



Program Specification

— (Postgraduate)

Program Name: **Master of Science in Electrical Engineering**

Program Code (as per the Saudi Standard Classification of Educational Levels and Specializations): **071301**

Qualification Level: **Master (of science)- 7th NQF Level**

Department: **Electrical Engineering**

College: **Engineering**

Institution: **Northern Border University**

Program Specification: New updated*

Last Review Date: **02/06/2024**

*Attach the previous version of the Program Specification.



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A. Program Identification and General Information:

1. Program's Main Location:

College of Engineering
Main Campus of Northern Border University
Arar City - Northern Border Region.

2. Branches Offering the Program (if any):

The program is offered only at the main campus

3. System of Study:

Coursework & Thesis Coursework

4. Mode of Study:

On Campus Distance Education Other(specify)

5. Partnerships with other parties (if any) and the nature of each:

- Partnership Arrangement: **NA**
- Type of Partnership: **NA**
- Duration of Partnership: **NA**

6. Professions/jobs for which students are qualified:

- Electrical Engineer
- Electromechanical engineer
- Automation engineer
- Power generation engineer,
- Power transmission and distribution engineer
- Electrical wiring engineer
- Instrumentation Electronic Engineer
- Medical Devices Engineer
- Instrumentation Engineer
- Protection Engineer
- Telecommunication Engineer
- Network Engineer
- Control Engineer
- Maintenance Engineer
- Operation Engineer
- Broadcast Engineer
- Instrumentation Engineer

7. Relevant occupational/ Professional sectors:

- The constructions and contracting companies
- The general institution for water refined
- The military occupations management
- The water and sewage authority
- The Saudi commission for the engineers
- The general institution for ports
- The Saudi company for basic industries (SABIC)
- The construction materials factories
- The Saudi airlines
- The Saudi Arabia Aramco company



- The Saudi Electrical Company
- Ministry of Water and Electricity
- Ministry of Municipal and Rural Affairs
- The General Establishment for Water Desalination
- General Organization for Ports
- Saudi Airlines
- Construction and contracting companies
- Electronics and communications companies
- Power and electric power companies
- Ministry of Transportation
- General Electricity Corporation
- Saudi Consolidated Electricity Company
- Research & Development

8. Major Tracks/Pathways (if any):

Major track/pathway	Credit hours (For each track)	Professions/jobs (For each track)
1. Unavailable		
2.		

9. Exit Points/Awarded Degree (if any):

Exit points/Awarded degree	Credit hours
1. Unavailable	
2.	

10. Total credit hours: (30)



B. Mission, Goals, and Program Learning Outcomes

1. Program Mission:

Graduating qualified experts with advanced skills in analyzing, evaluating, and designing electrical systems of various types, with a focus on renewable energy, artificial intelligence, and process automation. Conducting advanced scientific research to provide innovative solutions that serve society

2. Program Goals:

1. Developing deep insights into electrical engineering theories and concepts by providing advanced knowledge in power systems, electronics, communications, and control engineering to help students tackle complex issues.
2. Boosting technical skills for innovative energy project design and implementation, enabling students to create and refine advanced electrical systems that meet contemporary industrial and societal needs.
3. Driving new technology development through advanced scientific research, motivating students to engage in pioneering research that advances electrical technology, focusing on innovation and sustainability in renewable energy and smart grids.
4. Training students to devise sustainable and effective engineering solutions that promote sustainable development, enhance energy efficiency, and minimize environmental impacts.
5. Equipping students with the necessary skills and knowledge to implement engineering solutions that enhance community infrastructure.

3. Program Learning Outcomes:*

Knowledge and Understanding:

K1	Demonstrate advanced knowledge and understanding of the principles and practices of specialized domain of electrical engineering
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Skills:

S1	Apply advanced mathematical, scientific, and technical knowledge to solve complex problems in specialized field of electrical engineering
S2	Use analysis, simulations, and experiments to develop and evaluate solutions in specialized field of electrical engineering
S3	Design electrical engineering systems that meet specified needs and constraints
S4	Effectively communicate analysis and research results to diverse audiences

Values, Autonomy, and Responsibility:

V1	Conduct and produce quality research in electrical engineering assuming professional and ethical responsibility.
V2	Manage effectively specialized applications in electrical engineering discipline with a high degree of independence
V3	Lead and collaborate effectively in improving the quality of engineering research to contribute to supporting the society life quality

* * Add a table for each track (if any)



C. Curriculum:

1. Curriculum Structure:

Program Structure	Required/ Elective	No. of courses	Credit Hours	Percentage
Course	Required	3	9	30%
	Elective	5	15	50%
Graduation Project (if any)	NA	NA	NA	NA
Thesis (if any)		1	6	20%
Field Experience (if any)	NA	NA	NA	NA
Others (.....)	NA	NA	NA	NA
Total		9	30	100

* Add a separated table for each track (if any).





2. Program Courses:

Level	Course Code	Course Title	Required or Elective	Pre-Requisite Courses	Credit Hours	Type of requirements (Institution, College, or Program)
Level 1	EE611	Advanced engineering mathematics	Required	-----	3	Program
	EE612	Research methodology	Required	-----	3	Program
	EE613	Modeling and simulation of electrical engineering systems	Required	-----	3	Program
Level 2	EE621	Artificial Intelligence and Machine Learning	Elective	EE611, EE613	3	Program
	EE622	Renewable and sustainable energy systems	Elective	EE611, EE613	3	Program
	EE623	Advanced energy conversion	Elective	EE611, EE613	3	Program
	EE631	Advanced topics in electrical machines	Elective	EE611, EE613	3	Program
	EE632	Power system dynamics and control	Elective	EE611, EE613	3	Program
	EE641	Communication and Information Theory	Elective	EE611, EE613	3	Program
	EE642	Digital Communication	Elective	EE611, EE613	3	Program
	EE643	Optical Fiber Communications	Elective	EE611, EE613	3	Program
Level 3	EE724	Integration of renewable energy	Elective	EE622	3	Program
	EE725	Energy economics and regulations	Elective	EE623	3	Program
	EE733	Advanced topics in power electronics	Elective	EE631	3	Program
	EE734	Advanced electrical drive systems	Elective	EE631	3	Program
	EE735	Advanced energy distribution systems	Elective	EE632	3	Program
	EE736	Advanced topics in electrical power system engineering	Elective	EE632	3	Program
	EE737	Energy Efficiency	Elective	EE623	3	Program
	EE744	Satellite Communications	Elective	EE641	3	Program
	EE745	Radar systems engineering	Elective	EE642	3	Program
	EE746	Advanced Wireless Communication	Elective	EE642	3	Program
	EE747	Advanced Digital Signal Processing	Elective	EE643	3	Program
EE748	Statistical Signal Processing	Elective	EE643	3	Program	
EE749	Digital Image Processing	Elective	EE643	3	Program	
Level 4	EE714	Thesis	Required	Completion of 50% of courses and department approval	6	Program

* Include additional levels (for three semesters option or if needed).





** Add a table for the courses of each track (if any)

3. Course Specifications:

Insert hyperlink for all course specifications using NCAAA template (T-104)

https://northernuniversity-my.sharepoint.com/:f:/g/personal/2392159246_nbu_edu_sa/EpkwTZvu1ANlvW1gwVmDgKwBxLo0jowJFCxXDPup3oyS0w?e=7tYWOO

4. Program learning Outcomes Mapping Matrix:

Align the program learning outcomes with program courses, according to the following desired levels of performance (*I = Introduced P = Practiced M = Mastered*).

Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
		K1	S1	S2	S3	S4	V1	V2
Core courses								
EE611	I	I			I	I		I
EE612	I		I	I		I	I	I
EE613	I	I		I		I		I
Elective courses								
EE621	P	P	P	P				P
EE622	P	P	P	P	P			
EE623	P	P		P			P	
EE631	P	P	P				P	
EE632	P	P	P	P	P			
EE641	P	P				P		P
EE642	P	P			P		P	
EE643	P		P	P	P			P
EE724	M	M			M	M		M
EE725	M	M			M		M	
EE733	M	M	M	M	M		M	M
EE734	M	M	M		M	M		
EE735	M	M		M		M		M
EE736	M	M		M		M		
EE737	M	M		M		M	M	
EE744	M	M		M		M	M	
EE745	M	M	M		M			M
EE746	M	M	M			M		
EE747	M	M		M			M	
EE748	M	M	M	M	M			M
EE749	M	M		M		M	M	



Course code & No.	Program Learning Outcomes							
	Knowledge and understanding	Skills				Values, Autonomy, and Responsibility		
		K1	S1	S2	S3	S4	V1	V2
Thesis (if any)	M	M	M	M	M	M	M	M

* Add a separated table for each track (if any).



5. Teaching and learning strategies applied to achieve program learning outcomes:

Describe teaching and learning strategies, to achieve the program learning outcomes in all areas.

- Lecturing** – classical method of delivering facts and information
- Case study** – a detailed analysis is made of some specific, usually compelling event or series of related events so that learners will better understand its nature and what might be done about it.
- Direct instruction** – step by step instruction directed by teacher
- Demonstration** – modelling of knowledge and skills
- Lecture discussion** – group assembles to communicate with one another through speaking and listening about a topic.
- Problem solving** – student work purposefully toward a solution, synthesis, or a cause
- Recitation** – students are given information to study independently
- Reports** – individuals or groups are given or choose topics and shared with other class members
- Tutoring**- step by step sessions to be guided on solving problems

6. Assessment Methods for program learning outcomes:

Describe assessment methods (Direct and Indirect) that can be used to measure the achievement of program learning outcomes in all areas.

The program should devise a plan for assessing Program Learning Outcomes (all learning outcomes should be assessed at least once in the program's cycle).

The direct assessment methods include:

- a. Quizzes, homework, & Assignments: assess gradual understanding of course subjects.
- b. Written Reports (For Projects): assess technical report writing and data collection abilities.
- c. Discussion Groups: assess personal interaction and communication skills.
- d. Midterm Exams: assess understanding of course subjects, problem solving abilities, and analytical and design capabilities.
- e. Final Exam: assess overall understanding of the course as well as analytical and problem solving capabilities.
- f. Research assignment and final project to assess the ability of conducting theoretical and practical research. Usually, a sufficient weight is given to the projects and assignment for the master degree program.

The indirect assessment methods:

Indirect assessment such as Student surveys for the course material, the instructor and the college facility will be introduced and conducted

D. Thesis and Its Requirements (if any):

1. Registration of the thesis:

(Requirements/conditions and procedures for registration of the thesis as well as controls, responsibilities and procedures of scientific guidance)

Student are allowed to register for the thesis course after finishing 9 CH from core courses and 6 CH electives

2. Scientific Supervision:

(The regulations of the selection of the scientific supervisor and his/her responsibilities, as well as the procedures/mechanisms of the scientific supervision and follow-up)

Any graduate student must have a supervisor before he/she starts the program. The supervisor duties include:

- Advise and help students in early registration and registration formalities,
- Provide guidance in dropping and adding courses and in improving academic performance,
- Ensure that the students understand the academic regulations and follow their academic programs in a sequential order,
- Follow-up the students' academic progress, especially those who are not in good academic standing.
- Develop and provide a trusting and respectful environment that allows students to define, develop, and achieve their realistic goals.



- Assist students in gaining learning, communication, decision making, and leadership skills.
- Motivate students' sense of responsibility towards their educational plans and achievements.
- Understand and effectively communicate to students the department policies and procedures, graduation requirements, and educational requirements.
- Guide the students to effectively pursue his research and assist the student in writing his/her dissertation, and provide guidance to ensure successful achievement to the student

3. Thesis Defense/Examination:

(The regulations for selection of the defense/examination committee and the requirements to proceed for thesis defense, the procedures for defense and approval of the thesis, and criteria for evaluation of the thesis)

Defense committee is formed by the department request, and it consists of 3 members 2 from the department and one from other department or college.

H. Student Admission and Support:

1. Student Admission Requirements:

In addition to meeting the University's general graduate admission requirements, applicants must hold a credential deemed academically equivalent to a bachelor's degree in electrical engineering from NBU or other accredited universities recognized by the Ministry of Higher Education of Saudi Arabia. Applicants who have a Bachelor's Degree in Science or Engineering discipline recognized by the Ministry of Higher Education are eligible to enroll in this program.

Academic requirements for graduate admission include the following:

- A minimum cumulative grade-point average (CGPA) of 3.75/5.00 or equivalent.
- As English is the language of instruction in Engineering, applicants must present evidence of competency to pursue studies in the English language prior to being extended an offer of admission.
- Full time and part time: Full time and part time options are available for the students according to their needs.

2. Guidance and Orientation Programs for New Students:

(Include only the exceptional needs offered to the students of the program that differ from those provided at the institutional level).

- Meet with the new students individually to discuss their academic and career goals
- Provide information about the program's curriculum, faculty, resources, and academic policies. Ensure that the students understand the requirements for graduation and how to access support services
- Work with the students to develop a plan for their academic and professional development. This plan should include course selection, research opportunities, and career development activities
- Communicate regularly with the students to ensure that they are on track to meet their goals. Provide constructive feedback and offer guidance on how to improve their academic performance.
- Evaluate the effectiveness of advising and guidance. Ask for feedback from the students and make any necessary changes to our approach.

3. Student Counseling Services:

(Academic, professional, psychological and social)

(Include only the exceptional needs offered to the students of the program that differ from those provided at the institutional level)

Academic advisors provide educational counselling for students. The academic advisor's primary responsibility is to evaluate the student's plan of study to ensure it will satisfy the college and university requirements while it meets each student's specific needs. To be effective, the advisor must recognize that each student has different abilities, interests, aspirations, needs, experiences, and problems so that his approach in dealing with students can be different from one to another.

Counselors at the Deanship of Student Affairs can also support the student in addressing the following issues and concerns; Communication/Assertiveness skills, eating disorders or eating concerns, Physical/Emotional abuse, coping with stress, Depression thoughts, Coping with loss-grief, Conflict resolution, Post-trauma Debriefing, Anxiety/Panic/Phobias, and Homesickness/Loneliness.





For the research track the thesis adviser will be the academic adviser of the student

4. Special Support:

(Low achievers, disabled, and talented students).

The college will provide access to special need students. This support includes handicapped parking's, access to class rooms, labs and college facilities.....etc.

E. Faculty and Administrative Staff:

1. Needed Teaching and Administrative Staff:

Academic Rank	Specialty		Special Requirements / Skills (if any)	Required Numbers		
	General	Specific		M	F	T
Professor		1		1		1
Associate Professor		8		8		8
Assistant Professor		8		6	2	8
Technicians and Laboratory Assistant		1		1		1
Administrative and Supportive Staff						
Others (specify)	1	1		2		2

F. Learning Resources, Facilities, and Equipment:

1. Learning Resources:

Learning resources required by the Program (textbooks, references, and e-learning resources and web-based resources, etc.)

The library contains many textbooks, references, journals and other publications that are regularly updated with newer editions. Reference books and specialized books on various areas of Electrical Engineering are available in the library. The library provides a wide range of online electronic tools such as online scientific databases, library catalog, access to full text articles from top-ranking scientific journals and conference proceedings, etc.

The department has sufficient classrooms for lectures with all required facilities such as whiteboard and an overhead data projector

2. Facilities and Equipment:

(Library, laboratories, classrooms, etc.)

The department maintains 11 educational laboratories. All the laboratories are equipped with advanced equipment and facilities.

3. Procedures to ensure a healthy and safe learning environment:

(According to the nature of the program)

The college has a committee for lab and equipment and in charge of security and maintenance.



G. Program Quality Assurance:

1. Program Quality Assurance System:

Provide a link to quality assurance manual.

[University Quality Manual](#)

You can also copy the link and paste in a web browser:

<https://quality-academic-accreditation-dean.nbu.edu.sa/regulations>

Program Quality Manual (Please copy the link and paste in a web browser):
shorturl.at/iwWY1

2. Program Quality Monitoring Procedures:

- The college of engineering has The Quality Assurance and Academic Accreditation committee.
- The office members represent all the engineering programs
- The representative member of each program (department) is responsible for the development of the program in terms of quality assurance.
- The teaching staff in the program is responsible and will work for the development of the program.
- Monitoring Procedure is described in the college Quality Assurance handbook.

3. Procedures to Monitor Quality of Courses Taught by other Departments:

NA

4. Procedures Used to Ensure the Consistency between within the main campus:

(including male and female sections).

To ensure consistency between the male and female sections in the Program of Master of Science in Electrical Engineering, we must implement the following steps:

1. Standardize the educational Curriculum:

- Establish a standardized curriculum that integrates core and elective courses, learning outcomes, and assessment methods
- Maintain consistency in course content, topics, and depth of knowledge across all sections (including male and female sections).

2. Appoint course supervisors:

- Assign a course coordinator for each course across all sections (male and female sections) to maintain quality and consistency
- The coordinator is responsible for overseeing course content, providing guidance to instructors, and ensuring alignment with program outcomes (including male and female sections).

3. Establish a uniform evaluation strategy:

- Implement a uniform assessment plan across all course sections, including male and female sections.
- Maintain consistency in assessment methods, grading criteria, and deadlines to ensure fairness and equity in evaluations.

5. Assessment Plan for Program Learning Outcomes (PLOs):

The assessment and evaluation process of the learning outcomes (PLOs) briefly described as follows:

1. Assessment process:

- Data Collection: Data is collected using different instruments, as explained in chart below for student outcomes.
- Data Preparation: Data collected in the previous step is checked and validated to make sure it is correct and consistent to be used for evaluation.

2. Evaluation process:



- Data Interpretation: A set of metrics are calculated (depending on the data), using the average score achieved in a specific student outcome or educational objective.
- Attainment Evaluation: The attainment of students' outcomes is evaluated by comparing the real achievements with the targets for each objective and outcome.
- Issue Analysis: If achievements are higher or equal to targets, the objective or outcome is considered attained. If not, an analysis is required to understand the reasons behind the non-attainment of that objective or outcome.
- Improvement Plan: Based on the analysis of the reasons behind the non-attainment of an objective or an outcome, an improvement plan is decided in order to overcome the identified issues. Then, a new assessment cycle begins.

Several committees are involved in the assessment and evaluation processes of the educational objectives and the student outcomes including Quality and Academic Accreditation Committee, Curriculum Committee, Engineering Training Committee, Senior Design Committee, and the Assessment and Continuous Improvement Committee.

6. Program Evaluation Matrix:

Evaluation Areas/Aspects	Evaluation Sources/References	Evaluation Methods	Evaluation Time
Leadership	Faculty	surveys	End of academic year
Effectiveness of Teaching & Assessment	Students	surveys	End of each semester
Learning resources	Students and faculty	Surveys	End of each semester
Partnership	Alumni and Employers	Surveys	End of academic year
Research	review	Publications	End of academic year

Evaluation Areas/Aspects (e.g., leadership, effectiveness of teaching & assessment, learning resources, services, partnerships, etc.)

Evaluation Sources (students, graduates, alumni, faculty, program leaders, administrative staff, employers, independent reviewers, and others.)

Evaluation Methods (e.g., Surveys, interviews, visits, etc.)

Evaluation Time (e.g., beginning of semesters, end of the academic year, etc.)

7. Program KPIs:*

The period to achieve the target 5 years.

No.	KPIs Code	KPIs	Target ed Level	Measurement Methods	Measurement Time
1	KPI_P-01	Students' Evaluation of Quality of learning experience in the Program	4	Indirect Average overall rating of final year students for the quality of learning experience in the program. (Five-point scale survey)	End of the academic year.
2	KPI_P-02	Students' evaluation of the quality of the courses.	4	Indirect Average students' overall rating of the quality of courses in an annual survey. (Five-point scale survey)	End of the academic year.
3	KPI_P-03	Students' evaluation of the quality of academic supervision	4	Indirect Average students' overall rating of the quality of scientific supervision in an annual survey. (Five-point scale survey)	End of the academic year.
4	KPI_P-04	Average time for students' graduation	4 semesters	Direct Average time (in semesters) spent by students to graduate from the program.	End of the academic year.
5	KPI_P-05	Rate of students dropping out of the program	≤ 4%	Direct Percentage of students who did not complete the program to the total number of students in the same cohort.	End of the academic year.
6	KPI_P-06	Employers' evaluation of the program graduates' competency	4	Indirect Average of the overall rating of employers for the competency of the program graduates in an annual survey. (Five-point scale survey)	Annual
7	KPI_P-07	Students' satisfaction with services provided	4	Indirect Average of students' satisfaction rate with the various services provided by the program (food, transportation,	End of the academic year.



No.	KPIs Code	KPIs	Target ed Level	Measurement Methods	Measurement Time
				sports facilities, academic advising, ...) on a five-point scale in an annual survey.	
8	KPI_P-08	Ratio of students to faculty members	≤3/1	Direct The ratio of the total number of students to the total number of full-time and fulltime equivalent faculty members participating in the program.	End of the academic year.
9	KPI_P-09	Percentage of publications of faculty members	90 %	Direct Percentage of faculty members participating in the program with at least one research publication during the year to total faculty members in the program	End of the academic year.
10	KPI_P-10	Rate of published research per faculty member	2	Direct The average number of refereed and/or published research per each faculty member participating in the program during the year. (Total number of refereed and/or published research to the total number of faculty members during the year)	End of the academic year.
11	KPI_P-11	Citations rate in refereed journals per faculty member	4	Direct The average number of citations in refereed journals from published research (total number of citations in refereed journals from published research for faculty members to the total published research).	End of the academic year.
12	KPI_P-12	Percentage of students' publication	40%	Direct Percentage of students who: a. published their research in refereed journals. b. presented papers at conferences. to the total number of students in the program during the year.	End of the academic year.
13	KPI_P-13	Number of patents, innovative products, and awards of excellence	³ 2 every two years	Direct Number of: a. Patents and innovative products b. National and international excellence awards obtained annually by the students and staff of the program.	End of the academic year.

*including KPIs required by NCAAA

H. Specification Approval Data:

Council / Committee	Electrical Engineering Department Council
Reference No.	No 15
Date	02 /06 /2024

