*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: 02*
*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

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 | Electronic Engineering |
| 4. Title of Final Award | BSc in Electronic 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

- Preparing the student scientifically to work in the field of computer engineering
- Build and prepare the student psychologically to play his role as a reliable engineer in this field.
- Building students capable of competing with other engineers for job opportunities and obtaining the required seats to complete postgraduate studies.
- Ability to submit to external tests by local, regional or international bodies for the purpose of completing studies or appointment.
- Urging the student to be creative and think about specialization projects and keep pace with developments in this field.
- 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. Cognitive goals A1- Teaching the student the principles of how computers work and how to deal with computer algorithms.

A2- Enabling students to obtain knowledge and understanding in working on and designing electronic computers.

A3- Teaching the student the methods of forming computer parts and their interconnection.

A4- Enabling students to obtain knowledge and understanding of designing everything related to computer microprocessors.

A5- Enabling students to obtain knowledge and understanding of diagnosing faults and maintaining various computer devices.

A6- Teaching the student the foundations of solving programming problems, computer networks, and communications.

B. The skills goals special to the program.

B1 - Explanation of computer principles topics by specialists in the subject, with an emphasis on the use of mathematics as a basis for understanding and learning.

B2 - Providing them with skills to solve practical problems related to various computer systems and computer programs for addressing and solving technical problems in various fields of computerized work.

Teaching and Learning Methods

- Providing students with the basics and additional topics related to previous educational outcomes and skills to solve practical problems.
- Solving a group of practical examples by the academic staff.
- Students participate during the lecture in solving some practical problems.
- The department's scientific laboratories are monitored by the academic staff.

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- Enabling students to think and analyze topics related to the engineering framework, such as various logical circuits.

C2- Enabling students to think and analyze topics related to computer systems related to the engineering framework.

C3- Enabling students to think and analyze topics related to solving practical problems.

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.

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

D1- Enabling students to write reports and notes on various branches of computer engineering.

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.

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 | | | | 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 |
| | | | |
| 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 |

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|---|---|---|---|
| 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 |

| 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.<br>• The department's website and contact the department by email. |

| 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** |
| 4th Year-2nd Semester | **EE 410** | **Microwave** | C | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| | | | | | | | | | | | | | | | | | | | |
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# 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 | EE 410/ Microwave |
| 4. Modes of Attendance offered | Class Lectures |
| 5. Semester/Year | 2nd Semester – 4th Year |
| 6. Number of hours tuition (total) | 45 hours |
| 7. Date of production/revision of this specification | 17/09/2023 |
| 8. Aims of the Course | |
| The course aims to study and clarify the broad concept of accurate and theoretical wave engineering by introducing the student to the equivalent of the mentor and concepts of reflection and refraction and then enhancing the understanding of these concepts through an expanded explanation of the transmission line and the directive of the waveides of all kinds and then touching on effective and ineffective elements Active & Passive Elements used in accurate wave frequency networks and finally get to know the most important science recently in the field of accurate waves. | |

9· Learning Outcomes, Teaching ,Learning and Assessment Methode

A- Cognitive goals.

A1-During the first semester of the academic year, the student learns the concept of microwave engineering and the frequencies that operate in this range. Then he learns the wave equation, its reflection and refraction, and how to analyze this wave. He also learns transmission lines, in addition to learning the solution using... Smith Chart.

During the second semester, the student learns the following:

A2- Understanding and studying the Scattering Matrix and finding its elements to benefit from in analyzing microwave networks, in addition to the concept of Impedance Matching.

A3- Understanding and studying Active Elements, including Waveguides.

A4- The student learns the topic of Microwave Cavity Resonators.

A5 - Understanding and studying passive elements, including Microwave Couplers and Circulators.

A6- The student learns everything related to microwave transistors and diodes, such as Gunn diode, Tunnel diode, and others.

A7- The student learns the concept of klystron and magnetron and the purpose of their use.

B. The skills goals special to the course.

B1-Familiarity with mathematical derivations related to the subject of the plane wave equation, its reflection and refraction.

B2- Familiarity with the laws and calculations of transmission lines and learning to extract them from the Smith diagram.

B3- Familiarity with mathematical derivations and relationships related to the subject of load suitability and the S matrix.

B4- Familiarity with the mathematical derivations related to the topic of (Waveguides) and understanding how the wave is transmitted through them.

B5- Familiarity with derivations and mathematical relationships related to the topic (Cavity Resonators).

B6- Familiarity with the mathematical laws related to the subject of inert elements, the most important of which are duals.

B7- Familiarity with the method of using and the importance of diodes and microtransistors, in addition to their theoretical concept.

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 expand his understanding of cosmic phenomena and waves and linking them to the concept of the vector equation.

C2- Urging the student to think about the most important applications of TL in the field of communications and microwave transmission.

C3- Urging the student to think about the most important applications of Impedance Matching in the field of control, machinery and communications.

C4- Urging the student to think about the most important uses of vectors and oscillators in the field of electronic engineering and micro and digital communications.

C5- Urging the student to think about the importance of studying microwave engineering devices and components such as diodes and transistors.

C6- Urging the student to expand his thinking about the importance of using the Klystron and the Magnetron

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)

D1- Enabling students to write reports on topics related to physics.

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.

| 10. Course Structure | | | | | |
|---|---|---|---|---|---|
| Week | Hours | ILOs | Unit/Module or Topic Title | Teaching Method | Assessment Method |
| Week 1 | 3 | The teacher reviews everything related to electromagnetic theory | Electromagnetic Theory | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 2 | 3 | The teacher explains an introduction to microwave engineering | Microwave Engineering | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 3 | 3 | An introduction to transmission lines | Transmission Line Theory | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 4 | 3 | A detailed explanation of how to find transmission line constants and loads and solve problems | Transmission Line Theory | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 5 | 3 | An expanded explanation of the Scattering Matrixand uses of its elements | S-Parameters | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 6 | 3 | Understand and study the method of router transmission across routers with examples | Waveguides | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 7 | 3 | Explain the different types of vectors, which are rectangular, circular, and semicircular, with examples | Waveguides | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 8 | 3 | Understanding and studying the method of wave | Cavity Resonators | Lectures Notes PDF power point | Daily exams + monthly exams |

| | | | | | |
|---|---|---|---|---|---|
| | | transmission through oscillators and explaining their types | | Video | |
| Week 9 | 3 | Understanding and studying how duals work and their importance in transmitting microwaves | Microwave Directional Couplers | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 10 | 3 | Understanding and studying the way insulators work and their importance in the flow and transmission of microwaves | Design & Analysis of Ferromagnetic Components in Microwave | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 11 | 3 | The lecturer presents the types of diodes and micro transistors, their theoretical concept and applications | Microwave Diodes & Transistors | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 12 | 3 | Understand how microwave tubes and filters work and how to use them within the microwave network | Microwave Tubes & Filters | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 13 | 3 | Understanding and studying the mechanism of operation of amplifiers and microwave oscillators | Microwave Amplifiers & Oscillators | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 14 | 3 | Understanding and studying the mechanism of operation of the Klystron and Magnetron and the method of amplifying | Microwave Amplifiers & Oscillators | Lectures Notes PDF power point Video | Daily exams + monthly exams |
| Week 15 | 3 | Showcasing the | Applications of | Lectures Notes | Daily exams |

| | | | | | |
|---|---|---|---|---|---|
| | | latest scientific findings in microwave engineering applications, | Microwave Engineering | PDF<br>power point<br>Video | + monthly exams |

| 11. Infrastructure | |
|---|---|
| 1. Books Required reading: | 1. Samuel Liao “Microwave Devices and Circuits”.<br>2. David M. Pozar. “Microwave Engineering” Fourth Edition. |
| 2. Main references (sources) | • Lectures presented by the Lecturer<br>• Books available in the college library |
| A- Recommended books and references (scientific journals, reports…). | All solid scientific journals related to the broad and advanced concept of microwave engineering. |
| B-Electronic references, Internet sites… | All websites and electronics that have the course vocabulary |
| 12. The development of the curriculum plan | |
| It was suggested that there be a laboratory for the substance to conduct experiments on the substance | |