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

# Academic Program Description Form

# Electronics Engineering Department

# 2024-2025

**University Name**: **University of Nineveh**
**Faculty/Institute**: **College of Electronics Engineering**
**Scientific Department**: **Department of Electronics Engineering**
**Academic or Professional Program Name**: **Bachelor of Science in Electronics Engineering**
**Final Certificate Name**: **Bachelor of Science in Electronics Engineering**
**Academic System**: **Annual for third and fourth classes**
**Description Preparation Date**: **20-3-2025**
**File Completion Date**: **20-3-2025**

**Signature**:
**Head of Department Name**:
**Assistant Professor Harith Ahmed Mohammed**
**Date**:

**Signature**:
**Scientific Associate Name**:
**Assistant Professor Bilal Alaa El-Din Jabr**
**Date**:

**The file is checked by**:
**Department of Quality Assurance and University Performance**
**Date**:
**Signature**:

**Approval of the Dean**

## 1. Department Vision

Electronics Engineering should specialize in electronics engineering sciences and be distinguished by its engineering education and scientific research leading to the advancement of knowledge, the development of the profession, and serving the community through partnership with industries, engineering and service institutions, and the graduation of cadres to provide the community with highly qualified cadres.

## 2. Department Mission

1. Education : Providing specialized engineering educational programs with a precise specialization for undergraduate and graduate studies. Providing a distinguished and recognized educational environment so that its graduates have high professional experience and basic engineering education that enables them to contribute effectively to serving their community and raising the level and progress of their profession. All of this falls within the international standard specifications and is implemented by adopting the ABET quality system in the field of engineering education**.**
2. Research: Providing a high-level research environment so that its professors, researchers and students can conduct research in basic, applied and exploratory engineering fields and disseminate and apply available and new knowledge in a way that serves the community and the region and interacts with the world**.**
3. :Leadership Developing leadership capabilities for staff and students, and instilling self-learning, reflection, and deduction abilities in those who possess talent in the field of profession.
4. Community Service : Interacting with the community and engaging in the field of developing the country's industry and engineering institutions, which leads to the social and economic development of the country through consultations, continuous education, and

commitment to industrial problems as research to provide solutions for them.

## 3. Department Objectives

A. Graduation of engineers Specialists in the field of engineering sciences Electronics and its applications with high specifications, they have the ability to work in Public and private sector.

B. Effective contribution to the renaissance and progress of society through holding seminars, conferences and continuous education.

C. Producing solid applied scientific research in the field of electronic engineering for the purpose of solving industrial and service problems in society.

D. Strengthening the leadership aspect among members and graduates and instilling a spirit of cooperation among them

E. Granting postgraduate degrees in the department's various specializations with high specifications

F. Adopting the approach of updating the curricula and improving performance in activities and events to ensure achieving the desired goals of the department

**The goals of the Department of Electronic Engineering**

i. Graduating competent engineers in the field of electronic engineering who possess the ability to identify and analyze problems and develop effective solutions, while being skilled in the use of modern technologies.

ii. Preparing engineers capable of working collaboratively and professionally with specialists, decision-makers, and others within their professional environment.

iii. Preparing graduates for admission to graduate programs locally and internationally and for work in research centers.

iv. Preparing engineers who adhere to professional standards and ethical responsibilities in the practice of electronic engineering.

v. Effectively contributing to the advancement of society by holding seminars, conferences, and continuing education in the field of electronic engineering, while adopting a continuous improvement approach to all activities and programs.

| 4. Program Accreditation |
|---|
| None |

| 5. Other external influences |
|---|
| None |

## 6. Program Structure

| Program Structure | Number of Courses | Credit hours | Percentage | Reviews* |
|---|---|---|---|---|
| Institution Requirements | 4 | 12 | 7.8% | Basic |
| College Requirements | 8 | 36 | 23.4 | Basic |
| Department Requirements | 25 | 106 | 68.8 | Basic |
| Summer Training | Third class | | | |
| Other | | | | |

* This can include notes whether the course is basic or optional.

## 7. Program Description

| Year/Level | Course Code | Course Name | Credit Hours | |
|---|---|---|---|---|
| | | | theoretical | practical |
| First-Bologna Process | | | | |
| | | | | |
| Second - Bologna Process | | | | |
| | | | | |
| the third | EE3301 | Electronic II | 3 | - |
| the third | EE3201 | Digital Signal Processing | 3 | - |
| the third | EE3302 | Control Engineering | 3 | - |
| the third | EE3303 | Microprocessors | 3 | - |
| | EE3304A | Digital System Design I | | |
| the third | EE3304B | Digital System Design II | 3 | - |
| the third | EE3305 | Communications | 3 | - |
| the third | EE3306 | ELECTRONIC INSTRUMENTATION | 3 | - |
| the third | EE3307 | Laboratory | - | 6 |

| | | | | |
|---|---|---|---|---|
| Fourth | E E4301 | Industrial Electronic | 3 | - |
| Fourth | EE4302 | DATA TRANSMISSION& COMPUTER ETWORKS | 3 | - |
| Fourth | EE4303 | Microprocessor & Micro Controller | 3 | - |
| Fourth | EE4304 | Microelectronics | 3 | - |
| Fourth | EE4305 | Radiation | 3 | - |
| Fourth | EE4306 | Computer aided design | 3 | - |
| Fourth | EE4307 | Engineering Project | 1 | 3 |
| Fourth | EE408 | Laboratory | - | 6 |

## 8. Expected learning outcomes of the program

**Cognitive Objectives**

1. Graduate qualified engineers who have the knowledge in mathematics, logic and engineering sciences.

2. Graduate engineers who are able to design and conduct experiments as well as analyze the obtained results.

**Skill Objectives**

1. An ability to design and conduct appropriate experiments, analyze and interpret data, apply quality assurance principles.

2. An ability to communicate effectively, with diverse audiences and across various organizational and managerial levels.

**Affective and Value Objectives**

1. Graduate engineering who are able to recognize ethical and professional responsibilities in engineering situations, considering the economic, environmental, and societal impacts of engineering solutions.

2. Graduate engineering who are able to recognize the ongoing need for professional development and to effectively locate and apply relevant knowledge.

3. An ability to function effectively as a member or leader of a team, to set goals, plan and meet deadlines.

Adaptive Graduation

1. GO-1 An ability to distinguish, identify, define, formulate, and solve engineering problems by applying principles of engineering, science and mathematics.

2. GO-2 An ability to produce engineering designs that meet desired needs within certain constraints by applying both analysis and synthesis in the design process.

3. GO-3 An ability to create and carry out proper measurement and tests with quality assurance, analyze and interpret results, and utilize engineering judgment to make inferences.

4. GO-4 An ability to skillfully communicate orally with a gathering of people and in writing with various managerial levels.

5. GO-5 An ability to perceive ethical and professional responsibilities in engineering cases and make brilliant judgments taking into account the consequences in worldwide financial, ecological and societal considerations.

6. GO-6 An ability to perceive the continual necessity for professional knowledge growth and how to find, assess, assemble and apply it properly.

7. GO-7 An ability to work adequately on teams and to set up objectives, plan activities, meet due dates, and manage risk and uncertainty.

Affective and Value Objectives

1. Develop students' ability to perform assigned tasks and complete them on time with accuracy and dedication.

2. Develop scientific analytical thinking based on fundamental scientific and logical principles.

3. Enable students to engage in productive dialogue and discussion on issues related to their specialization. Encourage the exchange of views and provide space for others to express different perspectives on the issues raised.

## 9. Teaching and Learning Strategies

- Continuous follow-up of the academic program and all its activities.Form groups of students and involve them in solving a real problem and discussing the proposed solutions.
- Opening the door to dialogue on some issues and hearing different opinions aboutthe program and its continuous development.
- Focus on the nature of the problems addressed by graduation projects. For the past year, andemphasizeon the practical aspects of it, which give the student additional experience that will benefit him later in the field of work when employed.

## 10. Evaluation methods

- online.
- Submitting laboratory reports.
- Evaluation of the practical implementation of experiments.

- Providing various activities.
- Daily, quarterly, and final exams in person and online.

## 11.Faculty members

| T | Name | Title | General Specialty | Specific Specialty |
|---|---|---|---|---|
| 1 | Khaled Khalil Mohammed Jassim | Mr | Electrical Engineering | Electronics and communications |
| 2 | Qais Dhnoon, the star of Abdullah Al Ahmed Jassim | Mr | Physics | plasma |
| 3 | Ahmed Dhnoon Younis Hussein Al-Naqeeb | assistant professor | Electrical Engineering | Microelectronics |
| 4 | Mujahed Fahmy Ibrahim Ismail Al-Azzou | assistant professor | Electrical Engineering | communication |
| 5 | Ouss Zuhair Younis Suleiman | assistant professor | Computer Engineering | communication |
| 6 | Harith Ahmed Mohammed Ahmed Al-Badrani | assistant professor | Electrical Engineering | Power electronics |
| 7 | Ahmed Mohammed Ahmed Salama | assistant professor | Electrical Engineering | communication |
| 8 | Hisham Suwadi Hashim | assistant professor | PhD | date |
| 9 | Omar Badr Mohammed Khader Al Nuaimi | Teacher | Electrical Engineering | Microelectronics |
| 10 | Ihab Essam Daoud Suleiman Al-Rawji | Teacher | Computer Engineering | communication |
| 11 | Magic is necessary for Qudori Khader Al-Dulaimi | Teacher | Computer Engineering | Computer and information technology |
| 12 | Sarmed Fakhr El-Din Ismail Jassim Al-Mawla | Teacher | Computer Engineering | Digital image analysis and processing |
| 13 | Sinan Khaled Mohammed Hassan Shanshal | Teacher | Electrical Engineering | Electronics and communications |
| 14 | Nour Talal Mahmoud Aziz Kadawi | Teacher | Electrical Engineering | Electronics and communications |

| | | | | |
|---|---|---|---|---|
| 15 | Khaled Fazaa Mahmoud Mohammed | Teacher | Electrical Engineering | Electronics and communications |
| 16 | Imad Abdel Halim Abdo Ali Al Mulla Khader | Teacher | Electronic engineering | Electronic |
| 17 | Abdul Hamid Mohammed Jassim Mohammed Al-Jabouri | Teacher | Electronic engineering | Electronic |
| 18 | A whisper of Fawaz Dhnoon Mohammed Al-Raho | Teacher | Electrical Engineering | Solid state |
| 19 | Heba Abdel Khaleq Hamdoun Abdel Sawaf | Teacher | Electrical Engineering | Electronics and communications |
| 20 | Shawkat Mohammed Younis Mal Allah | Assistant Professor | Electrical Engineering | Power electronics |
| 21 | Zahraa Siddiq Yahya Ahmed Al-Sayegh | Assistant Professor | Electrical Engineering | Electronics and communications |
| 22 | Amna Idris Kanaan Suleiman Hayo | Assistant Professor | Electrical Engineering | Electronics and communications |
| 23 | Names of Nabil Khalil Omar | Assistant Professor | Computer Engineering | Computer and information technology |
| 24 | Mohamed Ibrahim Mohamed Ahmed | Assistant Professor | Electrical Engineering | Power electronics |
| 25 | Hamam Maher Abdul Shaheen Al-Hamdani | Assistant Professor | Electronic engineering | Electronic |
| 26 | Younis Saber Othman Khattab Al-Rifai | Assistant Professor | Computer Engineering | Calculators |
| 27 | Harith Hazem Dhnoon Younis | Assistant Professor | Electronic engineering | Electronic |
| 28 | Abdul Mohsen Ahmed Hussein Al-Shalawi expresses | Assistant Professor | Electrical Engineering | Electronic |
| 29 | Sinan Mahmoud Ayoub Mahmoud Al-Raho | Assistant Professor | Electronic engineering | Electronic |
| 30 | Mohammed Saleh Safar Rasool | Assistant Professor | Mechanical Engineering | Thermal engineering |
| 31 | Amer Talal Ali Ahmed | Assistant Professor | Electronic engineering | Computer and information technology |
| 32 | Hani Mohammed Saleh Salman | Assistant Professor | Mechanical Engineering | Thermal engineering |

| | | | | |
|---|---|---|---|---|
| 33 | Rasha Walid Hamad | Assistant Professor | Electrical Engineering | Electronics and communications |
| 34 | Omar Naguib Saadi | Assistant Professor | Electrical Engineering | Electronics and communications |
| 35 | Maysara Abdul Jabbar Qasim | Assistant Professor | Electrical Engineering | Power and machinery |
| 36 | Hisham Mohammed Mahmoud | Assistant Professor | Electrical Engineering | Power electronics |
| 37 | Hajar Khalil Ibrahim Ahmed | Assistant Professor | Electronic engineering | Electronics |
| 38 | Mohammed Saleh Safar Rasool | Assistant Professor | Mechanical Engineering | Thermal engineering |
| 39 | Star Obaid Dahwi | nothing | engineering | engineering |
| 40 | Tariq Hussein Khader | nothing | engineering | engineering |
| 41 | Marwa Essam Ahmed | nothing | engineering | engineering |
| 42 | Adel Ghazi Sharif | nothing | engineering | engineering |
| 43 | Mohammed Muwaffaq Hadi | nothing | engineering | engineering |
| 44 | Asaad Abdul Ghani Saleh | nothing | engineering | engineering |
| 45 | Yathrib Walid Qasim Khalil | nothing | engineering | engineering |
| 46 | Saif El-Din Kamal | nothing | engineering | engineering |
| 47 | Ammar Ahmed Abdullah | nothing | engineering | engineering |
| 48 | Pearl Hazem Fathallah | nothing | Management and Economics | Management and Economics |
| 49 | Idris Mohammed Younis Ahmed | nothing | institute | institute |

## 12.Acceptance Criterion

The admission plan for new students in the department's programs naturally follows the centralized admission plan of the Ministry of Higher Education and Scientific Research and is implemented by the university and college. It can be said that the students enrolled in the department's programs represent the top levels in terms of their grades among applicants to the College of Electronic Engineering, where the principle of differentiation is based on the preparatory school grade and the student's

desire to determine the study program within the programs of the College of Electronic Engineering. Therefore, the nature of the students accepted into the department's programs is that they are distinguished by their academic and intellectual levels and their contributions throughout the program.

## 13.The most important sources of information about the program

Detailed information about the department's programs can be obtained By visiting the official website of the University of Nineveh and browsing the website of the College of Electronics Engineering:
www.uoninevah.edu.iq

Self-evaluation report and annual department guide within the university and college guide .

## 14.Program Development Plan

The curriculum is updated annually according to the latest relevant scientific books and labor market requirements, in addition to using the international information network to view the curriculum items of the subject in other leading international universities in this field.

| Program Skills Outline | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Required program Learning outcomes | | | | | | | | | | | |
| Year/Level | Course Code | Course Name | Basic or optional | Knowledge | | | | Skills | | | | Ethics | | | |
| | | | | A1 | A2 | A3 | A4 | B1 | B2 | B3 | B4 | C1 | C2 | C3 | C4 |
| the first | NVEE206 | Mathematics I | Basic | * | * | * | * | * | | * | | * | * | * | * |
| | NVEE215 | DC Circuits Analysis | Basic | * | * | * | * | * | * | * | * | * | | * | * |
| | NVEE218 | Physical Electronics | Basic | * | * | * | | * | * | * | * | * | * | * | * |
| | NVEEELM111 | Computer science | Basic | * | * | * | * | * | * | * | * | * | * | * | |
| | NVEE203 | Mechanical engineering principles | Basic | * | | * | | * | * | * | * | * | * | * | |
| | NVU12 | Democracy and Human Rights | Basic | * | | | * | | | | | * | * | | * |
| | NVEE216 | AC Circuits Analysis | Basic | * | * | * | * | * | | * | * | * | * | * | * |
| | NVEE207 | Mathematics II | Basic | * | * | | * | * | * | | * | * | * | * | * |
| | NVEE219 | Physics Of Semiconductor | Basic | * | | * | * | * | * | * | * | | | * | * |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NVEE217 | Digital Techniques | Basic | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ |
| | NVEE201 | Engineering Drawing | Basic | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVU11 | English | Basic | ※ | ※ | | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ |
| | | | Basic | | | | | | | | | | | | |
| **/the second medical** | NVEE208 | Engineering Analysis I | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | |
| | NVEEELM211 | Signal Analysis | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ |
| | NVEEELM212 | Electronic I | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ | ※ |
| | NVEE223 | Digital design | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | |
| | NVEE215 | Electromagnetic fields I | Basic | ※ | ※ | | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ |
| | NVEEELM213 | Human Physiology | Basic | ※ | ※ | | ※ | ※ | | ※ | | ※ | | | ※ |
| | NVEE210 | signals and systems | Basic | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEE209 | Engineering Analysis II | Basic | ※ | ※ | ※ | ※ | | ※ | ※ | | ※ | ※ | ※ | |
| | NVEEELM221 | Electronic II | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NVEEELM222 | programming | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | |
| | NVEE221 | Electromagnetics FieldsII | Basic | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ | | ※ | |
| | NVU13 | The Crimes of the Defunt Baath Part | Basic | | ※ | ※ | | | ※ | ※ | | ※ | | ※ | |
| | | | | | | | | | | | | | | | | | |
| **Second/Industrial** | NVEE208 | Engineering Analysis I | Basic | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ | | ※ | |
| | NVEEELI212 | Electronic I | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEEELI213 | DC Machines | Basic | ※ | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | | ※ | |
| | NVEEELI214 | Computer Programming | Basic | ※ | ※ | ※ | | ※ | ※ | ※ | | ※ | ※ | ※ | ※ |
| | NVU13 | The crimes of the defunct Baath Party | Basic | | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | * |
| | NVEE221 | Fundamentals of Electromagnetics | Basic | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEE209 | Engineering Analysis II | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | |
| | NVEEELI222 | Electronics II | Basic | ※ | | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEEELI223 | AC Machines | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NVEEELI224 | Computer Languages | Basic | ※ | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEE223 | Digital Design | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | NVEE210 | Signals and Systems | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| **the third** | EE3301 | Electronic II | Basic | ※ | ※ | ※ | ※ | | ※ | ※ | | ※ | ※ | ※ | ※ |
| | EE3201 | Digital Signal Processing | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | EE3302 | Control Engineering | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | EE3303 | Microprocessors | Basic | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | EE3304 | DIGITAL SYSTEM DESIGN | Basic | ※ | | ※ | ※ | | | ※ | ※ | | ※ | ※ | ※ |
| | EE3305 | Communications | Basic | ※ | ※ | | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ |
| | EE3306 | ELECTRONIC INSTRUMENTATION | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ |
| | EE3307 | Laboratory | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | | ※ | ※ | ※ |
| | | | Basic | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Fourth** | EE4301 | Industrial Electronic | Basic | ※ | | ※ | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ |
| | EE4302 | DATA TRANSMISSION& COMPUTER ETWORKS | Basic | ※ | ※ | ※ | | ※ | ※ | ※ | | ※ | ※ | ※ | * |
| | EE4303 | Microprocessor & Micro Controller | Basic | ※ | | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | * |
| | EE4304 | Microelectronics | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | * |
| | EE405 | Microwave Engineering | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | * |
| | EE4306 | Computer aided design | Basic | ※ | ※ | ※ | ※ | | ※ | | ※ | ※ | ※ | ※ | ※ |
| | EE4201 | Engineering Project | Basic | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | ※ | * |
| | EE4307 | Laboratory | Basic | ※ | ※ | ※ | ※ | | ※ | ※ | ※ | ※ | ※ | ※ | * |

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation**

# Course description forms

# For the academic year 2024-2025

## Nineveh University

## College of Electronics Engineering

## Department of Electronics Engineering

## Courses Table For Third Class1.

| Electronic Engineering Deparatement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Undergraduate Third Class | | | | | | | | |
| Code | Subject | Hours/Week | | | | | | Units |
| | | First Term | | | Second Term | | | |
| | | Th | Pr. | Tut | Th | Pr | Tut | |
| EE3301 | Electronic – II | 2 | - | 1 | 2 | - | 1 | 4 |
| EE3201 | Digital Signal Processing | 2 | - | 1 | 2 | - | 1 | 4 |
| EE3302 | Control engineering | 3 | - | 1 | 3 | - | 1 | 6 |
| EE3303 | Microprocessor | 2 | - | 1 | 2 | - | 1 | 4 |
| EE3304A | Digital System Design I | 2 | - | 1 | | | | 2 |
| EE3304B | Digital System Design II | | | | 2 | - | 1 | 2 |
| EE3305 | Communication | 2 | - | 1 | 2 | - | 1 | 4 |
| EE3306 | Electronic Instrumentation | 2 | - | 1 | 2 | - | 1 | 4 |
| EE3307 | Laboratory | - | 6 | - | - | 6 | - | 4 |
| Total | | 15 | 6 | 7 | 15 | 6 | 7 | 34 |
| | | 28 | | | 28 | | | |

**Total Theoretical : 15 Hour/Week**

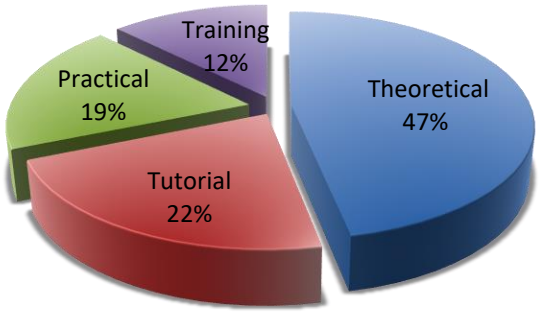
**Total Practical :6 Hour/Week**

**Total Summer Training 4 Hour/Week**

**Total Tutorial :7 Hour/Week**

**Total Units :34**

**Weekly classes categories for the department**




## Third Year

- **Course Number: EE3301**
- **Course Name: Electronics II**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** The electronics course covers the area of analog electronic circuit design: Non linear application of op-amp, Filter design theory and approximation, Active filter design, Waveform generator theory and classification, Power amplifier classification.

- **Course Number: EE3201**
- **Course Name: Digital signal processing**
- **Credit Hours: (4,3,0,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** This course covers the following topics: review of discrete signals and systems, discrete fourier series, dicsretefourier transform, convolution and correlation, discrete and fast fourier transform, z- transform,framework for digital filter design,realization of digital filter, finite impulse response digital filter design, infinite impulse response digital filter design

- **Course Number: EE3302**
- **Course Name: Control Eng.**
- **Credit Hours: (6,3,0,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:**This course covers the following topics: i-continuous control system (System representation, Time domain analysis, State space analysis, Stability of system, Frequency response analysis, Design of control system) II-DIGITAL CONTROL SYSTEM (Z-transform, Sampled data control system, Time response analysis, Stability of system).

- **Course Number: EE3303**
- **Course Name: Microprocessor I**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:**This course covers the following, Studying the 8086 microprocessor from software point of view, Studying the 8086 microprocessor from hardware point of view.

- **Course Number: EE3304A**
- **Course Name: Digital system design I**
- **Credit Hours: (2,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** This course covers the following topics: Standard buses, programmable logic devices, PLC.Inductive proximity sensors: ultrasonic, Optical , Basic Elements of PLC, PLC inputs and outputs interfaces, Ladder programming, PLC Instructions: Latching, Comparisons, Timers, Counters,Sequencers, Shift Registers

- **Course Number: EE3304B**
- **Course Name: Digital system design II**
- **Credit Hours: (2,2,1,0) ( Units, Theory, Tutorial, Practical)**
- Course Content:Programmable Logic Devices, GAL, SPLD, CPLD, OLMC, ISP, FPGA
- Introduction to VHDL, Modeling flip-flops using VHDL process, Compilation and simulation of VHDL code, Modeling a sequential machine,Variables, Signals and Constants, Arrays

- **Course Number: EE3305**
- **Course Name: Communication**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:**the course cover transmission lines, Analog input analog output schemes, Digital input analog output schemes, analog input digital output schemes, Digital input Digital output schemes.

- **Course Number:EE3306**
- **Course Name: Electronic Instrumentation**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** This course covers the following topics: instrumintation errors, transducers, signal conditioning, signal conversion, instrumentation amplifier, analog electronic instruments, digital instruments, and interface buses.

- **Course Number: EE3307**
- **Course Name: Laboratory**
- **Credit Hours: (4,0,0,6) ( Units, Theory, Tutorial, Practical)**

**Course Content:** The principle objective is to ensure that the student have the ability to integrate concepts and achieve the practical works for the different topics he attend in the theoretical classes. Each student should submit a written technical report for each experiment.

| University Of Ninevah |
|---|
| College of Electronics Engineering |
| Electronic Engineering Department |

| | | | | | |
|---|---|---|---|---|---|
| **Class** | **Third** | | | **Theory :** | **2Hrs/wk** |
| **Subject** | **Electronic II** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3301** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **OP-AMP Applications:** inverting, non-inverting amplifier, buffer, summing amplifier, difference amplifier, integrator and differentiator , comparator, sample and hold, zero crossing detector, peak detector, precision diode and fast rectifier, analog computation. | **12** |
| **Filters:** Filter approximations, passive RLC design, active filter design methods (ladder, and cascaded design technique). | **9** |
| **Oscillators :**BarkHausen´s criteria for oscillators ; Satiability concept Three pole amplifier ; Nyquist criteria ; Stabilizing networks ; frequency compensation and sinusoidal oscillator ; phase shift , Wien bridge , Colpitts , Hartley , Crystal and Tune circuit type oscillator (AF &RF Range ). | **9** |
| **Tuned Amplifier**: Introduction to single tuned amplifier ; G.B. response calculations & design ; Cascade amplifier ; Neutralization methods ; Synchronously tuned amplifier ; Elementary treatment of stagger tuned and doubly tuned amplifiers . | **9** |
| **Audio Frequency Linear Power Amplifiers:** Introduction to Class A, B, AB, a ,C operation , Class A – common –emitter power amplifier ; Transformer coupled amplifier ; Class push –pull power amplifier ; Amplifiers using complementary symmetry ; Class C amplifier . | **12** |
| **Comparators and Converters :** Zero crossing detector , Schmitt trigger , Comparator ,Voltage limiters and window detector , Clippers and clampers , Peak detector , introduction to A / D and D /A converters and sample and hold circuit . | **9** |
| **Multivibrators:**Astable, monostable, 555 timer, and bistable | **12** |
| **Integrated Circuits and Devices :** Introduction of IC families ; Fabrication Steps and evolving transistor , Diode and Resistor ; capacitors families. | **9** |
| **Specialized ICApplications** : phase locked loops , ICL 8038 function generator , Voltage Controlled Oscillator , XR 2240 programmable timer / counter . | **9** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1:** Integrated electronics by Milmann |
| **2:** Microelectronics by Milma |

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|---|---|---|---|---|---|
| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Digital Signal Processing** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3201** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Review of Discrete Signals and Systems** | **6** |
| **Discrete Fourier Series:** Spectra of periodic digital signals، Properties of series. | **9** |
| **Dicsrete Fourier Transform:** Properties، Frequency response of LTI systems**.** | **9** |
| **Convolution and Correlation** | **6** |
| **DISCRETE AND FAST FOURIER TRANSFORM** | **9** |
| **Z- Transform:** Review، Z-plane poles and zeros**.** | **9** |
| **Framework for Digital Filter Design** | **6** |
| **Finite Impulse Response Digital Filter Design:** window method، frequency sampling method، realization of FIR. | **12** |
| **Infinite Impulse Response Digital Filter Design:** Pole-zero method، Bilinear Z-transform، Realization of IIR**.** | **12** |
| **Applications of Filter Banks in DSP** | **12** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: " Digital Signal Processing**", By Emmanuel and Barrie |
| **2: "Digital Signal Processing with Computer Applications", John Wiley & Sons , 1997** By PAUL A. LYNN |

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| **Class** | **Third** | | | **Theory :** | **3 Hrs/wk** |
| **Subject** | **Control Engineering** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3201** | **Unit** | **6** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Introduction And Basic Definition:** Closed Loop And Open Loop, Control Systems | **3** |
| **Transfer Fonction**: Electrcal System; Mechanical System; Servo System. | **6** |
| **Block Diagram:** Block Diagram Reductioin Algebra. | **3** |
| **Signal Flow Graph:** Mason Gain Rule. | **6** |
| **Time Respnse:** Typical Test Signals &Types Of System; Steady StateErrors; Transient Responseof 1st and 2nd Order System. | **9** |
| **Stability Of Control System**: Routh-Hurwtiz Criterion: | **3** |
| **Root Locus Analysis:**Root Locus Plot;General Rules Of Constructing Root Loci; Root Locus Analysis Of Control Systems | **9** |
| **Frequency Response**: Introduction To Frequency Response. | **3** |
| **Bode Plot:** Bode Analysis; Rules For Sketching The Bode Plots;Phase And Gain Margines; Relative Stability. | **9** |
| **ContRol System Design By Frequency Response:** Proportional Gain Only; Lead Compensation; Lag Compensation. | **12** |
| **The PID Controller; Definition; Tuning By Ziegler-Nicholes Methods.** | **6** |
| **Digital Control Systems :**Z- Trans Form &Inrevse Z-Transfrom; PulseTransfer Function ; Open Loop And Closed Loop Responses Of Discrete-TimeSystems;Descretization Methods; Stability Test For Digital Control System (Jury's Test). | **15** |
| **State-Space Analyses:** State Equation; Solution Of State Equation;Controlabilityand Observability. | **6** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: "AUTOMATIC CONTROL SYSTEM"** ByB. KUO 2001 |
| **2: "MODERN CONTROL SYSTEM"** ByK.OGATA 2001 |

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| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Microprocessors I** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3303** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Introduction to 16bit Microprocessor**:<br>8086 /8088 Architecture , Machine language, instruction , Internal execution and timing . | **6** |
| **8086/8088 Family Assembly Language Programming**:<br>Data Transfer instructions ;Arithmetic instructions, logical, Shift and rotate instructions ; Branch instructions ; Loop instruction;NOP ; HLT and flag manipulation instructions; Assembler directives. | **12** |
| **8086 System Connections and Timing** :<br>8086 Hardware overview ; Basic Signal flow on 8086 buses ;Analyzing a minimum mode system; 8086 addressing and address decoding ; 8086 timing parameter . | **12** |
| **Interrupts and Interrupt Service Procedure** :<br>8086 interrupts and interrupt response ; 8086 interrupt types ; Hardware and software consideration for using interrupt . | **12** |
| **I/O Programming** :<br>Fundamentals I/O consideration ;Programmed and interrupt I/O ; Block transfers and DMA ,I/O design example . | **12** |
| **Interfacing** :<br>Programmable Parallel ports and handshake input/ output ; Interfacing microprocessors to keyboard and display ; D/A converter operation ; Interfacing and applications ;A/D converter ; Specifications and interfacing ; Serial communication interfaces . | **12** |
| **Parallel I/O and Interfacing Application** :<br>Basic interfacing concepts 8255 Program Peripheral Interface ; Interfacing displays ; Keyboards;, 8279 Programmable keyboard interface;, interfacing memory ; Memory ; Mapped I/O . | **12** |
| **General Purpose Programmable Peripheral Devices**:<br>8253 Programmable Timer 8257 controller , 8259 interrupt controller . | **12** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: "The Intel Microprocessor"**By BARRY B. BREY, |
| **2: "The 8088 & 8086 mp`s programming , interfacing S/W, H/W &applications", PrenticeHall, 2003**ByW. A. Triebel& A. Singh |

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| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Digital System Design I** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3304A** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| **Article** | **Hrs** |
|---|---|
| Programmable Logic Controller PLC<br>Basic Components & Their symbols | 3 |
| Control Transformer switches , relays , time delay relays | 1 |
| References Designators: on ,off ,Run ,stop, cycle | 3 |

| | | |
|---|---|---|
| Inductive proximity sensors: ultrasouic, Optical | | 1 |
| Analog Input / output | | 3 |
| Basic Elements of PLC | | 3 |
| PLC inputs and outputs interfaces | | 3 |
| Ladder programming | | 6 |
| PLC Instructions: Latching, Comparisons, | | 6 |
| Timers, Counters, | | 6 |
| Sequencers, Shift Registers | | 2 |
| Math Instructions: ADD, SUB, MUL, DIV, CLV, CLR, SQR<br>Move & Logic Instructions: MOV, MVM, AND, OR, NOR, NOT,CLR | | 2 |
| Standard Buses | | 3 |
| Internal, External buses, Serial, Parallel buses | | 3 |
| | Total | 45 |

| Text book: |
|---|
| 1: Digital Fundamental, Floyd |
| 2: PLC Software Manual |
| |

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| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Digital System Design II** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3304B** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| **Article** | | **Hrs** |
|---|---|---|
| Programmable Logic Devices<br>GAL, SPLD, CPLD, OLMC, ISP, FPGA | | 9 |
| V-Hardware Description Language (VHDL) | | 3 |
| Introduction to VHDL | | 3 |
| VHDL description of combinational network | | 3 |
| Modeling flip-flops using VHDL process | | 3 |
| Compilation and simulation of VHDL code | | 3 |
| Modeling a sequential machine | | 3 |
| Variables, Signals and Constants | | 3 |
| Arrays | | 3 |
| VHDL operators, functions, procedures Packages and Libraries | | 3 |
| Memory Expansion, RAM, ROM | | 3 |
| System Projects | | 6 |
| | Total | 45 |

| Text book: |
|---|
| 1: Digital Fundamental, Floyd |
| 3: Digital System Design using VHDL By Charles H |

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| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Communication** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3305** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Transmission lines:**<br>Equivalent circuit, characteristic impedance, phase velocity, reflection coefficient, standing waves, quarter – wave transformer, smith chart calculation and stub matching. | **15** |
| **Analog Input Analog Output Schemes:**<br>Amplitude Modulation ; Equation for AM, modulation index, spectrum of AM, DSB transmission with and without carriers, VSB transmission, DSB,C amplitude modulators, Envelope detectors, Balanced Modulator, SSB signal generation and Demodulation schemes. | **15** |
| **Frequency modulation:**<br>Equations for FM, modulation Index, spectrum calculation for sinusoidal waveform and Bessels function table, phase modulation, relationship between FM and PM, NBFM, frequency modulators ( Armstrong method) Types of noise in AM and FM systems. | **15** |
| **Digital Input Analog Output Schemes :**<br>ASK, FSK, QAM, BPSK, QPSK, Transmitter and receiver block diagrams. | **15** |
| **Analog Input Digital Output Schemes :**<br>Various pulse modulation methods, pulse code modulation PCM, Delta modulation DM. Comparison between PCM and DM, Compounding method, Noise in digital systems. | **15** |
| **Digital Input Digital Output Schemes :**<br>Line encoding methods : NRZ, RZ, Manchester, and multilevel encoding methods and comparison of these schemes | **15** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: principle of communication engineering by Anokh Singh** |

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| **Class** | **Third** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Electronic Instrumentation** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE3306** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **INSTRUMINTATION ERRORS** | **6** |
| **TRANSDUCERS:**<br>Resistive, Capacitive, Inductive. Active Transducers. | **9** |
| **SIGNAL CONDITIONING:**<br>Input signal modification, scaling of measuring variables, delay lines, noise, signal averaging, interference, grounding, shielding, signal filtering, signal correlation, current-mode amplifier. | **12** |
| **SIGNAL CONVERSION:**<br>Conversion by transducer bridge, electronic multipliers, signal generator, a.c to d.c signal conversion, logic elements, sample & hold, A/D and D/A signal conversion, isolation amplifier | **12** |
| **INSTRUMENTATION AMPLIFIER:**<br>Circuit design, characteristics, CMMR | **9** |
| **ANALOG ELECTRONIC INSTRUMENTS:**<br>Analog (voltmeter, multi-meter, vector impedance meter, frequency meter, distortion analyzer, spectrum analyzer. | **15** |
| **DIGITAL INSTRUMENTS:**<br>Digital indicator, voltmeter (dual slop, multi-slop, successive approximation, and voltage to frequency converter, ammeters, ohmmeters, multi-meters, counters (frequency, frequency ratio meter, time-interval meter, energy meter), digital multiplexers, microprocessor-based meters | **15** |
| **INTERFACE BUSES:**<br>Parallel port, RS-232, GPIB. | **12** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: "Electronic Instrumentation and Measurement Techniques" ByWillliam David Cooper and Albert D. Helfrick.** |
| **2: Principles of Measurement systems By John P. Bentley** |
| **3: Electrical and Electronic Measurement By Ahmed A.Montaser and Karam A. sharshar** |

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| **Class** | **Third** | | | **Theory :** | **Hrs/wk** |
| **Subject** | **Laboratory** | | | **Tutorial** | **Hrs/wk** |
| **Code** | **EE2307** | **Unit** | **4** | **Practical** | **6Hrs/wk** |

| Article | Hrs |
|---|---|
| The principal objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practicesand techniques. Each student should submit a written technical report for each experiment. The experiments cover the related topics in electronic circuit analysis, communication system and microprocessor technology. | |
| | |
| | |
| **Total** | **180** |

| **Text book:** |
|---|
| **1:** |
| **2:** |
| **3:** |

## Courses Table for Fourth Class2.

| Electronic Engineering Deparatement | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Undergraduate Fourth Class** | | | | | | | | |
| Code | Subject | Hours/Week | | | | | | Units |
| | | First Term | | | Second Term | | | |
| | | Th | Pr. | Tut | Th | Pr | Tut | |
| EE4301 | Industrial Electronic | 2 | - | 1 | 2 | - | 1 | 4 |
| EE4302 | Data Transmission&ComputerNetwork | 2 | - | 1 | 2 | - | 1 | 4 |
| EE4303 | MicroController(*) | 2 | - | 1 | | | | 2 |
| EE4309 | Microprocessor II(*) | | | | 2 | - | 1 | 2 |
| EE4304 | Microelectronics | 2 | - | - | 2 | - | - | 4 |
| EE4308 | Antenna &Propogation(*) | | | | 2 | - | 1 | 2 |
| EE4305 | Radiation(*) | 2 | - | 1 | | | | 2 |
| EE4306 | Computer aided design | 2 | - | 1 | 2 | - | 1 | 4 |
| EE4201 | Engineering Project | 1 | 3 | - | 1 | 3 | - | 4 |
| EE4307 | Laboratory | - | 6 | - | - | 6 | - | 4 |
| Total | | 13 | 9 | 5 | 13 | 9 | 5 | 32 |
| | | 27 | | | 27 | | | |

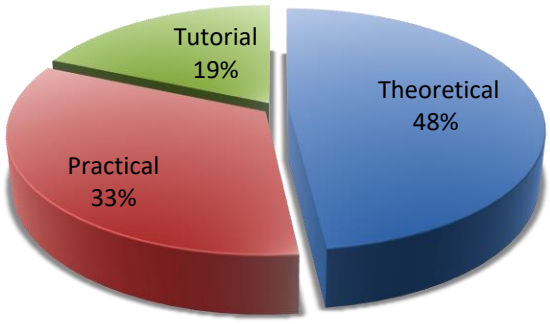
**Theoretical : 13 Hour/Week**

**Total Practical :9 Hour/Week**

**Total Tutorial :5 Hour/Week**

**Total Units :32**

**Weekly classes categories for the department**




## Fourth Year

- **Course Number: EE4301**
- **Course Name: Industrial Electronic**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** This course cover the power semiconductor devices, Phase control converters, Thyristor commutation techniques, Inverters, PWM and speed control.

- **Course Number: EE4302**
- **Course Name: Data Transmission and Computer Networks**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** Definitions and standards, Transmission media, OSI and TCP/IP models, Connecting devices. Data link control and data link protocols, LAN technologies, WLAN standards and devices, WAN and Wireless WAN.

- **Course Number: EE4309**
- **Course Name: Microprocessor II**
- **Credit Hours: (2,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** Introduction to Advanced Microprocessors, The 80386 and 80486 Microprocessor, Assembly language and Programming,

- **Course Number: EE4303**
- **Course Name: Microcontroller**
- **Credit Hours: (2,2,1,0) (Units, Theory, Tutorial, Practical)**

**Course Content:** Microprocessors and Microcontrollers, The MCS-51 Architecture, Basic Assembly Language Programming Concept, An MCS-51 Microcontroller Design

- **Course Number: EE4304**
- **Course Name: Microelectronics**
- **Credit Hours: (6,3,0,0) ( Units, Theory, Tutorial, Practical)**

**Course Content**: The microelectronics course covers the area of integrated circuit design. The fabrication of electronic devices, and design and analysis of analog and digital integrated circuits.

- **Course Number: EE4305**
- **Course Name: Radiation**
- **Credit Hours: (2,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** Give the students an overview of microwave technology and introduction to Microwave devices.

- **Course Number: EE4308**
- **Course Name: Antenna and Propagation**
- **Credit Hours: (2,2,1,0) ( Units, Theory, Tutorial, Practical)**
- **Course Content:**Antenna Theory ( Principles of radiation and equivalent circuit)

, Dipole antenna, Array antenna, Reflector Antenna (Parabolic antenna), Ground wave propagation (Direct and Reflected), IonsphericPropagation ,Radar theory (Circuits and equations)

- **Course Number: EE4306**
- **Course Name: Computer aided design**
- **Credit Hours: (4,2,1,0) ( Units, Theory, Tutorial, Practical)**

**Course Content:** This course covers the following topics: Numerical solution for Linear and nonlinear circuit ,DC and AC matrix analysis ,two port analysis ,graph theory , Simulation ,State variable analysis, Sensitivity, Optimization, CAD for integrated circuits, Genetic Algorithm .

- **Course Number: EE4201**
- **Course Name: Engineering Project**
- **Credit Hours: (4,1,0,3) ( Units, Theory, Tutorial, Practical)**

**Course Content:** Collaboration team work in research environment is expected including extensive interaction with other students. Each group should submit a written report and should attend the final oral examination.

- **Course Number: EE4307**
- **Course Name: Laboratory**
- **Credit Hours: (4,0,0,6) ( Units, Theory, Tutorial, Practical)**

**Course Content:** The principle objective is to ensure that the student have the ability to integrate concepts and achieve the practical works for the different topics he attend in the theoretical classes. Each student should submit a written technical report for each experiment.

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|---|---|---|---|---|---|
| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Antenna and Propagation** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4308** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| Antenna Theory ( Principles of radiation and equivalent circuit) | **3** |
| Antenna Parameters (Gain, Directivity, Bandwidth, Beam width, and Radiation Pattern) | **3** |
| Radiation Intensity and Power Density of Antennas | **3** |
| Monopole antenna | **3** |
| Dipole antenna | **3** |
| Array antenna | **3** |
| Reflector Antenna (Parabolic antenna) | **3** |
| Microstrip antenna | **3** |
| Free space propagation | **3** |
| Friis Transmission Formula | **3** |
| Ground wave propagation (Direct and Reflected) | **3** |
| Ionspheric Propagation | **3** |
| Radar theory (Circuits and equations) | **3** |
| Satellite communication | **3** |
| Mobile and 2-Ray model | **3** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: "Microwave Circuits and devices" by Liao** |
| **2: Microwave Engineering" by Pozar** |

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|---|---|---|---|---|---|
| **Class** | **Fourth** | | | **Theory :** | **2Hrs/wk** |
| **Subject** | **Data Transmission & Computer Networks** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4302** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Introduction and Definitions:** Data Communication، Networks، Protocols، Standards، and Standard organizations. | **3** |
| **BASIC CONCEPTS:-** Line configuration، Topology، Categories of networks. | **6** |
| **Transmission Media:** Electromagnetic spectrum.,Guided media: Unshielded Twisted Pair (UTP) Cable., Shielded Twisted Pair (STP) Cable., Coaxial Cable., Optical Fiber., Unguided media: Radio Transmission., Microwave Transmission., Satellite Microwave**.** | **9** |
| **Interfaces and Modems:** Data transmission: parallel، serial، synchronous and asynchronous.,DTE-DCE interface and standards., Modems. | **6** |
| **The OSIand TCP/IP Models** | **6** |
| **Networking and Internetworking Devices:** Networking devices: NICs، Hubs، Repeaters، Bridges and Switches.,Internetworking devices: Router and Gateways. | **6** |
| **Data Link Control:**Link Discipline، Flow control، Error control. | **6** |
| **Data Link Protocols:**Asynchronous protocols، Synchronous protocols. | **3** |
| **Local area Network (LAN):** Ethernet ,Token Bus, project 802, Token Ring, FDDI. | **12** |
| **TCP/IP Modeland Protocols** | **9** |
| **Wireless LAN (WLAN):** Introduction and history of (WLANs)، Standardization and frequency bands، IEEE 802.11 standard، WIFI، WIMAX، Bluetooth. | **9** |
| **Wide Area Network (WAN)** | **6** |
| **Wireless WAN** | **6** |
| **Internet Working and Internet** | **3** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: "Introduction to Data Comm. And Networking"**، ByPehrouzForouzan. |
| **2: "Computer Networks and Internets"،Douglas** ByE. Comer ($4^{th}$ edition) |

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| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Industrial Electronic** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4301** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Introduction :** Scope of power electronics , power converter specification .<br>**Power Semiconductor Devices :**Thyristor families , V-I characteristics of SCR , Triac , GTO , Diac , Source of thyristor triggering , turn On \ turn Off characteristic and Gate triggering requirements, series/parallel operation, device ratings. | **12** |
| **Power Transistor devices:**<br>Basic structure and V-I characteristics of power MOSFET,IGBT,SIT. Switching characteristic, Gate/Base drive circuits, Safe operating area, di/dt / dv/dt limitation, series/parallel operation, ratings. | **12** |
| **Phase Control Converters:**<br>Signal phase central taped transformer connection , half controlled and fully controlled Bridge configuration , three phase half controlled Bridge converters , Use of flywheeling diode operation with resistive , inductive and Back EMF load , line commutated inverter , effect of source inductance on converter performance , power factor , ripple factor calculation , firing scheme , linear alpha and cosine angle control , application of D.C motor speed control , regulated power supply , battery charger | **18** |
| **ThyristorCommutation Techniques:**<br>Natural commutation , Force commutation ,Voltage / Current commutation , DC chopper , Principle of Voltage control , analysis of Morgan chopper circuit , Johns chopper circuit, regenerative chopper circuit . | **15** |
| **Inverters :**<br>Single phase series and parallel inverters , classification of CSI and VSI inverters , single phase and three phase inverter circuit , methods of voltage controlled inverter circuits , comparison of thyristor and transistor, based inverters, application to speed control of AC motors , uninterrupted power supply , induction melting , heating furnaces . | **15** |
| **Industrial Applications:**<br>DC Motor Control, Induction Motor Control, Pulse width Modulation & Speed Control, Static Relays & Contactors. | **12** |
| **Total** | **90** |

| **Text book:** |
|---|
| **1: Power Electronics by: Muhammad Rashid** |

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| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Microprocessor II** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4309** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| • **Introduction to Advanced Microprocessors :** Overview of 80186,80286 , 80386 , 80486 Architecture , Descriptor table , Privilege levels , paging . Detail study of Pentium , Pentium MMX architecture , Pentium II , Memory and Microprocessor , The Programming Model , Real mode and protected mode Memory addressing , Data formats . | **12** |
| • **The 80386 and 80486 Microprocessor :** Architecture – Real mode and Protected mode , 80386 Memory Management , Memory segmentation , Memory paying Mechanism , On chip cache organization . | **12** |
| **Assembly language and Programming concepts :** The instruction set , Addressing modes , Data movement instructions , Arithmetic and logic instructions , programming the Microprocessor . | **12** |
| • **Interfacing and Applications :** Memory interfacing , Basic **I /O** interfacing . | **9** |
| **Total** | **45** |

| **Text book:** |
|---|
| **1: "The 80386-80486 and Pentium processor" By Walter A. Tribel;** |
| **2: "The Intel Microprocessors " By Barry B. Bery** |
| **3: "The 8051 micro-controller" By I. Scott Mackenzie.** |

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| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Microcontroller** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4303** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Microprocessors and Microcontrollers :** Comparing Microprocessors and Microcontrollers , The Z80 and MCS 51 , Microcontroller survey . | **6** |
| **Microprocessor & Micro Controller :**Comparing Microprocessors and Microcontrollers, , Micro Controller survey. | **9** |

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| **The MCS-51Architecture :**Introduction, MCS-51 family microcontrollers hardware, Input/output pin, ports and circuits, External memory interfacing, counter, timer, serial data input/output, Interrupts. | **9** |
| **Basic Assembly Language Programming Concept :** Addressing mode, External data, move, Code memory read – only data moves, Push and Pop opcodes, Data Exchanges, Logical operations, Arithmetic operations, Branching Instructions, Interrupts and Returns. | **12** |
| **An MCS-51 Microcontroller Design :**Microcontroller Specification, External memory and Memory space Decoding, Expanding I/O , Memory map I/O , Memory address decoding, Testing the Design, Lookup table for the 8051, Serial data Transmission. | **9** |
| **Total** | **45** |

| **Text book:** |
|---|
| **1: "The 80386-80486 and Pentium processor" By Walter A. Tribel;** |
| **2: "The Intel Microprocessors " By Barry B. Bery** |
| **3: "The 8051 micro-controller" By I. Scott Mackenzie.** |

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| **Class** | **Fourth** | | | **Theory :** | **3 Hrs/wk** |
| **Subject** | **Microelectronics** | | | **Tutorial** | **Hrs/wk** |
| **Code** | **EE4304** | **Unit** | **6** | **Practical** | **Hrs/wk** |

| Article | **Hrs** |
|---|---|
| **Semiconductor Fundamental :**Energy band model of solid, intrinsic and extrinsic semiconductor, free carrier density in semiconductor, carrier concentration and Fermi level. Carrier transport and recombination, carrier diffusion, the drift current, Hall effect. MIS, MOS, Schottky barriers, magnetic effect, bipolar junction, p-n junction, FET. | **6** |
| **IC fabrication processes :**Crystal growth, diffusion, doping, evaporations, and photo masking, Ion implementation, Thin and thick film fabrication, sputtering, mounting, package, and hybrid integrated circuits**.** | **12** |
| **LSI and VLSI Design and Application :**Discrete device design, bipolar transistor fundamental, technology, and miniaturization. Linear I.C's: fabrication, and general consideration. Current sources,. LSI oriented bipolar technology. Logic Families based on bipolar transistor (RTL, DTL, TTL, ECL, TRL, $I^2L$). TTL gate circuit analysis. Metal-Semiconductor junction, Metal-Oxide Semiconductor junction. FET theory and analysis. | **18** |
| **MOS Transistor Fundamentals and MOS I.C Technology :**MOS capacitor, static characteristics of the MOS transistor, MOS device fabrication. MOSFET's. Logic circuits based on MOSFET, PMOS, NMOS, CMOS,DMOS, SOS, VMOS. NMOS inverter and gate circuit analysis. CMOS inverter and gate circuit analysis. Charge-coupled devices and non-volatile memory devices, software applications. | **18** |
| **ASIC Design methodologies and system design consideration** | **9** |
| **LCA, Standard cell, Gate array, Structured array]** | **9** |

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| **Full-Custom and Semi-Custom Design** :Design motivations; design either discrete component, full-custom and semi-custom design approaches**.** | | **9** |
| **Field programmable gate arrays FPGA and Field programmable analog arrays FPGA** | | **9** |
| | | |
| | **Total** | **90** |

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| **Text book:** |
| **1: Microelectronic By Millmann** |
| **2:Pprinciple of CMOS VLSI Design By Neil Weste and KarmranEshrahian** |

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| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Radiation** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4305** | **Unit** | **2** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| Various applications of Microwaves, Review of Maxwell's Equations | **3** |
| Review of Electromagnetic Theory: (Plane wave incidence on boundaries, Reflection &transmission ) | **3** |
| Waveguide Theory | **3** |
| Rectangular Waveguides | **3** |
| Circular Waveguides | **3** |
| S-parameters and the scattering Matrix | **3** |
| Tee junctions & Magic Tee | **3** |
| Attenuators, Directional couplers | **3** |
| Propagation into Ferrites, Ferrites Devices | **3** |
| Active Microwave Device, Two cavity Klystron | **3** |
| Velocity Modulation, Power and Efficiency | **3** |
| The Reflex Klystron, Power and frequency characteristics, Magnetron | **3** |
| Passive Microwave Devices, Detector Diodes, power sensing diode, | **3** |
| Varactor diodes, PIN diodes, BARITE & IMPATT diodes | **3** |
| Microwave Transistor circuit | **3** |
| **Total** | **90** |

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| **Text book:** |
| **1: "Microwave Circuits and devices" by Liao** |
| **2: Microwave Engineering" by Pozar** |

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| **Class** | **Fourth** | | | **Theory :** | **2 Hrs/wk** |
| **Subject** | **Computer Aided design** | | | **Tutorial** | **1 Hrs/wk** |
| **Code** | **EE4306** | **Unit** | **4** | **Practical** | **Hrs/wk** |

| Article | Hrs |
|---|---|
| **Introduction**<br>Linear circuits, A.C circuits, A.C circuits matrix analysis, two port analysis, graph theory. Numerical solution for nonlinear network simple search algorithm convergence properties, secant method. | **12** |
| **Simulation**<br>Algorithms , stability and accuracy in Eulers methods , higher-order , Runge-kutto Algorithms. | **15** |
| **State variable analysis**<br>Generation of state equation from topological data , finding a tree, solution of state equations. | **18** |
| **Sensitivity analysis**<br>Sensitivity measures , sensitivity calculation tolerance analysis. | **9** |
| **Optimization**<br>Gradient algorithms , numerical solution of gradient algorithm , stability , search methods. | **12** |
| **C.A.D for integrated circuits**<br>Layout algorithm routing algorithm , testability analysis. | **15** |
| **Genetic algorithms**<br>Application of GA in electronics. | **9** |
| | |
| **Total** | **90** |

| **Text book:** |
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| **1: Computer Assisted Network and System Analysis by: by Mastacusa** |

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| **Class** | **Fourth** | | | **Theory :** | **1 Hrs/wk** |
| **Subject** | **ENGINEERING PROJECT** | | | **Tutorial** | **Hrs/wk** |
| **Code** | **EE4201** | **Unit** | **4** | **Practical** | **3Hrs/wk** |

| Article | Hrs |
|---|---|
| Collaborative team work of the nature in a research environment is expected, including extensive interaction with other students. Each student should submit a written technical report and should attend the final oral examination . The students apply verbal written and oral technical skills to document the design process . | |
| **Total** | **120** |

| **Text book:** |
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| **1:** |

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| **Class** | **Fourth** | | | **Theory :** | **Hrs/wk** |
| **Subject** | **Laboratory** | | | **Tutorial** | **Hrs/wk** |
| **Code** | **EE4307** | **Unit** | **4** | **Practical** | **6Hrs/wk** |

| Article | Hrs |
|---|---|
| The principle objective is to ensure that students have a good quality capstone design & experience to integrate concepts from a range of classes in the core. The students are to apply modern engineering practices and techniques. Each student should submit a written technical report for each experiment. | |
| **Total** | **180** |

| **Text book:** |
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| **1:** |