جامعة الموصل

كلية الهندسة

قسم الهندسة الكهربائية

# مناهج الدراسات العليا

# الماجستير - الفصل الثاني

# 2024-2023

# قسم الهندسة الكهربائية

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor:**

**Assis. Prof. Dr. Saad Ahmed Ayoob**

**Course Title: Mobile Communication**

**Course Code: EEE646**

**Hours/ Units: 2**

**Level/Term**: 2

| **Course Description:** |
|---|
| This course ( Mobile Dommunication EEE646) provides the basics of the science of Introduction, Transmission mode, simplex, half duplex, full duplex, classification of mobile comunication system, radio phases dispatch system, paging system, …etc.cellular telephones ,the cellular concept, system design fandamentals,concept of cellular system , cell shape cell patters, frequency reuse , kind of channels in cellular system, cellular telephone system interference , channel assignment fixed , dynamic, and hybrid, multiple access schemes for cellular system FDMA, TDMA, CDMA, passing through the Wireless system and standards , AMPS , GSM , CDMA , UMTS. In addition to OFDM, OFDMA, 4G, LTE. |

**Refernces:**


1- Satellite Communications, Fourth Edition, by Dennis Roddy 2006.

2- Mobile Communications, Second Edition, by Jochen H. Schiller 2003.

3- Wireless Communications Principles and Practice, Second Edition, by Rappaport 2001.

4- Satellite Communications Systems Engineering, Second Edition, by Louis J. Ippolito 2017.


**Course Details:**

| **Subject** | **Week** |
|---|---|
| Introduction, Transmission mode, simplex, half duplex, full duplex, classification of mobile comunication system, radio phases dispatch system, paging system | 1&2 |
| The cellular concept, system design fandamentals,concept of cellular system, cell shape cell patters. | 3&4 |
| Frequency reuse , kind of channels in cellular system, cellular telephone system interference , channel assignment fixed , dynamic, and hybrid. | 5&6 |
| Multiple access schemes for cellular system FDMA, TDMA, CDMA, Wireless system and standards. | 6&7 |
| AMPS , GSM , CDMA | 8&9&10 |
| OFDM, OFDMA | 11 |
| 4G, LTE | 12 |
| Reports Discussion | 13&14 |
| Exam | 15 |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor: Prof Dr. B.M Saied**

**&Dr Yasir M.Y. Ameen**

**Course Title: Electrical Drive**

**Course Code: EEP 672**

**Hours/ Units: 2/2**

**Level/Term:M.Sc. /2**

## Course Description:

The course "Electrical Drive" is designed to provide Master of Science (MSc) students with advanced knowledge of the principles and applications of electrical drives in modern industrial systems. The course covers both theoretical and practical aspects of electrical drives, including power electronics, motor control, and application in various industrial sectors.

**Upon completing this course, students should be able to:**

Understand the fundamental principles of electrical drives and their application in modern industrial systems.
Analyze and design power electronic converters and motor control circuits.
Implement control strategies for electrical drives.
Understand the practical aspects of electrical drives in various applications.
Analyze and evaluate advanced topics in electrical drives.

**Assessment methods** may include assignments, quizzes, exams, and a final project, where students will have the opportunity to apply their knowledge to a real-world problem in the field of electrical drives.

## Refernces:


1. "Electric Drives: Concepts and Applications" by Vedam Subrahmanyam
2. “power semiconductor contrlloed drives”by G.K. Dubey
3. "Electric Motor Drives: Modeling, Analysis, and Control" by R. Krishnan
4. "Power Electronics and Motor Drives: Advances and Trends" edited by Bimal K. Bose
5. "Control of Electric Machine Drive Systems" by Seung-Ki Sul
6. "Electric Drives and Control Laboratory Using MATLAB/Simulink" by Mohammad A. Haque


## Course Details:

| Subject | Week |
|---|---|
| Overview for DC & AC Drives, Concept, classification, parts and advantages of electrical dives, Dynamic of the motor load system, Components of load toques, Electrical Braking, steady state stability, Ratings of converters and motors, speed control and multiquadrant operation. | 1 |
| Power Electronics Drives Classification, Overview of Semiconductor switching devices, Thyristor Based Speed Control Techniques of DC Motor , | 2 |
| Three phase full-converter drives. Analysis and waveforms of voltage and current waveforms of the dc drive under different operating conditions , relation of firing angles with respect to rotor speed. For starting behavior and different mode of quadrant operation by modeling the DC drive based on using MATLAB Simulink | 3&4 |
| DC to DC Converter for DC Motor Drive, classifications, step down dc to dc (Buck or clas A) converter types, step up dc to dc (Boost or clas B) converter types , motoring and braking of DC Motor, modeling the DC drive based on using MATLAB Simulink.. | 5 |

| | |
|---|---|
| Multi-quadrant control of Chopper -fed DC motor, two-quadranet control consisting of forwared motoring and regerative braking , two-quadranet control consisting of forwared motoring and reverse regenerative braking, four quadrent. | 6 |
| AC motor drive classification. The performance and torque – speed characteristics of three phase induction motor, motor torque equations, , Steady states stability, Quadrants operation of drives, Voltage source inverter. | 7 |
| Rotor voltage control (using slip power recovery scheme,) Current source inverter or cycloconverter | 8 |
| Three phase voltage source inverter to drive three phase induction motor by controlling Volts/Hertz based on sinusoidal pulse width modulation for obtaining wide speed range in different modes of operation, | 9 |
| Advanced control techniques: vector control, field-oriented control | 10 |
| Advanced synchronous motor control: permanent magnet and reluctance motors | 11&12 |
| The Drive System of Robots and its Various Types | 13 |
| PV three-phase Pump dirve technology, PV Water Pump with Variable Frequency Drive | 14 |
| *Student-led presentations and discussions on ongoing research &Exam* | 15 |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor: Dr. Saad Enad Mohammed**

**Course Title: Power System Protection**

**Course Code:**

**Hours/ Units: 2**

**Level/Term:Msc Students**

**Course Description:**

This course focuses on the principles, methodologies, and technologies used in the protection of power systems. Students will learn about various protection schemes, equipment, relays, and the theoretical foundations behind power system protection. The course will also cover modern advancements in protection technology.

**References:**


1- Power System Protection & Switchgear By B. Ram, McGraw Hill.
2- Power System Protection By Patra Basu & Choudhary, Oxford & IBH.
3- Protective Relay, Their Theory & Practices Vol. 1 By A.R.C. Warrington, Chapman & Hall UK.
4- Power System Protection- Static Relays By T.S.M. Rao Tata McGraw Hill.


**Course Details:**

| | **Week** |
|---|---|
| **Importance of power system protection** | 1 |
| **Overview of fault types and their consequences** | 2 |
| **Fuses and Circuit Brekers** | 3 |
| **Protective Current & Potential Transformers** | 4 |
| **Review of Electromagnetic Relays** | 5 |
| **Over current protection** | 6 |
| **Exam 1** | 7 |
| **power transformer protection** | 8 |
| **Generator protection** | 9 |
| **Motor protection** | 10 |
| **Bus-bar protection** | 11 |
| **Transmission lines protection (Distance Protection)** | 12 |
| **Exam 2** | 13 |
| **Digital protection** | 14 |
| **Substation automation and SCADA systems** | 15 |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor:Dr.Mohammed Younis**

**Course Title:Computer Networks**

**Course Code:EEE661**

**Hours/ Units: 2**

**Level/Term**:

**Course Description:**

This course (Computer Networks EEE661) provides the Advanced of the science of computer networks and communications, starting from the OSI Model and TCP/IP Model and give a brief history of the internet , Protocol layers and their service model.

**Refernces:**

1. **TCP/IPProtocol Suite Forth Edition.**
2. **Data Communications and Networking Fifth Edition**
3. **Computer NetworkingA Top-Down ApproachSeventh EditionJames F. Kurose**

**Course Details:**

| **Subject** | **Week** |
|---|---|
| Abrief history of the internet , Protocol layers and their service model. | 1 |
| Underlying Technologies | 2&3 |
| ntroduction to Network Layer | 4&5 |
| IPv4 Addresses | 6&7 |
| Delivery and Forwarding of IP Packet | 8&9 |
| Internet Protocol Version 4 (IPv4) | 10 |
| Address Resolution Protocol (ARP) | 11 |
| Internet Control Message Protocol Version 4 (ICMPv4) | 12&13 |
| Application Layre : the web and HTTP,FTP,SMTP,DNS.Transport Layer: connection less protocols connection oriented protocols, ongestion control. | 14&15 |
| | |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor:**

**Course Title:** Advanced High Voltage

**Course Code:** EEP 671

**Hours/ Units:** 2/2

**Level/Term**:M.Sc/2nd term

**Course Description:**

The course deals with the physical behaviour of equipment and systems for production, transmission and use of electrical energy, and with construction and characteristics of this equipment and systems. The major areas of research in high voltage engineering are design of high voltage power apparatus, estimation of electrical field strength in power apparatus, development of methods of detecting faults during impulse voltage testing, estimation of overvoltage power apparatus. The course includes studies and modelling of material properties in electric fields, material ageing, discharges and breakdown in gases, liquids, solids and complicated insulating systems, high voltage cables, lightning protection and earthing systems, protection against overvoltages, partial discharge and high voltage dc systems.

**Refernces:**


1. Andreas Küchler, High voltage Engineering, Springer-Verlag GmbH Germany, 2018.
2. E. Kuffel, W.S. Zaengl, and J. Kuffel, High Voltage Engineering: Fundamentals, 2nd edition, ButterworthHeinemann, 2000.
3. C.L. Wadhwa, High Voltage Engineering, 2nd ed., New Age International, 2007


**Course Details:**

| **Subject** | **Week** |
|---|---|
| Electrical Stresses in High Voltage Engineering | 1 |
| Breakdown Mechanism of Gases | 2-3 |
| Breakdown Mechanism of Liquid | 4 |
| Breakdown Mechanism of Solid Materials | 5 |
| Earthing Systems | 6 |
| Mid-Term Exam | 7 |
| Lightning Protection | 8 |
| Overvoltages and Overvoltages Protection | 9 |
| Gas-Insulated Substations | 10 |
| High Voltage Cables | 11 |
| Partial Discharge | 12 |
| High Voltage DC Systems | 13 |
| Tutorial - Revision | 14 |
| Final Exam | 15 |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor: Dr. Omar Sh. Yehya**

**Course Title: Scientific Research Methods**

**Course Code: EEE 690**

**Hours/ Units: 1**

**Level/Term**: **Master Students**

**Course Description:**

In this course, the students will learn more about scientific research and clarification of research components. Furthermore, the categories of journals and papers. How to write scientific papers. As well as More information will be presented in front of students to be familiar with working on it during their research.

**References:**


1- Kumar, R. (2018). Research methodology: A step-by-step guide for beginners. Sage.

2- Pandey, P., & Pandey, M. M. (2021). Research methodology tools and techniques. Bridge Center.

3- "Research Methodology: A Step-by-Step Guide for Beginners" by Ranjit Kumar (2019)

4- "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" by John W. Creswell and J. David Creswell (2017)


**Course Details:**

| **Subject** | **Week** |
|---|---|
| Research Methodology , introduction and definition | 1 |
| Characteristics of Research Methods and Data Collection | 2 |
| Literature Review | 3 |
| Research Proposal | 4 |
| Scientific websites and Indexing issue : SJR, JCR, WOS and others | 5 |
| Impact Factor, H- Index | 6 |
| **Exam 1** | 7 |
| Plagiarism | 8 |
| How to choose the right journal: Type of Conferences, Type of Journals | 9 |
| Mendeley program for arrangement of the references | 10 |
| Research Ethics | 11 |
| How to write your paper | 12 |
| **Exam 2** | 13 |
| How to Submit your paper to the journal | 14 |
| How to write your thesis , and How to Pass your Viva | 15 |

**University of Mosul**

**College of Engineering**

**Department: Electrical**

**Instructor: Dr.MahmodJasim**

**Course Title:Programmable Controllers**

**Course Code:EEE680**

**Hours/ Units: 2**

**Level/Term**:

**Course Description:**

This course (Programmable ControllerEEE680) provides description of family members, memory systems, and various I/O systems needed which include memory, ADC and DAC, UART, PIAs, timers, key-board, serial ports parallel ports, arithmetic coprocessors,and explain the purpose of each block and describe the function of the microprocessor and microcontroller in detail its basic operation.

**Refernces:**


1- **THE INTEL MICROPROCESSORS 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4, and Core2 with 64-Bit Extensions, Eighth Edition by BARRY B. BREY, 2009**
2- **Architecture, Programming, and Interfacing The AVR Microcontroller and Embedded Systems: Using Assembly and C Muhammad Ali Mazidi ,SarmadNaimi, SepehrNaimi. 2014.**
3-


**Course Details:**

| **Subject** | **Week** |
|---|---|
| The 80386DX and the 80486DX .µPs. The 32-bit Family µPs Real-mode: softwarw architecture Instruction Set | 1&2 |
| Architecture . Introduction to the Pentium TM µP. Introduction to P4 | 3&4 |
| Overview of embedded systems Introduction to , AVR Microcontroller and Embedded Systems, architecture and memory organization AVR Microcontroller | 5&6 |
| Memory organization, Instruction set, software I/O ports, SFR, Timers and Counters | 7&8 |
| Timers and Counters Digital Converter | 9&10 |
| Serail Communication ports, Serial Communication Protocols(UART) | 11&12 |
| Interfacing A/D, Motors , Switches, Digital J/O modules | 13&14 |
| Examination | 15 |

**University of Mosul**

**College of Engineering**

**Department of Electrical Engineering**

**Instructor:**

**Course Title: Microwave Devices**

**Course Code:**

**Hours/ Units: 2**

**Level/Term: Master Program**

| **Course Description:** |
|---|
| The objective of this course is to provide a comprehensive understanding of basics, principles, operation, and applications of microwave devices. Students in this course will learn the components, devices, and their practical applications in microwave engineering via theoretical concepts. They will be able to explain, analyze, and design microwave networks.<br>The course list of topics includes introduction to microwave engineering, microwave components, microwave circuit analysis, microwave passive and active devices, microwave antennas, microwave oscillators and frequency synthesizers, microwave integrated circuits, microwave measurements, instrumentation, and applications. Students will be introduced to the important developments of future technologies in microwave engineering.<br>The assessment in this course includes homework, quizzes, seminars, midterm and final exams. |
| **References:** |
| [1]"Foundations for Microwave Engineering",2nd Edition, by Robert E. Collin.<br>[2]"Microwave Engineering",4th Edition, by David M. Pozar. |
| **Course Details:** |

| **Subject** | **Week** |
|---|---|
| Introduction to microwave engineering | 1 |
| Microwave components | 2 |
| Microwave transmission lines | 3 |
| Microwave circuit analysis | 4 |
| Microwave passive devices | 5 |
| Microwave antennas | 6 |
| Microwave active devices | 7 |
| Microwave oscillators | 8 |
| Microwave frequency synthesizers | 9 |
| Midterm Exam | 10 |
| Microwave integrated circuits | 11 |
| Microwave measurements | 12 |
| Microwave instrumentation | 13 |
| Microwave applications | 14 |
| Future trends in microwave engineering | 15 |