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

University of Diyala

College of engineering

Department of Electronic Engineering



**Academic Program and Course Description Guide**

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**Introduction:**



**Concepts and terminology:**



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# TEMPLATE FOR PROGRAMME SPECIFICATION

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| 1. vision |
| The basic vision of the Department of Electronic Engineering is to make the department one of the leading engineering departments in the field of contemporary scientific and technological development. Therefore, the department strives to develop modern scientific curricula in the field of electronic engineering, in addition to completing all requirements for the department’s laboratories. And improving the teaching staff, to provide society with engineering cadres capable of contributing to technological growth. |

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| 1. mission |
| The department offers a high level of knowledge in the field of electronic engineering and its various applications by integrating theoretical knowledge with practical experience. The department strives to advance the process of scientific, engineering and technological research, and to encourage research creativity. The department also provides valuable information to students in their field of specialization, which makes their thinking and ability to solve various technological and scientific problems and meet the needs of society, whether at the public or private sector level, serve our dear country. |

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| 1. Aims of the Program |
| * Train specialized engineers in the field of electronic engineering, with a focus on professional ethics, and prepare them to be distinguished scientifically and practically. |
| * The department supports scientific research to advance knowledge and technology in the field of electronic engineering and its applications. |
| * The department provides a comprehensive training program to equip graduate students with the basic skills needed to be fully prepared to work in community institutions. |
| * Collaborating with all scientific and industrial entities to enhance the engineering education process at the college and elevate its global ranking. |

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| 1. Programmatic accreditation |
| N/A |

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| 1. Other external Supports |
| N/A |

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| 1. Program Structure | | | | |
| Notes | Percentage Notes | of Courses Study | Number of Courses Study | Program Structure |
| متطلبات المؤسسة | 3.9 | 6 | 5 | Institution requirements |
| متطلبات الكلية | 18.7 | 29 | 9 | College requirements |
| متطلبات القسم | 77.4 | 120 | 49 | Requirements of Section |
| There is a summer course | يوجد |  |  | Summer Training |

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| 1. Program Structure | | | | 12. Awards and Credits |
| Level/Year | Course or Module  Code | Course or Module Title | Credit rating |
| 1st Year-1st Semester | E 101 | Mathematics 1 | 6 | Bachelor Degree Requires ( 155) credits |
| 1st Year-1st Semester | EE 101 | Electrical Engineering Fundamentals 1 | 8 |
| 1st Year-1st Semester | EE 107 | Electronic Physics | 6 |  |
| 1st Year-1st Semester | EE 106 | Engineering Drawing | 4 |
| 1st Year-1st Semester | U 103 | Computer Skills | 4 |
| 1st Year-1st Semester | U 104 | English Language | 2 |
| 1st Year-2nd Semester | E 102 | Mathematics 2 | 6 |  |
| 1st Year-2nd Semester | EE 102 | Electrical Engineering Fundamentals 2 | 8 |  |
| 1st Year-2nd Semester | EE 103 | Digital techniques | 7 |  |
| 1st Year-2nd Semester | EE 105 | C++ Programming | 4 |  |
| 1st Year-2nd Semester | EE 104 | Workshops skills | 3 |  |
| 1st Year-2nd Semester | U 101 | Human Rights and Democracy | 2 |  |
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| 2nd Year-1st Semester | E201 | Advance Mathematics –I | 3 |  |
| 2nd Year-1st Semester | EE 201 | Electronics I | 2 |  |
| 2nd Year-1st Semester | EE 203 | Electric Circuits Analysis I | 2 |  |
| 2nd Year-1st Semester | EE 205 | Advanced Programming | 1 |  |
| 2nd Year-1st Semester | EE 208 | Electro-Magnetics I | 2 |  |
| 2nd Year-1st Semester | EE 210 | Digital Electronic I | 2 |  |
| 2nd Year-1st Semester | EE 206 | Machines (DC) | 2 |  |
| 2nd Year-2nd Semester | E202 | Advance Mathematics- II | 3 |  |
| 2nd Year-2nd Semester | EE 202 | Electronics II | 3 |  |
| 2nd Year-2nd Semester | EE 204 | Electric Circuits Analysis II | 2 |  |
| 2nd Year-2nd Semester | EE 212 | Measurement &Instruments | 2 |  |
| 2nd Year-2nd Semester | EE 209 | Electro-Magnetics II | 2 |  |
| 2nd Year-2nd Semester | EE 211 | Digital Electronic II | 3 |  |
| 2nd Year-2nd Semester | EE 207 | Power and AC Machines | 4 |  |
| 2nd Year-2nd Semester | EE 213 | University Culture Activity | - |  |
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| 3rd Year-1st Semester | EE 301 | Digital Signal Processing I | 2 |  |
| 3rd Year-1st Semester | EE 309 | Advanced Electronics I | 3 |  |
| 3rd Year-1st Semester | EE 303 | Communication Systems I | 3 |  |
| 3rd Year-1st Semester | EE 305 | Microprocessor and Microcontroller: Hardware | 3 |  |
| 3rd Year-1st Semester | EE 307 | Engineering Analysis I | 2 |  |
| 3rd Year-1st Semester | EE 311 | Antenna | 3 |  |
| 3rd Year-2nd Semester | EE 312 | Engineering Administration | 2 |  |
| 3rd Year-2nd Semester | EE 302 | Digital Signal Processing II | 3 |  |
| 3rd Year-2nd Semester | EE 310 | Advanced Electronics II | 3 |  |
| 3rd Year-2nd Semester | EE 304 | Communication Systems II | 3 |  |
| 3rd Year-2nd Semester | EE 306 | Microprocessor-Based System: Programming | 2 |  |
| 3rd Year-2nd Semester | EE 308 | Engineering Analysis II | 2 |  |
| 3rd Year-2nd Semester | EE 313 | Optoelectronics | 2 |  |
|  |  |  |  |  |
| Fourth Year-1st Semester | EE 401 | Microelectronic I | 2 |  |
| Fourth Year-1st Semester | EE 403 | Power Electronics I | 3 |  |
| Fourth Year-1st Semester | EE405 | Control System I | 3 |  |
| Fourth Year-1st Semester | EE407 | Digital System Design | 3 |  |
| Fourth Year-1st Semester | EE 409 | Information Theory | 3 |  |
| Fourth Year-1st Semester | EE411 | Hardware Description Language (HDL ) Programming | 3 |  |
| Fourth Year-2nd Semester | EE 413 | Introduction to AI | 2 |  |
| Fourth Year-2nd Semester | E402 | Eng. Graduation Project I | 2 |  |
| Fourth Year-2nd Semester | EE402 | Microelectronic II | 2 |  |
| Fourth Year-2nd Semester | EE404 | Power Electronics II | 3 |  |
| Fourth Year-2nd Semester | EE406 | Control System II | 3 |  |
| Fourth Year-2nd Semester | EE408 | Advanced Digital System Design | 3 |  |
| Fourth Year-2nd Semester | EE410 | Microwave | 2 |  |
| Fourth Year-2nd Semester | E401 | Engineering Profession Ethics | 2 |  |
| Fourth Year-2nd Semester | EE412 | Digital Image Processing | 2 |  |
| Fourth Year-2nd Semester | E403 | Eng. Graduation Project II | 2 |  |

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| 1. Learning Outcomes, Teaching, Learning and Assessment Methods |
| 1. Cognitive goals   A1- The ability to have knowledge in the fields of mathematics and specialized sciences Engineering expertise in the application of electronic engineering.  A2 Preparing the student to continue self-learning and acquire technology And new skills in the field of electronic engineering.  A3- Enabling students to obtain knowledge and understanding of designing and implementing various electronic systems.  A4- The student will understand the foundations of creating, programming, and simulating electronic circuits in hardware languages and various engineering programs.  A5- Enabling the student to visualize project management and solve the problems he encounters in the factory. |
| B. The skills goals special to the program.  B1 - The ability to select and perform the required examinations and collect their locations. Review and analyze the results of the relevant tests.  B2 The ability to design and supervise the implementation of relevant systems In electronic engineering.  B3 The ability to derive and approach engineering problems in a Recognize and determine the appropriate method to address the emerging engineering problems. This.  B4 - Provides them with skills to solve practical problems related to various electronic systems and computer programs for those systems. |
| C. Affective and value goals  C1- Questioning: Searching for a new information and raising questions.  C 2 Inference and deduction: thinking about what is beyond the known available to fill the gaps in it  C 3 Comparison: Noticing the proportions and differences between things  C 4- Classification: Placing things into groups according to common characteristics. |
| 1. 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. |
| 1. 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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| 1. Academic staff | | | |
| Number of teaching staff | | **Specialization** | **Scientific degree** |
| 1 | Electronic and communication | | Prof |
| 5 | Electronic | | Asst. Prof |
| 1 | Control | | Asst. Prof |
| 5 | Electronic and communication | | Lect. |
| 3 | Electronic | | Lect. |
| 1 | communication | | Lect. |
| 1 | Power | | Lect. |
| 5 | Electronic and communication | | Asst. LECT |

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| 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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| **Curriculum Skills Map** | | | | | | | | | | | | | | | | | | | | | |
| **please tick in the relevant boxes where individual Program Learning Outcomes are being assessed** | | | | | | | | | | | | | | | | | | | | | |
|  | | | | **Program Learning Outcomes** | | | | | | | | | | | | | | | | | |
| Year / Level | Course Code | Course Title | Core (C)  Title or Option (O**)** | Knowledge and understanding | | | | | Subject-specific skills | | | | Thinking Skills | | | | General and Transferable Skills (or) Other skills relevant to employability and personal development | | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **C1** | **C2** | **C3** | **C4** | **D1** | **D2** | **D3** | **D4** | **D5** |
| 2ndYear-2nd Semester | **EE 209** | Electro-Magnetic II | C | √ | √ |  |  |  | √ |  | √ | √ | √ | √ | √ | √ |  |  | √ |  | √ |
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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 program specification. |

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| 1. Course Title | Electro-Magnetic II |
| 2. Course code | EE 209 |
| 3. Semester/Year | 2nd Semester – 2nd Year |
| 4. Date of production/revision of this specification | March 2024 |
| 5. Modes of Attendance offered | Class Lectures |
| 6. Number of Credit Hours (Total) / Number of Units (Total) | 30 hours/2 units |
| 7. Course administrator's name (mention all, if more than one name) | Hanan Badeea Ahmed  hananbadeea79@uodiyala.edu.iq |
| 8. Aims of the Course | |
| The topic of electromagnetic theory in the second course aims to teach the student the concept of voltage and the potential difference on a charge or a system of charges and the potential field, as well as the relationship between voltage and electric field and methods of extracting them mathematically, in addition to getting to know the concepts of the electric duo and electric flux and learning their laws and methods of extracting them. In this course, the student also learns about the types of materials such as conductors, insulators, and semiconductors, as well as the types of currents and their densities that pass through the three types of materials. The student also learns about the concept of electrical polarization. The student also learns about the concept of insulators and its direct relationship to electrical capacitance and the energy stored in them, the operation of capacitors and methods of connecting them. Finally, the concept of magnetic flux and how it arises is learned, and the laws of Biot-Svart and Ampere are learned. Then we discuss the magnetic field and how to measure it on a strip of electric current, the density of the magnetic flux and its relationship to the magnetic field. The student also learns how to extract these concepts mathematically. | |

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| 9· Learning Outcomes, Teaching ,Learning and Assessment Method |

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| A- Cognitive goals.  A1- The student learns the concept of voltage, the potential difference on a charge or a system of charges, the potential field, as well as the relationship between voltage and the electric field and ways to extract them mathematically.  A2- The student learns the concepts of the electric duo and electric flux, their laws, and methods of extracting them.  A3- The student learns the types of materials, including conductors, insulators, and semiconductors, as well as identifying the types of currents and their densities that pass through the three types of materials. The student also learns the concept of electrical polarization.  A4- The student learns the concept of insulators and their direct relationship to electrical capacitance and the energy stored in them, the operation of capacitors and methods of connecting them.  A5- The student learns the concept of magnetic flux and how it arises, and learns about the laws of Biot-Svart and Ampere, the concept of the magnetic field, and how to measure it on a strip of electric current.  A6- The student learns the density of magnetic flux, its relationship to the magnetic field, and how to extract these concepts mathematically. |
| B. The skills goals special to the course.  B1 - Learn the concept of voltage and potential difference.  B2- Learn the concepts of the electric duo and electric flux and methods of analyzing them  B3- Learn the types of materials, including conductors, insulators, semiconductors, and electrical polarization  B4- Learn the concept of insulators, capacitance, and capacitances.  B5- Learn the concept of magnetic flux and the laws of Biot-Savart &amp;  B6- Learn the concept of magnetic field and how to measure it on a strip of electric current.  B7- Learn the concept of magnetic flux density and its relationship to the magnetic field |
| 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 make a profit from energy and potential.  C2- Urging the student to think about the importance of dealing with types of materials.  C3- Urging the student to think and understand electrical flux and relationship between E and V.  C4- Urging the student to think and understand the magnetic field and magnetic flux.  C5- Urging the student to learn and apply Biot-savart law and Amper law . |
| 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 electromagnetic theory.  D2- Enabling students to link theories to the practical reality of mathematical bases.  D3- Enabling students to self-develop after graduation. |

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| Week | Hours | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1-3 | 6 | Studying Potential difference, and potential field, Electric Dipole and Flux lines | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 4-6 | 6 | Conductors, Dielectrics, and Capacitance. Energy stored in a capacitor | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 7-9 | 6 | Introduction to Steady Magnetic Field, Biot-Savart law and Amper law. | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 10-14 | 10 | Magnetic Flux Density and the application of Amper law | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 15 | 2 | Discussion of course project of each student | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |

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| 11. Infrastructure | |
| 1. Books Required reading: | Electricity and Magnetism by Purcell |
| 2. Main references (sources) | • Lectures presented by the Lecturer  • Books available in the college library |
| A- Recommended books and references (scientific journals, reports…). |  |
| B-Electronic references, Internet sites… | Any other materials available on the web. |