17/9/2023 Signature

Assist. prof. Dr. Salah N Farhan

The College Quality Assurance and University Performance Manager

Date :17/9/2023 Signature

Quality Assurance And University Performance Manager Date : / /

Signature

# TEMPLATE FOR PROGRAMME SPECIFICATION

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**PROGRAMME SPECIFICATION**

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| 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. |

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| 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 | |
| * 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. | |
| * 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. | |
| * Advance in responsibility and leadership in their careers and compete with their peers according to the profession ethics. | |
| * Promote students with the necessary scientific and practical skills in the discipline for solving engineering problems and treating them logically and scientifically. | |
| * Promote students with the necessary skills administration, time management, team-work, communication and language skills, soft computing and programming skills. | |
| * Providing students with scientific, practical and personal skills that enable them to solve practical problems and deal with them using scientific concepts. | |

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| 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. |
| 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. |
| 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 |
| * 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. * Monthly exams for the curriculum in addition to the final exam. |
| C. Affective and value goals  C1- Enhancing the ability to work collectively through practical groups in the laboratory, mini-projects and discussion panels  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  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 |
| 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. * Giving students homework and periodic reports. |
| 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. |

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| 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*** |  | |  | ***TOTAL for 1st Year*** | ***20*** | ***16*** | ***2*** | ***11*** |  | | ***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*** |  | |  | ***TOTAL for 2nd Year*** | ***28*** | ***22*** | ***4*** | ***13*** |  | | ***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*** |  | |  | ***TOTAL for 3rd Year*** | ***43*** | ***34*** | ***5*** | ***19*** |  | | ***EP401*** | ***Power System Analysis 1*** | ***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*** | ***-*** | ***-*** |  | |  | ***TOTAL for 4th Year*** | ***21*** | ***16*** | ***0*** | ***10*** |  | | ***TOTAL*** | | ***112*** | ***88*** | ***11*** | ***53*** |  | | **151** | | |  |   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. |

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| Year / Level | Course Code | Course Title | Core (C)  Title or Option (O**)** | Knowledge and understanding | | | | Subject-specific skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | | |
| **A1** | **A2** | **A3** | **A4** | **B1** | **B2** | **B3** | **B4** | **C1** | **C2** | **C3** | **D1** | **D2** | | **D3** |
| 3rd Year-1st Semester | **PE 309** | **Power Electronics I** | o | √ | √ | √ | √ | √ | √ | √ | √ |  | √ | √ | √ | √ | | √ |
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# TEMPLATE FOR COURSE SPECIFICATION

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| HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW |

**COURSE SPECIFICATION**

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| 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. |

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| 1. Teaching Institution | University of Diyala |
| 2. University Department/Centre | College of Engineering |
| 3. Course title/code | PE 309 / Power Electronics I |
| 4. Modes of Attendance offered | Class Lectures |
| 5. Semester/Year | 1st Semester – 2ndYear |
| 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 Methode |

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| A- Cognitive goals .  A1- During the school year, the student learns the basics of electronics.  A2- Understanding the basics of semiconductors.  A3- Learn how to think about how a diode works and its applications.  A4- The student learns other types of diodes and applications of zener diodes |
| B. The skills goals special to the course.  B1 - Learn how to deal with power diodes and applications of diodes.  B2- Learn about the types of power Electronics Devices .  B3- Familiarity with the basic concepts of the types of conductive, semiconductor, and insulator materials.  B4- Familiarity with how the thyristor works and its applications |
| Teaching and Learning Methods |
| * The lecturer prepares lectures on the subject in paper and electronic form and presents them to the students. * The lecturer delivers lectures in detail. * The lecturer requests periodic reports and homework assignments on the basic topics of the subject. |
| 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. |

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| D. General and rehabilitative transferred skills(other skills relevant to employability and personal development)  D1- Enabling students to write reports on topics related to electronics.  D2- Enabling students to know how to use the Internet to obtain important information.  D3- Raising the student’s self-confidence by linking theoretical material to practical reality.  D4- Developing students’ skills in how to deal with computer hardware and software problems and how to deal with them. |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1 to Week 3 | 6 | The student learns an introduction to the types of materials | Semiconductor Materials ,PN Junction  Forward biased, reverse biased | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 4 to Week 7 | 8 | The student learns the characteristics of the diode, drawing the load line, and the different types of diodes | I-V relationship  Diodes: models  circuit analysis | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 8 to Week 13 | 12 | Learn the details of diode applications | Diode Applications:  rectifiers and others) Zener Diode | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 14 to Week 15 | 4 | Learn how a Transistors works and its applications | Transistors:  Bipolar Junction Transistors(BJTs),.  DC Biasing Circuits of BJTs  BJT modeling | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |

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| 11. Infrastructure | | |
| 1. Books Required reading: | | Robert L. Boylestad and Louis Nashelsky*, Electronic Devices and Circuit Theory*, 7th or 10th or 11th Edition. |
| 2. Main references (sources) | | 1- electronic devices and circuit theory; By Robert L.Boylestad  2- electronic circuit; By By Dr. R.S. Sedha |
| A- Recommended books and references (scientific journals, reports…). | | * المدونات العالمية وخاصة البرطانية BS-Stdوالأمريكية IEEE, ANSIوالألمانية VDE |
| B-Electronic references, Internet sites… | | Any other materials available on the web. |
| 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 | |

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