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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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| 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 Programmed Learning Outcomes are being assessed** | | | | | | | | | | | | | | | | |
|  | | | | **Programmed Learning Outcomes** | | | | | | | | | | | | |
| Year / Level | Course Code | Course Title | Core (C)  Title or Option (O**)** | Knowledge and understanding | | | | | Subject-specific skills | | | | Thinking Skills | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **B1** | **B2** | **B3** | **B4** | **C1** | **C2** | **C3** | **C4** |
| 4th Year-2nd Semester | **EE 408** | Advanced Digital system design | 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 programmed specification. |

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| 1. Course title | Advanced Digital system design | |
| 2. Course code | EE 408 | |
| 3. Semester/Year | 2nd Semester – 4th Year | |
| 4. Date of production/revision of this specification | April 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) | Qahtan K. Omran  qahtan@uodiyala.edu.iq | |
| 8. Aims of the Course | | |
| The Digital System Designs course aims to teach the student methods for designing synchronous and asynchronous digital systems and methods for implementing them using digital gates and programmed digital arrays. In addition to qualifying the student to be a designer of advanced digital systems by developing his engineering sense, starting with the process of building the idea, passing through learning the necessary steps for design, and ending with the final examination of the designed system.. | | |
| 1. Cognitive goals.   A1- Knowing the basic components of various digital systems, the mathematical model, and methods of analyzing them.  A2- During the academic year, the student learns methods for designing synchronous and asynchronous digital systems.  A3- Learn and understand the types of programmed digital arrays and ways to use them in implementing digital systems.  A4- Learn to exploit the scientific resources acquired during the academic years and employ them in analyzing and designing digital systems | | |
| B. The skills goals special to the course.  B1 - Familiarity with the mathematical models required to design synchronous and asynchronous digital systems.  B2- Familiarity with how to draw a flow chart for the digital system.  B3- Familiarity with the design steps that must be followed for the purpose of converting the flow chart into a digital electronic system.  B4- Familiarity with how to implement digital systems using different types of programmed digital arrays, as well as purifying the system from the problems of delay, racing, and hazard. | | |
| |  | | --- | | C. Affective and value goals  C1- Urging the student to understand the purpose of studying the subject in general.  C2- Urging the student to think about the importance of digital systems in facilitating contemporary life.  C3- Urging the student to think about the importance of the impact of digital systems on the development of scientific research methods.  C4- Urging the student to think and follow the rapid development of digital systems.  C5- Urging the student to think about how to develop himself in the field of digital system design. | | | |
| 9- 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. | | |

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| 10. Course Structure | | | | | |
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1 | 3 | Introduction to designing digital systems using the ASM algorithm | **Introduction of**  **Algorithm State Machine**  **( ASM ). -** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 2 | 3 | Structural construction of ASM flowchart | **Basic elements of ASM Chart: ASM Blocks.** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 3 | 3 | Draw the flow chart and convert it to the ASM equivalent chart | **State Diagram & Equivalent ASM chart.** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 4 | 3 | The process of binary encoding and creating the transition table | **State graph & State Assignments.** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 5 | 3 | Steps to draw the complete ASM diagram | **Derivation of ASM chart.** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 6 | 3 | Steps for advanced design of digital systems supported by a detailed comprehensive example: | **Design example**  **ADD Shift Multiplier** | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week  7,8 &9 | 3 | Steps for advanced design of digital systems supported by a detailed comprehensive example: the electronic dice game | Design procedure aided by complete design example: Dice Game | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 10 | 3 | Introduction to programmed digital arrays and types of memory | Programmable Logic Devices: Introduction  Types of ROMs | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week  11 &12 | 3 | Classification of SOPs and their internal structure. Implementation of SOP modifiers using different SOPs | PLDs classifications:  -programmable logic Array  -PLA ,PAL and GAL Structures  - Implementation of SOP expression | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 13&14 | 3 | Digital systems designed using a selected practical ASM algorithm  It is presented by the students and explained during the lecture | Selected Study case: ASM\_ Based Controller  Such as :  ATM, Smart traffic light  Automatic washing machine, Vending Machine, Elevator, and Arithmetic Circuits | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |
| Week 15 | 3 | Implementing digital systems using memory circuits  The various programmed digital matrices are supported by examples | Realization of ASM charts:  -ROM –based Realization  PLA & Flip Flop based Realization.  -Design Examples. | Lectures Notes  PDF  power point  Video | Daily exams + monthly exams |

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| 11. Infrastructure | |
| 1. Books Required reading: | Digital Design by Mano, M. Morris. |
| 2. Main references (sources) | 1-Charles H.Roth.Jr., “Fundamental of Logic Design”.  2-Douglas Lewin, “Design of Logic System”.  3-AE.A Al mani, “ Electronics Logic Systems”.  4-Clare,C.R., “Designing Logic System Using State Machines” |
| A- Recommended books and references (scientific journals, reports…). | All scientific books and journals related to the design of digital systems.   * Lectures presented by the Lecturer * Books available in the college library |
| B-Electronic references, Internet sites… | Any other materials available on the web. |
| 12. The development of the curriculum plan: Proposing to change the curriculum from semester to Bologna course contributes to developing the curriculum | |