Academic Program Description Form(Postgraduate Studies)

University Name: Mosul University
Faculty/Institute: College of Engineering
Scientific Department: Electrical Engineering
Academic or Professional Program Name: M.Sc. Program in Electrical Engineering / Power and Machines
Final Certificate Name: Master of Science in Electrical Engineering/ Power and Machines
Academic System: Semester system - coursework, research, thesis/dissertation
Description Preparation Date: , 2026
File Completion Date: , 2026

Signature :
Head of Department Name :
Name :Dr. Omar Sh. Alyozbaky
Date :

Signature :
Scientific Associate
Dr. Ayman T. Hameed
Date :

The file is checked by:
Department of Quality Assurance and University Performance
Director of the Quality Assurance and University Performance
Department : Asst. Prof. Rana Burhan Abdulrahman
Date :
Signature :

Approval of the Dean
Asst prof Dr Omar M. Hamdoon

Ministry of Higher Education and Scientific Research

University of Mosul / College of Engineering

Department of Electrical Engineering

Academic Program Description for Postgraduate Studies

M.Sc. Program in Electrical Engineering / Power and Machines

Academic Year 2025-2026

Table of Contents

1. Introduction and Basic Concepts

This academic description provides an organized framework for the postgraduate program offered by the Department of Electrical Engineering, College of Engineering, University of Mosul. It presents the main features of the M.Sc. Program in Electrical Engineering / Power and Machines, including courses, targeted learning outcomes, teaching and assessment mechanisms, admission requirements, and development plans.

The document converts the approved undergraduate academic-description structure into a postgraduate-oriented format. It also includes concise course descriptions for each subject, including aims, learning outcomes, indicative content, teaching strategies, and assessment methods.

Field	**Details**
University Name	University of Mosul
Faculty/Institute	College of Engineering
Scientific Department	Department of Electrical Engineering
Academic Program Name	M.Sc. Program in Electrical Engineering / Power and Machines
Final Certificate Name	Master of Science in Electrical Engineering/ Power and Machines
Academic System	Semester system - coursework, research, thesis/dissertation`
Description Preparation Date	2025-2026
File Completion Date	To be officially specified by the Department

Name	**Position**	Date	**Signature**
	Head of Department		
	Scientific Assistant		
	Director of Quality Assurance and University Performance		
	Dean Approval		

2. Program Vision

To make the Department of Electrical Engineering a distinguished academic and research center for preparing researchers and specialists in power systems, electrical machines, power electronics, renewable energy, control systems, and smart electrical networks in a manner that serves scientific development and community needs

3. Program Mission

To provide a rigorous postgraduate program with scientific and research depth in power and machines engineering. The program aims to prepare graduates who possess advanced skills in analysis, modeling, design, scientific research, and academic publishing, and who can produce and apply engineering knowledge to solve national and regional technical problems.

4. Program Objectives

1. Prepare researchers and specialists capable of addressing advanced engineering problems in electrical engineering.
2. Deepen specialized knowledge in power systems, electrical machines, power electronics, control systems, and renewable energy.
3. Enhance scientific research skills, academic publishing, critical analysis, and research ethics.
4. Develop the ability to use modeling, simulation, measurement, and analytical tools to solve real engineering problems.
5. Strengthen research cooperation with governmental, industrial, and research institutions.
6. Provide a supportive academic environment for innovation, research supervision, and professional development.

5. Program Accreditation and External Influences

Item	Description
Program Accreditation	The program is subject to review and updating according to quality-assurance and academic-accreditation requirements and the regulations of the Ministry of Higher Education and Scientific Research.
External Influences	The program is influenced by labor-market needs, energy and infrastructure projects, renewable energy developments, smart grids, and national research priorities.

6. Program Structure and Courses

The programs are based on specialized coursework distributed over two semesters, followed by scientific research and a thesis/dissertation according to the applicable postgraduate regulations. The following tables present the courses by program, specialization, and semester.

6.1 M.Sc. in Electrical Engineering / Power and Machines - First Semester

No.	Code	Course Title	Instructor(s)	Credit Units	Type
1	EEP667	Modern Power Electronics	Dr. Yasser Mohammed Younis + Dr. Mohammed Natiq Abdulqadir	2	Compulsory
2	EEP683	Advanced Power Systems	Dr. Ahmed Nasr Bahjat + Dr. Wael Hashim Hamdoon	2	Compulsory
3	EEP691	Reliability and Optimization	Dr. Mohammed Obaid Mustafa	2	Compulsory
4	EEP640	Advanced Mathematics	Dr. Dawood Najim Saleh	2	Compulsory
5	EEP638	English Language	Dr. Farhad Ezzeldin Mahmood	2	Compulsory
6	EEP670	Modeling and Simulation	Dr. Omar Muwafaq Mahmood	2	Compulsory
7	EEP669	Advanced Electrical Machines	Dr. Omar Sharaf Al-Din Yahya	2	Compulsory

6.2 M.Sc. in Electrical Engineering / Power and Machines - Second Semester

No.	Code	Course Title	Instructor(s)	Credit Units	Type
1	EEP692	AI Techniques	Dr. Ahmed Nasr + Dr. Hasan Adnan	2	Compulsory
2	EEP647	Modern Control Theory	Dr. Mohammed Obaid + Dr. Omar Muwafaq	2	Compulsory
3	EEP672	Electrical Drives	Dr. Yasser Mohammed Younis + Dr. Mohammed Natiq	2	Compulsory
4	EEP671	Advanced High Voltage Engineering	Dr. Dawood Najim + Dr. Riyadh Zaki	2	Compulsory
5	EEP682	Power Systems Protection	Dr. Saad Enad + Dr. Shakir Mahmood	2	Compulsory
6	EEP690	Scientific Research Methods	Dr. Omar Sharaf Al-Din + Dr. Hiba Nazim	2	Compulsory

7. Expected Program Learning Outcomes for Postgraduate Studies

PGO1: Analyze, formulate, and solve advanced engineering problems using principles of engineering, science, and mathematics.

PGO2: Design models, algorithms, or engineering systems that meet specified requirements while considering technical, economic, and environmental constraints.

PGO3: Conduct independent scientific research, analyze data, interpret results, and draw scientifically defensible conclusions.

PGO4: Use software tools, laboratory instruments, and simulation environments to develop and analyze electrical and electronic systems.

PGO5: Communicate scientific work orally and in writing in Arabic and English, including reports, theses, dissertations, and research papers.

PGO6: Adhere to research ethics, professional responsibility, anti-plagiarism principles, and accuracy in presenting results.

PGO7: Demonstrate self-learning, follow recent developments, and work effectively within multidisciplinary research teams.

8. Teaching and Learning Strategies

- Advanced theoretical lectures supported by computational and applied examples.
- Discussion of recent scientific papers and linkage with research gaps.
- Computer laboratories and simulation using tools such as MATLAB/Simulink or specialized software.
- Periodic seminars presented by students to monitor academic and research progress.
- Mini-projects and case studies related to real problems in industry, power grids, electronics, Power، Machines and control.
- Self-directed learning under the guidance of the course instructor and academic supervisor.

9. Assessment Methods

- Mid-term and final written examinations.
- Assignments, analytical reports, or simulation reports.
- Oral presentations and research seminars.
- Evaluation of projects or case studies.
- Evaluation of research proposal and thesis/dissertation progress.
- Final defense of the thesis or dissertation according to the applicable regulations.

10. Faculty

Academic Rank	General Specialization	Specific Specialization	Number
Professor	Electrical Engineering/ Electronics and Communication	Solid State Electronic	1
Professor	Electrical Engineering/ Power and Machines	Electrical Power and Machines Engineering	2
Emeritus Professor	Electrical Engineering/ Power and Machines	Power Electronics Engineering	1
Assistant Professor	Electrical Engineering/ Power and Machines	Automatic Control Engineering	1
Assistant Professor	Electrical Engineering/ Electronics and Communication	Communication Engineering	1

Assistant Professor	Electrical Engineering/ Power and Machines	Power Electronics Engineering	3
Assistant Professor	Electrical Engineering/ Power and Machines	Electrical Power Engineering	3
Assistant Professor	Electrical Engineering/ Electronics and Communication	Nanotechnology	1
Assistant Professor	Electrical Engineering/ Electronics and Communication	Electronics and Communication Engineering	1

11. Admission Criteria

Admission to postgraduate programs is conducted according to the applicable instructions of the Ministry of Higher Education and Scientific Research and according to the capacity proposed by the Scientific Committee and Department Council and approved by the College, University, and Ministry. Applicants must hold a relevant bachelor's degree, satisfy GPA and competitive-examination requirements, and meet any additional conditions specified in the annual postgraduate-admission instructions.

12. Main Sources of Information about the Program

- Academic Program and Course Description Guide issued by the Ministry of Higher Education and Scientific Research.
- Official website of the University of Mosul / College of Engineering / Department of Electrical Engineering.
- Approved postgraduate curricula and course tables for the Department for the academic year 2025-2026.
- Course-description files received from the Scientific Committee and course instructors.

13. Program Development Plan

- Annual review of courses and learning outcomes.
- Update course contents according to modern technologies such as smart grids, HVDC, renewable energy, electric vehicles, and artificial intelligence.
- Strengthen scientific publishing requirements.
- Develop simulation and measurement laboratories.
- Encourage research cooperation with universities and industrial institutions.
- Apply benchmarking with reputable international postgraduate programs.

14. Brief Detailed Course Descriptions

This section includes concise course-description forms for all postgraduate courses. These forms can be used as an initial basis and then reviewed by the course instructor to add weekly contact hours, detailed grade distribution, and full references when required.

14.1 M.Sc. Courses / Power and Machines

EEP667 - Modern Power Electronics

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Yasser Mohammed Younis + Dr. Mohammed Natiq Abdulqadir

Course Aims:

- Study modern power converters and their applications in renewable energy systems, electrical drives, and electric charging.
- Analyze the performance of static converters, modulation methods, control techniques, and harmonic effects.

Course Learning Outcomes:

- Analyze advanced AC/DC, DC/DC, and DC/AC converter circuits.
- Select power semiconductor devices, filters, and suitable control strategies.
- Evaluate efficiency, harmonic distortion, thermal issues, and reliability in power electronic systems.

Indicative Contents:

Power semiconductor devices; rectifiers; DC-DC converters; inverters; PWM/SVPWM; filters; efficiency; thermal and reliability issues.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP683 - Advanced Power Systems

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Ahmed Nasr Bahjat + Dr. Wael Hashim Hamdoon

Course Aims:

- Develop advanced understanding of modeling, analysis, and operation of electric power systems.
- Study load flow, fault analysis, stability, voltage control, and economic operation in modern grids.

Course Learning Outcomes:

- Model power-system components and analyze multi-bus networks.
- Conduct power-flow and fault studies using analytical and software tools.
- Interpret stability and operation results and relate them to design and planning decisions.

Indicative Contents:

Power-flow methods; fault analysis; economic dispatch; voltage control; stability basics; renewable integration; smart grid concepts.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP691 - Reliability and Optimization

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Mohammed Obaid Mustafa

Course Aims:

- Introduce reliability concepts for electrical systems and mathematical optimization methods.
- Use reliability indices in assessing the performance of power systems and electrical components.

Course Learning Outcomes:

- Calculate basic reliability indices and relate them to supply quality.
- Formulate engineering optimization problems and select appropriate solution algorithms.

- Analyze trade-offs between cost, reliability, and performance.

Indicative Contents:

Reliability indices; failure rates; Markov models; deterministic optimization; heuristic/metaheuristic methods; multi-objective optimization.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP640 - Advanced Mathematics

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Dawood Najim Saleh

Course Aims:

- Strengthen the mathematical foundation required for modeling and analyzing advanced electrical systems.
- Develop the ability to use analytical and numerical methods for engineering problems.

Course Learning Outcomes:

- Apply linear algebra, transforms, and differential equations to electrical engineering problems.
- Choose suitable mathematical methods for engineering models.
- Interpret mathematical results and link them to the physical behavior of systems.

Indicative Contents:

Linear algebra; eigenvalues; differential equations; Laplace/Fourier transforms; numerical methods; optimization basics.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP638 - English Language

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Farhad Ezzeldin Mahmood

Course Aims:

- Develop academic reading and writing skills in English.
- Enable students to prepare abstracts, reports, research summaries, and scientific presentations clearly.
- Enhance the use of engineering and research terminology in electrical engineering.

Course Learning Outcomes:

- Write a research abstract, a formal academic text, and a concise literature review.
- Present an engineering topic in clear English.
- Use technical terminology accurately in written and oral communication.

Indicative Contents:

Academic writing; technical vocabulary; abstract and report writing; presentation skills; research-paper reading.

Teaching and Learning Strategies:

- Writing exercises, short presentations, scientific-paper reading, peer review, and guided correction of academic texts.

Assessment Methods:

- Short reports, oral presentation, translation/summarization assignments, and a written examination.

EEP670 - Modeling and Simulation

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Omar Muwafaq Mahmood

Course Aims:

- Develop skills in mathematical modeling and computer simulation of electrical and electronic systems.
- Connect theoretical models with real system behavior and validate simulation results.

Course Learning Outcomes:

- Build a mathematical/computational model for an electrical or electronic system.
- Run simulations using suitable tools such as MATLAB/Simulink or equivalent software.
- Perform sensitivity analysis, validate results, and discuss model limitations.

Indicative Contents:

Model formulation; state-space models; simulation workflow; parameter estimation; validation; sensitivity analysis; reporting results.

Teaching and Learning Strategies:

- Applied lectures, computer laboratories, simulation assignments, and discussion of student results.

Assessment Methods:

- Simulation project, technical report, presentation, and written examination.

EEP669 - Advanced Electrical Machines

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	First Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Omar Sharaf Al-Din Yahya

Course Aims:

- Extend students' knowledge of modeling and analysis of advanced electrical machines.
- Study dynamic performance, losses, efficiency, and operating characteristics of machines.

Course Learning Outcomes:

- Analyze machine models in different reference frames.
- Evaluate electromechanical performance under various loading and operating conditions.
- Relate machine design and control to drive and renewable-energy applications.

Indicative Contents:

Generalized machine theory; dq modeling; induction and synchronous machines; special machines; losses; efficiency; dynamic performance.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP692 - AI Techniques

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Ahmed Nasr + Dr. Hasan Adnan

Course Aims:

- Introduce artificial-intelligence techniques and their applications in electrical engineering.
- Employ machine learning and intelligent algorithms for diagnosis, forecasting, control, and optimization.

Course Learning Outcomes:

- Develop an AI model for an electrical engineering problem.
- Assess data quality, feature selection, and model accuracy.
- Discuss model limitations and practical applicability.

Indicative Contents:

Machine learning basics; neural networks; fuzzy systems; optimization algorithms; forecasting; fault diagnosis; AI applications in power and drives.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP647 - Modern Control Theory

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory
Credit Units	2

Instructor(s)	Dr. Mohammed Obaid + Dr. Omar Muwafaq

Course Aims:

- Deepen the concepts of modern control and analysis of multivariable dynamic systems.
- Enable students to design controllers suitable for electrical and electronic systems.

Course Learning Outcomes:

- Model systems in state-space form and analyze stability.
- Design modern controllers such as state feedback, observers, and introductory optimal control.
- Evaluate controller performance in terms of response, stability, and robustness.

Indicative Contents:

State-space analysis; controllability; observability; pole placement; observers; optimal/robust control concepts; digital implementation.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP672 - Electrical Drives

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Yasser Mohammed Younis + Dr. Mohammed Natiq

Course Aims:

- Study modern electrical drive systems and integration of the motor, inverter, and controller.
- Analyze speed and torque control strategies and their industrial and transportation applications.

Course Learning Outcomes:

- Model drive systems and analyze dynamic response.
- Design current, speed, and torque control loops.
- Evaluate performance in terms of harmonics, ripple, efficiency, and protection.

Indicative Contents:

Drive system components; DC/AC drives; vector control; scalar control; inverter-fed machines; regenerative braking; EV/industrial applications.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP671 - Advanced High Voltage Engineering

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Dawood Najim + Dr. Riyadh Zaki

Course Aims:

- Deepen knowledge of high-voltage phenomena, insulation systems, and insulation coordination.
- Study high-voltage testing and protection against transient overvoltages.

Course Learning Outcomes:

- Analyze breakdown mechanisms in gases, liquids, and solid dielectrics.
- Select suitable high-voltage generation and measurement methods.
- Apply insulation coordination and surge protection principles.

Indicative Contents:

Electric fields; breakdown mechanisms; HV generation and measurement; insulation coordination; surge protection; HV testing and safety.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP682 - Power Systems Protection

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory

Credit Units	2
Instructor(s)	Dr. Saad Enad + Dr. Shakir Mahmood

Course Aims:

- Develop advanced understanding of power-system protection philosophy and relay schemes.
- Study feeder, transformer, generator, busbar, and transmission-line protection.

Course Learning Outcomes:

- Select settings for overcurrent, directional, distance, and differential relays.
- Analyze faults and coordinate protection to achieve selectivity and speed.
- Evaluate numerical-relay and communication-assisted protection applications.

Indicative Contents:

Protection philosophy; CT/VT; overcurrent and earth fault; differential protection; distance protection; transformer/generator/line protection; numerical relays.

Teaching and Learning Strategies:

- Interactive lectures, advanced problem solving, recent-paper reading and discussion, software/simulation applications, and student seminars.

Assessment Methods:

- Mid-term and final examinations, assignments and reports, seminar presentations, research discussions, and a project/case study when required.

EEP690 - Scientific Research Methods

Field	Details
Program	M.Sc.
Specialization	Electrical Engineering / Power and Machines
Semester	Second Semester
Course Type	Compulsory
Credit Units	2
Instructor(s)	Dr. Omar Sharaf Al-Din + Dr. Hiba Nazim

Course Aims:

- Introduce scientific research methodology, research ethics, and requirements of sound academic publishing.
- Develop the ability to formulate a research problem, hypotheses, objectives, and an executable methodology.
- Develop skills in citation management, reference use, and plagiarism avoidance.

Course Learning Outcomes:

- Formulate a clear and focused research proposal.
- Conduct a critical literature review and link it to a research gap.
- Select suitable measurement, simulation, and analysis tools for engineering research.

Indicative Contents:

Research design; literature review; research gap; citation styles; ethics; plagiarism; data analysis; thesis proposal writing.

Teaching and Learning Strategies:

- Applied workshops on proposal writing, abstract writing, and literature review, with discussion of published research examples.

Assessment Methods:

- Research proposal, literature review, seminar presentation, and a short test in research ethics.

15. Brief Alignment between Courses and Program Learning Outcomes

M.Sc. in Electrical Engineering / Power and Machines

Code	Course	PGO1	PGO2	PGO3	PGO4	PGO5	PGO6	PGO7
EEP667	Modern Power Electronics	✓	✓	✓	✓			
EEP683	Advanced Power Systems	✓	✓	✓				
EEP691	Reliability and Optimization	✓	✓	✓				
EEP640	Advanced Mathematics	✓	✓	✓				
EEP638	English Language	✓	✓	✓		✓		✓
EEP670	Modeling and Simulation	✓	✓	✓	✓			
EEP669	Advanced Electrical Machines	✓	✓	✓				
EEP692	AI Techniques	✓	✓	✓				
EEP647	Modern Control Theory	✓	✓	✓				
EEP672	Electrical Drives	✓	✓	✓	✓			
EEP671	Advanced High Voltage Engineering	✓	✓	✓				
EEP682	Power Systems Protection	✓	✓	✓				
EEP690	Scientific Research Methods	✓	✓	✓		✓	✓	✓