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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 and Numerical 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 and Numerical Analysis II | 2 |  |
| 3rd Year-2nd Semester | EE 313 | Optoelectronics | 2 |  |
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| 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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| 1. 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. |
| 1. Admission criteria . |
| According to the rules and regulations of Ministry of Higher Education and Scientific Research. |
| 1. 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 Programme Learning Outcomes are being assessed** | | | | | | | | | | | | | | | | | | | |
|  | | | | **Programme 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** | **B1** | **B2** | **B3** | **B4** | **C1** | **C2** | **C3** | **C4** | **D1** | **D2** | **D3** | **D4** |
| 3rd Year-2nd Semester | **EE302** | **Digital Signal Processing 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 programme specification. |

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| 1. Course title | Digital Signal Processing II |
| 2. Course code | EE 302 |
| 3. Semester/Year | 2nd Semester – 3rd 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) | 45 hours /3 units |
| 7. Course administrator's name (mention all, if more than one name) | Tahreer Mahmood  tahreer\_mahmood\_eng@uodiyala.edu.iq |
| 8. Aims of the Course | |
| The Digital Signal Processing (DSP) course covers modern techniques in digital signal processing, which are considered essential in various diverse applications that are involved in electronic engineering and communications applications, and processing various signals digitally, such as processing and interpreting body signals, in addition to the basic role of this course in providing the capabilities of processing medical images through... Studying the characteristics of signals and methods of converting them from the analogue environment to the digital environment. | |

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

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| A- Cognitive goals.  A1-During the academic year, the student learns how to analyze the most important types of basic signals that are involved in the design of complex systems.  A2- Learn how to identify the characteristics of analogue and digital signals and study and convert between them.  A3- The student learns how to design digital filters in basic ways that will open horizons towards learning advanced complex methods.  A4- Understanding and interpreting mathematical relationships in different fields at the time domain and frequency domain levels.  A5- Using the MATLAB program to implement the mathematical relationships that are being studied to understand how to program them using a computer.  A6- Study of Z-transform and Z-inverse and how to use them to simplify the analysis of digital signals |
| B. The skills goals special to the course.  B1-Familiarity with the mathematical relationships that represent the Fourier transform  B2- Familiarity with the mathematical relationships that represent the Z-transform.  B3- Familiarity with various methods of analyzing digital signals.  B4- Summarizing the basic concepts of the characteristics of digital and analogue signals and how to analyze them.  B6- Familiarity with the basic methods for designing FIR and IIR filters manually and programmatically using the MATLAB program. |
| 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 |
| * The teacher delivers detailed theoretical lectures. * The teacher is familiar with the basic concepts of statistics and its practical applications, which enhances the method of learning and teaching. * The teacher introduces students to the most important components of digital signal processing, which are involved in many applications in our daily lives. |
| 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 digital signal processing.  D2- Enabling students to link theories to the practical reality of electrical circuits.  D3- Enabling students to pass professional tests organized by local or international bodies.  D4- Enabling students to continue self-development after graduation.  D5- Establishing special seminars for students for the purpose of self-development of their personalities |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1 | 3 | Definition of conversion method  z-transform | Discrete time system analysis using  Z-transform | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 2 | 3 | Different and study the ROC approach areas | Discrete time system analysis using Z-transform | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 3 | 3 | Study the application of the method  z-transform  Reverse | Inverse Z-transform | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 4 | 3 | Studying the effect of the locations of zeros and poles of digital systems | Pole –Zero plot and estimation of magnitude spectrums for systems | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 5 | 3 | Introduction to the types of digital filters, limited (FIR) and unlimited (IIR). | Digital Filters | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 6 | 3 | Studying methods for drawing and representing digital filters using Direct Form I and Direct Form II | Realization of digital filters | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 7 | 3 | An introduction to the design of the basic analogue filters | Analog Filter design | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 8 | 3 | Learn about the Butterworth method in designing basic analogue filters | Butterworth filter design (LPF, HPF, BPF, and BSF( | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 9 | 3 | Learn about the Chebyshev method in designing basic analogue filters | Chebyshev filter design (LPF, HPF, BPF, and BSF( | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 10 | 3 | Study of limited FIR digital filters | FIR Digital Filter Design | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 11 | 3 | Study of limited IIR digital filters | IIR Digital Filter Design | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 12 | 3 | Study of the associative transformation method in the design of infinite IIR filters | Bilinear Transformation Design Method | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 13 | 3 | Studying the method of designing unlimited FIR filters using Windows | Design of FIR filters using windows | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 14 | 2 | Characteristics of digital filters and their applications | Application of digital filters | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week15 | 2 | Introduction to methods for designing automatic adaptive filters and their applications | Introduction to adaptive filtering  And its application | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |

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| 11. Infrastructure | |
| 1. Books Required reading: | 1. Digital Signal Processing: principles, algorithms, and applications, third edition, by John G. Proakis and Dimitris G. Manolakis. 2. Digital Signal Processing, fundamentals and applications, 2008, by Li Tan. |
| 2. Main references (sources) | • Lectures presented by the Lecturer  • Books available in the college library |
| A- Recommended books and references (scientific journals, reports…). | All solid scientific journals that are related to the broad concept of engineering analyses. |
| B-Electronic references, Internet sites… | 1. Mathematics for Engineers and Applied Scientists, 2nd edition, by Stanley. 2. Introductory Digital Signal Processing, 2nd edition by P. A. Lynn. |
| 12. The development of the curriculum plan | |
| Adding vocabulary to the curriculum within the development of the course and at a rate not exceeding 10% . It is absolutely necessary to provide a laboratory for the subject because of its importance in deepening the understanding of the aforementioned vocabulary | |