


Republic of Iraq
Ministry of Higher Education & Scientific Research
Supervision and Scientific Evaluation Directorate
Quality Assurance and Academic Accreditation Dept.

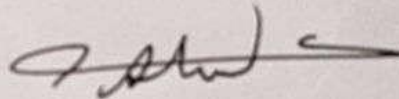
Academic Program Specification Form for Technical Colleges and Institutions

For Academic Year 2022-2023

University: Northern Technical University
College / Institute: Mosul Technical Institute
Department: Electrical Techniques Dept.
Date of Form Completion: 11/9/2023



Dr. Raghad Ghalib Alsultan
Assistant Dean for Scientific Affairs
Date: 11/9/2023
Signature :

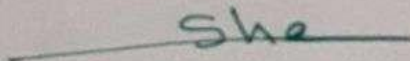


Asst. Prof. Dr. Ahmed Ataya Allu
Head of Electrical Techniques Department
Date: 11/9/2023
Signature :

Reviewed by Mr. Mohammed Khalid Yousef
Quality Assurance and University Performance Manager

محمد خالد يوسف
مسؤول شعبة ضمان الجودة وتقييم الأداء

Date: 11/9/2023
Signature:



Approved by Asst. Prof. Shahla Abdul Wahab Abdul Qadir
Dean of Mosul Technical Institute
Date: 11/9/2023
Signature:

This program briefly summarizes the most important features and what expected learning outcomes for students to achieve and demonstrates whether the students have satisfied the maximum benefits from the available opportunities. It is accompanied by a specification of each course within this program.

1. Educational Foundation	Northern Technical University
2. University College\ Institute	Mosul Technical Institute
3. Academic Program Title	Electrical Techniques Department
4. Certificate Title	Technical Diploma
5. Academic Education System	Modules based
6. Accreditation	The institute is in the process of fulfilling accreditation from the ABET organization
7. Other External Influences	The Technical Institute is mainly related to the General Directorate of Vocational Education as the primary beneficiary. Hence, it works on establishing new specializations and developing its curriculum to integrate with those of the Technical Institute. This is to ensure that learning outcomes match the job market requirements. The department also serves the community, and students actively participate in these efforts.
8- Date of Preparing This Form	27/8/2023

9. Academic Program Objectives

1. Working on creating a suitable academic environment to prepare technical personnel specializing in electrical power and networks, enabling them to work efficiently in all department laboratories and workshops. They graduate from the department after completing two academic years, including summer training, to obtain a Technical Diploma in Electrical Technologies.
2. Qualifying department students to be familiar with both the theoretical and practical aspects of all study subjects, including the ability to work with modern technologies used in the field of electricity.
3. Developing their capabilities in the field of electrical technologies and researching modern topics to provide a knowledge base on the nature of electrical circuit con-

nections, operation of electrical units in power generation, transmission, and distribution stations, and diagnosing problems that require further in-depth scientific research. This also includes equipment maintenance and installation of various electrical systems.

4. Developing the curriculum to align with the job market and providing quality services to the community by enhancing relationships with both private and government sectors.
5. Preparing and equipping students to play their role in the field of electrical engineering.
6. Working on fostering distinctive personal growth in students through cultural and social awareness development, enabling them to contribute effectively to their communities.

10. Required Program Outcomes and Methods of Teaching, Learning, and Assessment:

A. Cognitive Objectives:

1. Aiming to understand the general principles of electricity, such as knowledge of basic electrical quantities: voltage, current, power, and electrical energy.
2. Aiming to understand electronic elements and circuits, amplifiers, and industrial control.
3. Aiming to understand the operation of electrical machines: direct current and alternating current generators, as well as single-phase and three-phase transformers.
4. Aim to understand the types of motors, their maintenance, and operating principles.
5. Aiming to understand the types of power generation stations and methods of electricity transmission and distribution.
6. Aiming to understand secondary station components and installations, overhead transmission lines, and cables.
7. Aiming to understand electrical loads, load factor, demand factor, base load, peak load, station interconnection, how to draw load curves, and how to calculate kilowatt-hour costs.
8. Aiming to understand the principles of designing electrical and residential installations for residential buildings and calculating quantities and materials preparation for installation work and control and regulation arrangements.
9. Aiming to understand the recent developments in representing complex electrical circuits using logic controllers and Arduino.
10. Understanding computer applications, especially in implementing electrical diagrams and designs.

B. Skills Objectives Specific to the Program:

1. Learning to install and operate electrical machines and equipment for power genera-
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tion, transmission, and distribution.

2. Maintaining and rewinding all types of motors.
3. Extending and maintaining power transmission system.
4. Installing and operating electrical measurement devices.
5. Executing electrical and industrial installations in residential buildings and other institutions.
6. Dealing with electrical circuits using logic controllers.
7. Operating and maintaining protection and control devices for the electrical power system.
8. Implementing electrical designs using computers.
9. Supervising occupational safety requirements in educational workshops and laboratories.
10. Equipping students with the skill to diagnose electrical faults and solve practical problems in electrical networks.

Methods of Teaching and Learning:

1. Developing curricula that are compatible with internationally recognized curricula.
2. Sending students for training at power stations and departments affiliated with the Ministry of Electricity to gain practical experience.
3. Updating the study materials to keep pace with developments.
4. Hands-on work in laboratories and workshops.
5. Project execution by students.
6. E-learning.
7. Graduation projects in both theoretical and practical phases.

Methods of Assessment:

1. Theoretical and practical exams.
2. Preparing and discussing reports.
3. Non-exam activities and homework.
4. Discussion of graduation projects.

C. Ethical and Values Objectives:

1. The ability to teach and train vocational education students.
 2. Student interaction with each other and with academic material.
 3. Guiding students to care for and maintain the department's assets and the institute.
 4. Developing research skills using the Internet for students.
 5. Preparing qualified technical personnel for various private and public sector companies.
 6. Preparing specialists in equipment maintenance by providing students with practical skills.
 7. Offering solutions to problems faced by institutions and relevant departments in the field of electricity.
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8. Working towards providing job market requirements and enhancing economic capacity.

Teaching and Learning Methods:

1. Utilizing modern tools and methods for student education and training.
2. Organizing discussion sessions during lectures to address academic topics.
3. Applying theoretical concepts practically in various labs and educational workshops.
4. Assigning non-graded tasks to students.
5. Conducting scientific visits and summer training programs.
6. Supervising and supporting graduation research projects.

Assessment Methods:

1. Daily attendance and commitment, daily quizzes.
2. Monthly and final exams (theoretical and practical).
3. Classroom participation through academic discussions.
4. Non-graded assignments and weekly reports on practical experiments conducted by students.
5. Practical tests based on experiments related to theoretical subjects.

D. General and Transferable Skills (Other Skills Related to Employability and Personal Development):

1. Skills in representing electrical circuits and solving them using modern software.
2. Skills in electrical equipment maintenance and repair.
3. Communication, computer, and internet skills, as well as presentation skills.
4. Skills in creating electrical diagrams using computer software.
5. Self-learning and self-reliance skills.
6. Teamwork skills.
7. Skills to enable students to pass job interviews.
8. Distance learning skills.

Teaching and Learning Methods:

1. Developing curricula compatible with international standards.
 2. Sending students for training at power stations and government electrical departments to gain practical experience.
 3. Updating the study material to keep pace with developments.
 4. Practical work in labs and workshops.
 5. Training in presentation and communication skills.
 6. Theoretical and practical lectures.
 7. Student projects.
 8. E-learning.
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11. Program Structure

Electrical Power Branch / First Level							
Icon	Grade If any	number Units	Number of Hours		Course Name		Type of Requirement
			Practical	Theoretical	In English	In Arabic	
NTU100	-	1	0	1	Human Rights	حقوق الإنسان	University Requirements Count 14 (12 Compulsory Unit + 2 Optional Unit)
NTU106	-	1	0	1	Democracy	الديمقراطية	
NTU101	-	2	0	2	English Language	لغة إنكليزية	
NTU102	-	3	2	1	Computer Principles 1	مبادئ الحاسوب 1	
NTU103	NTU102	3	2	1	Computer Principles 2	مبادئ الحاسوب 2	
NTU104	-	2	0	2	Arabic Language	لغة عربية	
NTU105	-	2	1	1	Sport	رياضية (اختياري)	
NTU107	-	2	1	1	French Language	اللغة الفرنسية (اختياري)	
TIMO110	-	2	0	2	Mathematic 1	الرياضيات 1	Institute Requirement Compulsory 7 Unit
TIMO111	-	3	3	0	Mechanical Workshop	معمل ميكانيك	
TIMO112	TIMO110	2	0	2	Mathematic 2	الرياضيات 2	
ELT100	-	4	2	2	D.C. Circuits	دوائر التيار المستمر	Department specialized requirements 34 Unit (30 Compulsory Units + 4 Optional Units)
ELT101	-	4	2	2	Electronic Principles	مبادئ الإلكترونيك	
ELTP102	-	4	2	2	Electrical Installations Technology	تقنية التأسيسات الكهربائية	
ELT103	-	3	3	0	Engineering Drawing	الرسم الهندسي	
ELT104	-	3	3	0	Electrical Workshop	معمل كهرباء	
ELT105	-	4	2	2	A.C. Circuits	دوائر التيار المتردد	
ELT106	-	4	2	2	Electronic Circuits	دوائر الإلكترونيك	
ELT107	-	4	2	2	Digital Electronics	الإلكترونيات الرقمية	
ELT109	-	2	0	2	Vocational Safety	السلامة المهنية (اختياري)	
ELT110	-	2	0	2	Renewable Energy	طاقة متجددة (اختياري)	
ELT111	-	3	2	1	Electrical Circuits Simulation	محاكاة دوائر كهربائية (اختياري)	
55 Unit						Total Units Required	

Electrical Power Branch / Second Level							
Code	Grader, if any	number Units	Number of Hours		Course Name		Type of Requirement
			Practical	Theoretical	In English	In Arabic	
NTU200	-	2	0	2	English Language	اللغة الانكليزية	University requirements: 4 compulsory units
NTU201	-	2	0	2	Professional Ethics	اخلاقيات المهنة	
ELT200	-	5	3	2	D.C Machines	محركات التيار المستمر	Department specialization requirements: 54 units)52 Compulsory Units + 2 Optional Units)
ELT201	-	5	3	2	Power Electronics	الكثرونيات القدرة	
ELTP202	-	4	2	2	Electrical Power Grids	شبكات القدرة الكهربائية	
ELTP203	-	4	2	2	Industrial Electrical Installations	التأسيسات الكهربائية الصناعية	
ELTP204	-	3	3	0	Electric Workshop	ورشة الكهرباء	
ELTP205	-	3	3	0	Electrical Drawing	الرسم الكهربائي	
ELT206	-	2	2	0	Project1	المشروع 1	
ELT207	-	5	3	2	A.C Machines	محركات التيار المتردد	
ELT208	-	5	3	2	Power Electronics Applications	تطبيقات الكثرونيات القدرة	
ELTP209	-	4	2	2	Electrical Transmission Networks	شبكات النقل الكهربائية	
ELTP210	-	4	2	2	Installation and Industrial Control Systems	تأسيسات ونظم سيطرة صناعية	
ELTP211	-	3	3	0	Electrical Maintenance Workshop	ورشة الصيانة الكهربائية	
ELT212	-	3	2	1	Programmable Logic Controllers (PLC)	المتحكمات المنطقية المبرمجة	
ELT213	-	2	2	0	Project 2	المشروع 2	
ELTP214	-	2	1	1	Fundamentals of Protection Systems	أساسيات أنظمة الحماية الكهربائية	
ELTP215	-	3	2	1	Microcontrollers	المتحكمات الدقيقة	
55 Unit					Total Units Required		

Electrical Networks Branch / First Level							
Code	Grader, if any	number of units	number of hours		Course Name		Type of Requirement
			Practical	Theoretical	In English	In Arabic	
NTU100	-	1	0	1	Human Rights	حقوق الإنسان	University Requirements Count 14 (12 Compulsory Unit + 2 Optional Unit)
NTU106	-	1	0	1	Democracy	الديمقراطية	
NTU101	-	2	0	2	English Language	لغة الإنكليزية	
NTU102	-	3	2	1	Computer Principles 1	مبادئ الحاسوب 1	
NTU103	NTU102	3	2	1	Computer Principles 2	مبادئ الحاسوب 2	
NTU104	-	2	0	2	Arabic Language	لغة عربية	
NTU105	-	2	1	1	Sport	رياضية (اختياري)	
NTU107	-	2	1	1	French Language	اللغة الفرنسية (اختياري)	
TIMO110	-	2	0	2	Mathematic 1	الرياضيات 1	Institute Requirement 7 Compulsory Unit
TIMO111	-	3	3	0	Mechanical Workshop	معمل ميكانيك	
TIMO112	TIMO110	2	0	2	Mathematic 2	الرياضيات 2	
ELT100	-	4	2	2	D.C. Circuits	دوائر التيار المستمر	Department specialized requirements 34 Unit (30 Compulsory Units + 4 Optional Units)
ELT101	-	4	2	2	Electronic Principles	مبادئ الإلكترونيك	
ELTN102	-	4	2	2	Electrical Installation	التأسيسات الكهربائية	
ELT103	-	3	3	0	Engineering Drawing	الرسم الهندسي	
ELT104	-	3	3	0	Electrical Workshop	معمل كهرباء	
ELT105	-	4	2	2	A.C. Circuits	دوائر التيار المتردد	
ELT106	-	4	2	2	Electronic Circuits	دوائر الإلكترونيك	
ELT107	-	4	2	2	Digital Electronics	الإلكترونيات الرقمية	
ELTN108	-	4	2	2	Electrical Installations and Lighting	التأسيسات الكهربائية والإضاءة	
ELT109	-	2	0	2	Vocational Safety	السلامة المهنية (اختياري)	
ELT110	-	2	0	2	Renewable Energy	طاقة متجددة (اختياري)	
ELT111	-	3	2	1	Electrical Circuits Simulation	محاكاة دوائر كهربائية (اختياري)	
55 Unit					Total Units Required		

Electrical Network Branch / Second Level							
Code	Grader, if any	number of units	number of hours		Course Name		Type of Requirement
			Practical	Theoretical	In English	In Arabic	
NTU200	-	2	0	2	English Language	اللغة انكليزية	University requirements: 4 compulsory units
NTU201	-	2	0	2	Professional Ethics	اخلاقيات المهنة	
ELT200	-	5	3	2	D.C Machines	مكائن التيار المستمر	Department specialization requirements: 54 units (52 Compulsory Units + 2 Optional Units)
ELT201	-	5	3	2	Power Electronics	الكثرونيت القدرة	
ELTN202	-	4	2	2	Electrical Power System	منظومة القدرة الكهربائية	
ELT203	-	4	2	2	Electrical Protection Systems	انظمة الحماية الكهربائية	
ELT204	-	3	3	0	Maintenance on Generation Stations	صيانة محطات توليد	
ELTN205	-	3	2	1	High Voltage Technology	تكنولوجيا الضغط العالي	
ELT206	-	2	2	0	Project1	المشروع 1	
ELT207	-	5	3	2	A.C Machines	مكائن التيار المتردد	
ELT208	-	5	3	2	Power Electronics Applications	تطبيقات الكثرونيت القدرة	
ELTN209	-	4	2	2	Electrical Transmission Systems	منظومة النقل الكهربائية	
ELTN210	-	4	2	2	Power Systems Protection	حماية انظمة القدرة	
ELTN211	-	3	3	0	Maintenance on Power Transmission Lines	صيانة خطوط نقل القدرة	
ELT212	-	3	2	1	Programmable Logic Controllers (PLC)	المتحكمات المنطقية المبرمجة	
ELT213	-	2	2	0	Project 2	المشروع 2	
ELTN214	-	3	2	1	Industrial Installations Technology	تكنولوجيا التأسيسات الصناعية	
ELTN215	-	2	0	2	Principles of Mechanics	مبادئ الميكانيك	
58 Unit					Total Units Required		

12. Personal Development Planning:

Continuous planning is carried out to enhance the academic and administrative progress of the educational program. The procedures include:

1. Developing students' research and inquiry skills by encouraging them to participate in modern discussion groups, seminars, and lectures related to the field.

2. Encouraging students to explore various sources, books, and journals for information.
3. developing the skills of faculty members and technicians through their participation in training programs and workshops within or outside the university.
4. Technicians and staff participation in developmental courses within higher education institutions or elsewhere.
5. Organizing conferences, participating in scientific seminars, and hosting discussion groups for students.
6. Staying updated with the latest scientific developments in the field.
7. Conducting individual or collaborative research (applied or theoretical).

13.Admission Criteria (Establishment of Regulations for Enrollment in the College or Institute):

1. Admission is based on centralized admission procedures and conditions approved by the Ministry of Higher Education and Scientific Research.
2. Acceptance of professional study students specializing in electrical engineering is governed by central regulations.

14.Key Information Sources about the Program:

1. Department Email: elt.mti@ntu.edu.iq.
 2. Current study curriculum, surveys, and market needs.
 3. Central library at the institute.
 4. Decisions and recommendations from academic committees, department councils, the institute, the university, and the ministry.
 5. Department's webpage on the institute and university websites.
 6. Northern Technical University Guide.
 7. Experiences of Arab and international universities.
 8. Specialized seminars and workshops with relevant stakeholders.
 9. Personal Experiences.
 - 10.The Internet and Social Media.
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Please mark the checkboxes corresponding to the individual learning outcomes of the program subject to evaluation

Required Learning Outcomes from the Program																			
General and Transferable Skills (Other Employability and Personal Development Skills)					Ethical and Values-based Objectives				Program-specific Skill Objectives				Cognitive Objectives			Core or Elective	Module Name	Module Code	/Year Level
4d	3d	2d	d1	4c	c3	c2	c1	b4	b3	b2	b1	a4	a3	a2	a1				
√	√	√	√	√	√	√	√		√	√	√	√	√	√	√	Core	Human Rights	NTU100	1 st Level
					√	√	√		√	√	√	√	√	√	√	Core	Democracy	NTU106	
							√			√	√	√	√	√	√	Core	English Language	NTU101	
			√				√		√		√			√	√	Core	Computer Principles 1	NTU102	
		√			√	√	√		√	√	√		√	√	√	Core	Computer Principles 2	NTU103	
				√	√		√		√	√	√		√	√	√	Core	Arabic Language	NTU104	
			√	√		√	√		√	√	√		√	√	√	Core	Sport	NTU105	
																	French Language	NTU107	
																	Mathematic 1	TIMO110	
																	Mechanical Workshop	TIMO111	
																	Mathematic 2	TIMO112	
																	D.C. Circuits	ELT100	
																	Electronic Principles	ELT101	
																	Electrical Installations Technology	ELTP102	
																	Engineering Drawing	ELT103	
																	Electrical Workshop	ELT104	
																	A.C. Circuits	ELT105	
																	Electronic Circuits	ELT106	
																	Digital Electronics	ELT107	
																	Vocational Safety	ELT109	
																	Renewable Energy	ELT110	
																	Electrical Circuits	ELT111	

																		Simulation		
																		English Language	NTU200	2 nd Level
																		Professional Ethics	NTU201	
																		D.C Machines	ELT200	
																		Power Electronics	ELT201	
																		Electrical Power Grids	ELTP202	
																		Industrial Electrical Installations	ELTP203	
																		Electric Workshop	ELTP204	
																		Electrical Drawing	ELTP205	
																		Project1	ELT206	
																		A.C Machines	ELT207	
																		Power Electronics Applications	ELT208	
																		Electrical Transmission Networks	ELTP209	
																		Industrial Installation and Control Systems	ELTP210	
																		Electrical Maintenance Workshop	ELTP211	
																		Programmable Logic Controllers)(PLC	ELT212	
																		Project 2	ELT213	
																		Fundamentals of Protection Systems	ELTP214	
																		Microcontrollers	ELTP215	
																		Human Rights	NTU100	1 st Level
																		Democracy	NTU106	

																English Language	NTU101	
																Computer Principles 1	NTU102	
																Computer Principles 2	NTU103	
																Arabic Language	NTU104	
																Sport	NTU105	
																French Language	NTU107	
																Mathematic 1	TIMO110	
																Mechanical Workshop	TIMO111	
																Mathematic 2	TIMO112	
																D.C. Circuits	ELT100	
																Electronic Principles	ELT101	
																Electrical Installation	ELTN102	
																Engineering Drawing	ELT103	
																Electrical Workshop	ELT104	
																Mathematic 2	ELT105	
																D.C. Circuits	ELT106	
																Electronic Principles	ELT107	
																Electrical Installation	ELTN108	
																Engineering Drawing	ELT109	
																Electrical Workshop	ELT110	
																A.C. Circuits	ELT104	
																Electronic Circuits	ELT105	
																Digital Electronics	ELT106	
																Electrical Installations and Lighting	ELT107	
																Vocational Safety	ELTN108	
																Renewable Energy	ELT109	
																Electrical Circuits Simulation	ELT111	

																English Language	NTU200	nd 2 Level
																Professional Ethics	NTU201	
																D.C Machines	ELT200	
																Power Electronics	ELT201	
																Electrical Power System	ELTN202	
																Electrical Protection Systems	ELT203	
																Maintenance on Generation Stations	ELT204	
																High Voltage Technology	ELTN205	
																Project1	ELT206	
																A.C Machines	ELT207	
																Power Electronics Applications	ELT208	
																Electrical Transmission Systems	ELTN209	
																Power Systems Protection	ELTN210	
																Maintenance on Power Transmission Lines	ELTN211	
																Programmable Logic Controllers (PLC)	ELT212	
																Project 2	ELT213	
																Industrial Installations Technology	ELTN214	
																Principles of Mechanics	ELTN215	

Appendix for Objectives of Some Academic Subjects

Electrical Circuits:

Cognitive Objectives:

1. Identify the method of connecting electrical circuits and how they operate.
2. Understand the theories related to solving electrical circuits.
3. Recognize alternating and direct current circuits.
4. Identify different types of circuit connections.

Skills Objectives:

1. Measure electrical quantities using various devices.
2. Learn to apply various theories to solve electrical circuits.
3. Acquire the skill of designing electrical circuits.
4. Develop the ability to detect faults in electrical circuits.

Electronics:

Cognitive Objectives:

1. Identify laboratory equipment.
2. Understand the connection methods for electronic components.
3. Recognize circuits that convert alternating current to direct current.
4. Identify different types of electrical waves.

Skills Objectives:

1. Learn how to work with electrical circuits.
2. Acquire skills related to different electronic theories.
3. Learn the different types of biasing for various components.
4. Master signal amplification techniques and their various applications.

Electrical Machines:

Cognitive Objectives:

1. Identify various types of electrical machines.
2. Understand the theory of operation of generators and electric motors.
3. Recognize winding methods used with electric motors.
4. Understand the properties of different machines and influencing factors.

Skills Objectives:

1. Learn how to operate various electrical machines and connect them.
2. Acquire skills in series, parallel, and mixed machine connections.
3. Learn the process of synchronization between different machines.
4. Learn to draw curves related to the properties of each electrical machine.

Human Rights and Democracy:

Cognitive Objectives:

1. Define human rights for students.
2. Explain public and private freedoms.
3. Define intellectual, cultural, journalistic, economic, and social freedoms.
4. Explain the concept of democracy.

Conscience Objectives:

1. Learn about individual human rights.
2. Promote self-learning.
3. Encourage participation in collective work and voluntary contributions.
4. Enhance human behavior in respecting the rights of others and building personal, national, regional, and international relationships.

These objectives provide a clear framework for the expected knowledge and skills that students should gain from each subject.

Power Electronics:

Cognitive Objectives:

1. Identify the types of rectifiers for full-wave and half-wave rectification.
2. Understand the representation of thyristors using transistors.
3. Recognize other components and types of thyristors and their uses in electrical circuits.
4. Understand the triggering and commutation methods of thyristors.
5. Identify choppers and inverters circuits.

Skills Objectives:

1. Teach students how to connect and represent components in electrical circuits.
2. Aim to develop students' skills in triggering and commutation of thyristors using various methods.
3. Focus on teaching students the skill of using thyristors or their other types in various electrical applications.
4. Help students learn to work with choppers and inverters circuits in different electrical circuits.

Electric Power System:

Cognitive Objectives:

1. Identify methods for generating electrical energy and transmitting it over long distances.
2. Understand the means of electrical energy transmission.
3. Recognize different types of substations and their operation.
4. Know how to protect transmission lines from faults.

5. Understand the methods of distributing electrical energy to consumers.
6. Identify types of underground cables and their applications.

Skills Objectives:

1. Teach students the skill of drawing an electric power system from generation to consumer areas.
2. Help students learn the skill of classifying overhead transmission lines into short, medium, and long.
3. Develop the skill of representing overhead transmission lines using resistors, inductors, and capacitors.
4. Teach students the skill of calculating capacitance for single and three-phase systems with three wires.
5. Help students learn the skill of classifying underground cables based on various factors such as insulation type, conductor shape, and transmitted voltage.
6. Teach students the skill of using various relays in protecting transmission and distribution systems.

These objectives provide a clear outline of what students are expected to know and the skills they should acquire in these subjects.

Module Description Template

This module description provides a concise summary of the most important characteristics of the course and the expected learning outcomes for students

to achieve. It demonstrates whether the student has maximized the benefits of the available learning opportunities. It should be linked to the program description.

1. Educational Foundation	Northern Technical University
2. University College\ Institute	Mosul Technical Institute
3. Academic Program Title	Electrical Techniques Department
4. Module Name	Electrical Machines
5. Available Attendance Formats	Mandatory
6. Course \ Year	Module-based
7. Total Credit Hours	5*15 weeks= 75
8. Date of preparing this program	27/8/2023

9. Modules Objectives

1. Provide students with fundamental knowledge about electrical machines.
2. Provide and introduce students to both AC and DC electrical machines.
3. Educate and familiarize students with the components and operation of electrical machines and transformers.
4. Provide students with comprehensive information about various types of electrical machine connections.

10.Required Course Outcomes and Teaching, Learning, and Assessment Methods

A. Cognitive Objectives:

1. Enable students to connect various types of electrical machines.
2. Empower students with the knowledge of electrical transformers' components and assembly.
3. Enable students to conduct inspections on electrical machines.
4. Empower students to create curves specific to practical experiments.

B. Skill-Based Objectives for the Course:

1. Learn the installation and operation of electrical machines in their various types.
2. Inspect and test electrical machines.
3. Inspect and test electrical transformers.
4. Calculate currents and loads.
5. Understand different types of loads.

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6. Equip students with the skill to diagnose electrical faults and solve practical problems in electrical networks.
 7. Supervise occupational safety requirements in the laboratory.

Teaching and Learning Methods:

1. Theoretical lectures and practical training in laboratories, discussions, and dialogues
2. Application of the studied topics in theory on a practical level in various educational laboratories.
3. Field visits to power generation, transmission, and distribution stations throughout the academic year.
4. Presentation of scientific films during classroom sessions.

Assessment Methods:

1. Feedback (Testing students on the previous material), Self-assessment (Questions are provided to students by the instructor, and students answer them, while the instructor also provides answers, and students evaluate themselves based on the instructor's responses).
2. Daily written tests, and weekly reports on the practical experiments conducted by the student in the laboratory.
3. Commitment to assignments, attendance, and obligations.
4. Monthly and final exams (both theoretical and practical).
5. Classroom participation through discussions on study topics.
6. Continuous assessment of practical performance by the student in the labs.

C. Ethics and Values-Based Objectives:

1. Prepare specialized personnel for maintenance work on various types of machines by equipping students with practical skills.
2. Develop solutions for problems faced by institutions and relevant departments in the field of electricity.
3. Prepare specialized personnel for maintenance work on various types of machines.
4. Teach students methods of protecting electrical machines.
5. Foster interaction among students and with the academic material.
6. Guide students to take care of laboratory equipment and departmental assets.
7. Understand how to read the specifications for each electrical machine.

Teaching and Learning Methods:

1. Apply the theoretically studied topics at a practical level in educational laboratories.
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2. Write reports and discuss the results of each experiment.
 3. Surprise tests.
 4. In-class and homework assignments.
 5. Scientific visits to power stations.

Assessment Methods:

1. Practical examinations based on experiments related to theoretical subjects.
2. Reports on developments in the field of specialization, directing analytical and inferential questions.
3. Oral and practical exams.

D. General and Qualifying Skills (Other Skills Related to Employability and Personal Development):

1. Skills in the field of maintenance and repair of electrical appliances.
2. Field visits to gain experience from others.
3. Stay informed about the latest developments in the field of specialization (educational videos).
4. Self-learning skills and self-reliance.
5. Practical training at power stations and electrical departments.
6. Teamwork skills.

Teaching and Learning Methods:

1. Provide students with fundamentals through theoretical lectures for each subject.
2. Send students for training in power stations and government electrical departments to gain real-world experience.
3. Update the curriculum to keep up with developments.
4. Work in laboratories and workshops.
5. Questions that encourage critical and analytical thinking.
6. Execution of projects by students.

Assessment Methods:

1. Theoretical and practical exams.
2. Completion of reports and their discussion.
3. Non-class activities and homework.
4. Discussion of graduation projects.

11. Course Structure

Evaluation method	Method of education	Unit / Subject Name	Required Learning Outcomes	Hours
Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Basic principles of DC machines – main parts of machines – magnetic poles– product–external structure.	5
Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Production member coils - ripple winding - thousand non-single multipliers. Give computational and applied examples to know how to calculate The value of lines and how to apply them when performing the winding process, feed coils - current collector	5
اختبار	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Types of DC machines (succession - parallel - compound) separate feeding - self-feeding. DC losses. Fixed Joints – Variable Phases of Power Distribution in Generators Continuous. efficiency and give mathematical examples of how to calculate Lost.	5
test	Lecture, discussion, feedback, poster	DC Machines	Electromotive force – factors affecting	5

	presentation, video and film presentation, practical training		the voltage of the generator give mathematical examples of how to calculate the emf For all types of generators.	
test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	-Magnetic curve (no load)	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Load Profile Curve – Voltage regulation of different types of generators – External properties– Internal properties.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Product reaction and its effect on pregnancy and explain ways to reduce the provocation of the product's reaction – orthogonal amperes– Give computational examples of compensatory files.	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Commutation and influence it Improving the process of resistance consolidation and uniformity of driving force Electrical – interstitial electrodes.	5

Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Running parallel DC generators. The reasons for running DC generators in parallel. Conditions for operating DC generators in parallel. distribution of load on generators in parallel and giving mathematical examples	5
Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	DC motors Motor Theory – Reverse Electromotive Force Motor voltage equation – comparison between DC motors and generators.	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Torque – Production member torque – drive shaft torque Power distribution in motors State stages at the greatest output power	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation	DC Machines	General properties of speed and torque of successive, parallel and vehicle engines. Speed regulation rate Computational examples – comparison of engines in different industrial applications.	5

Test	Lecture, discussion, feedback, poster presentation, video and film presentation	DC Machines	Starting the movement – the importance of starting the movement Three-point initiator – Simple starter design– Arithmetic examples.	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation	DC Machines	Control the speed of DC motors. -1Speed regulation by voltage. -2Speed regulation by field. Arithmetic examples.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	DC Machines	Reverse the direction of rotation of the machine. Ways to stop engines. Dynamic Stop – Inverter Stop – Regeneration Stop.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Motor Testing Stop Test – Sunbun Test Hopkinson test – decreasing test – arithmetic examples.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Electrical transformers / transformer components and parts Operating theory (Transformer with inner core – transformer with outer core	5

			Equation of electromotive force - vector drawing - transformer equivalent circuit.)	
Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Open circuit and cabin test – and how to calculate the value of equivalent circuit components – transferred from the load state– Phase diagram of the transformer in case of pregnancy – losses – calculation of efficiency case of maximum efficiency – miscellaneous issues	5
اختبار	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Self-transformer – Issues. Current transformer – voltage transformer – scientific uses	5
Test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Three-phase transformers. Different ways to connect triple transformers – problems.	5
test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Three-phase induction transformers. Advantages – Disadvantages – Rotating Magnetic Field – Theory of Operation Slip – Rotor Frequency	5
Practical	Lecture, discussion,	AC Machines	Types of engines	5

test	feedback, poster presentation, video and film presentation, practical training		Squirrel cage engines. Sliding motors. Comparison between them - the composition of each type - the uses of each type.	
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	Startup control methods. Operation by Star Switch – Delta – Operation using by connecting the resistor in the rotor circuit.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	The relationship between torque and power factor. The relationship between torque and slippage. Torque – requirement for maximum starting torque. Torque – maximum torque requirement g Induction motor parabolic circuit – mathematical examples.	5
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation	AC Machines	Reverse the direction of rotation of three-phase induction motors. Methods of stopping induction motors – control of induction motors using:	5

			<p>Source voltage - number of poles - source frequency - resistance position in the rotor circuit - operation of two motors Respectively.</p>	
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation	AC Machines	<p>Single-phase induction motors – types – installation Theory of operation - how to obtain an initial torque - a detailed explanation of the types of induction motors: -1Split-phase induction motor. -2Induction motor with wide-starting capacity. -3Induction motor with wide start and rotation. -4Shaded pole induction motor. -5Altenerous motor. -6General engine. Reverse the direction of rotation for each type.</p>	5
Practical test	Lecture, discussion, feedback, poster presentation, video presentation, practical training	AC Machines	<p>Synchronous generators. Installation - principles of work - types of generators for the rotating member. Step coefficient –</p>	5

			<p>distribution coefficient.</p> <p>Equation of the electromotive force in the case of load (resistor - induction - capacitive) and draw the phase diagram for each</p> <p>Carrying voltage regulation rate – miscellaneous issues.</p>	
Practical test	Lecture, discussion, feedback, poster presentation, video and film presentation, practical training	AC Machines	<p>Comparison of DC and AC generators</p> <p>Reasons for making a product in synchronous generators</p> <p>Fixed running generators in parallel.</p> <p>Reasons and conditions for the operation of synchronous generators in parallel.</p> <p>Explanation of the synchronization process – voltage regulation rate – miscellaneous issues</p>	5
Test	Lecture, discussion, feedback, poster presentation, video and film presentation	AC Machines	<p>Synchronous motors</p> <p>Installation and principles of work in synchronous motors – Starting in synchronous motors–</p> <p>Synchronous motor</p>	5

			in carrying state – phase scheme in case of unit power factor – Advanced power factor– Delayed power factor – calculation of the value of the reverse electromotive force.	
Test	Lecture, discussion, feedback, poster presentation, video presentation	AC Machines	Practical uses – regulation rate. Scheja Engine – Installation – Speed Regulation General review of AC motors	5

12. Infrastructure:

1. Prescribed Textbooks.
2. Primary References (Sources).

Recommended Books and References (Scientific Publications, Reports, etc. Electronic References, Websites, etc. There is a dedicated laboratory for the Electrical Machines course.

13. Curriculum Development Plan:

1. Participation in relevant scientific conferences.
2. Additional lectures by guest lecturers from outside the institution
3. Establishing relationships with other universities and corresponding colleges.
4. Holding extensive meetings between faculty members of all colleges and institutes of Northern Technical University to develop the curriculum.
5. Discussing the basics of the curriculum with students to identify its strengths and weaknesses.
6. Two-month summer training program with 300 training hours.