The Higher Institute of Engineering in El-Shorouk City

Electrical Power and Machines Engineering Department

Electrical Power and Machines Engineering Program Specifications (2024-2025)

Regulation 2019

General

A. Basic Information

1- Program Title:	Electrical Power and Machines Engineering
2- Program type:	Single
3- Department responsibility:	Electrical Power and Machines Engineering
4- Coordinator:	Prof. Dr. Aboul Fotouh Abdel Rehiem Mohamed
5- External evaluator:	Prof. Dr. Ibrahim Abdelghafar Badran
6- Internal evaluator:	Dr. Mohamed Tawfik
7- Year of specification approval:	2024 / 2025
8- Dates of regulation approval:	2019

B. Professional Information

Institute Mission

Preparation of creative engineers through various academic programs. Distinguished graduate engineers in different disciplines meet the needs of the labor market. The development of scientific research to integrate with the industry and the local community requirements.

Program Vision

Promoting the educational process to achieve quality assurance and keep up with the distinguished corresponding programs in education and scientific research.

Program Mission

Preparing distinguished engineers capable of creativity [1], innovation and craftsmanship [2] to meet the requirements of the labor market [3].

To judge the compatibility between the program mission and institute mission, see the matrix in **Appendix 1.1**.

1. Program Aims

The EPM program prepares its graduates to become intellectual leaders in the industry. Graduates are grounded in scientific, mathematical, and technical knowledge and relevant technologies that give them the ability to analyze, synthesize, and design engineering systems. The program aims are:

X1. Enter professional employment and/or graduate study in several areas of Electrical and Electronic Engineering including, Electronics, Communications, Control, and Electric Power.

X2. Identify, analyze, and solve practical problems, making use of appropriate engineering tools and techniques.
X3. Work with contemporary laboratory instrumentation, design and perform experiments, and analyze and interpret the results.
X4. Communicate effectively through speaking, writing, and using graphics, functioning collaboratively within multi-disciplinary problem-solving teams.
X5. Use their understanding of professional, ethical, and social responsibilities and the importance of life-long learning in the conduct of their careers.
X6. Adapt successfully to changing technologies and apply their skills in new contexts to meet the demands of society.
X7. Provide an efficient program environment that encourages continuous self-learning and progression in career.

To judge the compatibility of the program mission with its aims, see the matrix in **Appendix 1.2.**

2. The attributes of Electrical power and machines engineer

According to the National Academic Reference Standard (NARS2018), the graduates of the EPM program must satisfy the following attributes:

1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real-life situations.
2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.
3. Behave professionally and adhere to engineering ethics and standards.
4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community.
6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles.
7. Use techniques, skills, and modern engineering tools necessary for engineering practice.
8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post-graduate and research studies.
9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.
10. Demonstrate leadership qualities, business administration and entrepreneurial skills.

To judge the compatibility of program attributes with program mission, see the matrix in **Appendix 1.3.**

To judge the compatibility of program attributes with program aims, see the matrix in **Appendix 1.4.**
In addition, to judge the compatibility of program attributes with program competencies, see the matrix in **Appendix 1.5.**

3. Learning Outcomes (LO's)

3.1. Competencies of engineering graduate (Level A)

The Engineering Graduate must be able to:

A- General Engineering NARS Competencies in 2018		
Level A (NARS)	A.1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
	A.2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.
	A.3	Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
	A.4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
	A.5	Practice research techniques and methods of investigation as an inherent part of learning.
	A.6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.
	A.7	Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.
	A.8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
	A.9	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
	A.10	Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

3.2. Competencies of basic electrical engineering (Level B)

The electrical engineering graduate must be able to:

B- Electrical NARS Competencies in 2018		
Level B (NARS)	B.1	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.
	B.2	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
	B.3	Design and implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
	B.4	Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
	B.5	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.

3.3. High specialized competencies (Level C)

The graduates of the electrical engineering program should be able to:

In addition to the competencies for all engineering programs (Level A) and the competencies for the BASIC Electrical engineering discipline (Level B), the Electrical Power & Machines Engineering Program graduate must be able to (Level C):

- A brain storming was made in a meeting dated 20/9/2023 in the Electrical Power Engineering Department to define the program competencies (Highly specialized).
- The benchmark references have been assured from The Stanford University Electrical Power Engineering (Standford.edu).

C- Electrical Power and Machines Engineering ARS		
Level C (ARS)	C.1	Identify and formulate engineering problems to solve problems in the field of electrical power and machines engineering.
	C.2	Test and examine components, equipment and systems of electrical power and machines.
	C.3	Analyze the performance of electric power generation, control, and distribution systems.
	C.4	Integrate electrical, electronic, and mechanical components and equipment with transducers, actuators, and controllers in creatively computer-controlled systems.

To judge the compatibility of program aims with its competencies, see the matrix in **Appendix 1.5.**

4. Academic Standards of Program

The EPM program adopted exactly as National Academic Reference Standards (**NARS**) of engineering program (August 2018) which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE.

5. Program Structure and Contents

a. Program duration 10 semesters (5-years)

b. Program Structure:

i.	No. of hours: 250	:	235 Compulsory		15 Elective	
ii.	No. of contact hours: 250	:	130 Lectures		80 Tutorial	40 Lab
iii.	Contact hours of Lectures: 130 hours = 52%					
iv.	Contact hours of Tutorials: 80 hours = 32%					
v.	Contact hours of Lab: 40 hours = 16%					

Practical/Field Training (Not Prerequisite): the students carry out 3 weeks of field training after the freshman year and after the sophomore year.

c. Program Years:

Year	Hours		
	Compulsory	Elective	Total
Preparatory	50	0	50
First	50	0	50
Second	50	0	50
Third	50	0	50
Fourth	35	15	50
Subtotal Hours			250

d. Program Levels and Courses

Preparatory Year

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 011	Mathematics (1)	2	2		4		2	60		90	150		4		
PHM 013	Physics (1)	2	1	2	5		2	30	30	90	150		5		
PHM 015	Mechanics (1)	2	2		4		2	60		90	150		4		
ARC 011	Engineering drawing & projection (1)	1	2		3		2	40		60	100		3		
CHE 011	Chemistry (1)	2	1	1	4		2	20	20	60	100		4		
HUM 013	Computer skills	1		2	3		2	10	10	30	50	3			
HUM 011	Technical language (1)	1		1	2		2	10	10	30	50	2			
Total		**11**	**8**	**6**	**25**						**750**	**5**	**20**		

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 012	Mathematics (2)	2	2		4		2	60		90	150		4		
PHM 014	Physics (2)	2	1	2	5		2	30	30	90	150		5		
PHM 016	Mechanics (2)	2	2		4		2	60		90	150		4		
ARC 012	Engineering drawing & projection (2)	1	2	2	5		2	20	20	60	100		5		
HUM 017	Production technology	1		2	3		2	15	15	45	75		3		
HUM 014	History of Eng. & Tech.	2			2		2	25		50	75	2			
HUM 012	Technical language (2)	1		1	2		1	10	10	30	50	2			
Total		**11**	**7**	**7**	**25**						**750**	**4**	**21**		

First Year

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPM 111	Electrical circuits (1)	2	2	1	5		2	30	30	90	150			5	
PHM 133	Economics and statistics	2	1		3		2	40		60	100		3		
EPM 113	Electrical & magnetic fields	2	1		3		2	40		60	100			3	
HUM 131	Technical writing , research and analysis	2	1		3		2	25		50	75	3			
HUM 1XX1	Selective Course Humanities(١)	2	1		3		2	25		50	75	3			
PHM 131	Mathematics (3)	2	2		4		2	50		75	125		4		
PHM 134	Physics (3)	2		2	4		2	25	25	75	125		4		
Total		**14**	**8**	**3**	**25**						**750**	**6**	**11**	**8**	

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 132	Mathematics (4)	2	1		3		2	25		50	75		3		
PHM 135	Physics (4)	2		1	3		2	20	20	60	100		3		
CVE 112	Civil Engineering	2	1		3		2	40		60	100		3		
EPM 112	Electrical circuits (2)	2	2	1	5		2	30	30	90	150			5	
EPM 114	Basis of energy conversion	2	2		4		2	50		75	125			4	
EPM 121	Electrical Measurements(1)	2		2	4		2	25	25	75	125			4	
HUM 1XX2	Selective course humanities(2)	2	1		3		2	25		50	75	3			
Total		**14**	**7**	**4**	**25**						**750**	**3**	**9**	**13**	

Second Year

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 231	Mathematics (5)	2	1		3		2	25		50	75		3		
EPM 213	Electrical circuits (3)	2	2		4		2	50		75	125			4	
EPM 241	Electrical Machines (1)	2	2		4		2	50		75	125			4	
EPM 222	Electrical Measurements(2)	1	1	2	4		2	25	25	75	125			4	
EPM 291	Mechanical Engineering	2	1		3		2	40		60	100			3	
ECE 231	Electronics and Logic Circuits	3	1		4		2	50		75	125			4	
HUM 231	Contracts, Laws, Quantities and Specs.	2	1		3		2	25		50	75		3		
Total		**14**	**9**	**2**	**25**						**750**		**6**	**19**	

Second Semester

Code	Course Name		Teaching Hours					Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 232	Mathematics (6)	2	1		3		2	25		50	75		3		
EPM 231	Electrical power generation and Eco. Oper.	2	2		4		2	50		75	125			4	
EPM 242	Electrical Machines (2)	2	2		4		2	50		75	125				4
EPM 252	Automatic Control system (1)	2	1		3		2	40		60	100			3	
EPM 292	Thermo Dyynamics	2	1		3		2	25		50	75			3	
ECE 249	Signals and Comunication Systems	3	1		4		2	50		75	125			4	
EPM 271	Computer programming	2		2	4		2	25	25	75	125			4	
Total		**15**	**8**	**2**	**25**						**750**		**3**	**18**	**4**

Third Year

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPM 331	Electrical Power sys. (1)	2	2		4		2	50		75	125			4	
EPM 333	Protection of Electrical Power Systems (1)	2	1		3		2	40		60	100			3	
EPM 343	Electrical Machines (3)	2	2		4		2	50		75	125				4
EPM 323	Electrical testing (1)	1	1	2	4		2	20	20	60	100			4	
EPM 372	Electrical Power Simulations	2		2	4		2	25	25	75	125			4	
HUM 331	Projects management	2	1		3		2	25		50	75		3		
EPM 381	Training★	1		2	3		2	50		50★	100				3
Total		**12**	**7**	**6**	**25**						**750**		**3**	**15**	**7**

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPM 332	Electrical Power sys. (2)	2	1		3		2	40		60	100				3
EPM 334	Protection of Electrical Power Systems (2)	2	1	1	4		2	25	25	75	125				4
EPM 335	New and Renewable Energy	2		1	3		2	40		60	100				3
EPM 324	Electrical testing (2)	1	1	2	4		2	20	20	60	100				4
EPM 336	Electrical Installations and Specifications	2	1		3		2	25		50	75				3
EPM 353	Automatic Control system (2)	2	1	1	4		2	25	25	75	125				4
EPM 362	Power Electronics (1)	2	1	1	4		2	25	25	75	125				4
Total		**13**	**7**	**5**	**25**						**750**				**25**

- Field training is available for 3rd -level students during the summer period and is evaluated from 50 marks in the Training subject (EPM 381).

Fourth Year

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPM 431	Electrical Power sys. Analysis (1)	2	2		4		2	40		60	100				4
EPM 430	High Voltage Engineering	2	2		4		2	40		60	100			4	
EPM 463	Power Electronics (2)	2	1	1	4		2	25	25	75	125				4
EPM 4AA	specialized elective course (1)	2	1		3		2	40		60	100				3
EPM 4BB	specialized elective course (2)	2	1		3		2	40		60	100				3
HUM 4XX	Selective course humanities(3)	2	1		3		2	25		50	75	**3**			
EPM 481	Graduation Project★	1	1	2	4			100	50★		150				4
Total		**13**	**9**	**3**	**25**						**750**	**3**		**4**	**18**

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPM 432	Electrical Power sys. Analysis (2)	2	2		4		2	40		60	100				**4**
EPM 447	Utilization of elec. Power	2	2		4		2	50		75	125			**4**	
EPM 446	Electrical Drive systems	2	2		4		2	50		75	125				**4**
EPM 4CC	specialized elective course (3)	2	1		3		2	40		60	100				**3**
EPM 4DD	specialized elective course (4)	2	1		3		2	40		60	100				3
EPM 4EE	specialized elective course (5)	2	1		3		2	40		60	100				3
EPM 481	Graduation Project	1	1	2	4			100			100				**4**
Total		**13**	**10**	**2**	**25**						**750**			**4**	**21**

- Field training is available for 4th-level students during the summer period and is evaluated from 50 marks based on the practical grades in the first term of the graduation project (EPM 481).

Total teaching hours and subject's distribution over the subject areas electrical power and machines engineering

	Semester	Course teaching hours	Univ. Req.	Faculty Req.	General. Req.	Special Req.
Prep.	1st	25	5	20		
	2nd	25	4	21		
First	1st	25	6	11	8	
	2nd	25	3	9	13	
Second	1st	25		6	19	
	2nd	25		3	18	4
Third	1st	25		3	15	7
	2nd	25				25
Fourth	1st	25	3		4	18
	2nd	25			4	21
Total of Five Years		250	21	73	82	75
% of Five Years		100%	**8.4%**	**29.2%**	**32.8%**	**30%**
Reference Frame 2020			**8%**	**20%**	**35%**	**30%**
			Min.	**Min.**	**Min.**	**Max.**

The above table shows the agreement with Reference Frame 2020 requirements.

Specialized Elective Courses

Course Code	Course Title	Weekly Hrs.				Total Marks Score			Examination Duration (Hrs.)	Total Marks
		Lectures	Tutorial	Practical	Total Hours	Final	Semester works	Practical /		
EPM 4AA - Specialized Elective Course (1)										
EPM 473	Computer Applications in Electric Power systems	2	-	1	3	60	20	20	2	100
EPM 451	Programmable Logic Control	2	-	1	3	60	20	20	2	100
EPM 434	Advanced Studies in Protection Equipment and Systems	2	-	1	3	60	20	20	2	100
EPM 4BB - Specialized Elective Course (2)										
EPM 445	Special Electric Machines	2	1	-	3	60	40	-	2	100
EPM 448	Electric Machines Design	2	1	-	3	60	40	-	2	100
EPM 435	Modern Power Systems	2	1	-	3	60	40	-	2	100
EPM 4CC - Specialized Elective Course (3)										
EPM 454	Digital Control	2	1	-	3	60	20	20	2	100
EPM 455	Control System Technologies	2	1	-	3	60	20	20	2	100
EPM 456	Industrial Control System	2	1	-	3	60	20	20	2	100
EPM 4DD - Specialized Elective Course (4)										
EPM 436	Electrical Power Quality	2	1	-	3	60	40	-	2	100
EPM 437	Planning of Electric Power Systems	2	1	-	3	60	40	-	2	100
EPM 438	Reliability of Electric Power Systems	2	1	-	3	60	40	-	2	100
EPM 4EE - Specialized Elective Course (5)										
EPM 439	Advanced Studies in High Voltage Engineering	2	1	-	3	60	40	-	2	100
EPM 433	Control in Electric Power Systems	2	1	-	3	60	40	-	2	100
EPM 464	Advanced Studies in Power Electronics	2	1	-	3	60	40	-	2	100

Field Training courses

Course Code	Course Title	Weekly Hrs.				Total Marks Score				
		Lectures	Tutorial	Practical	Total Hours	Final	Semester works	Practical /Oral	Examination Duration (Hrs.)	Total Marks
Field Training for Training Course										
EPM 282	**Generation Stations**	-	-	2	2	-	-	50	-	50
EPM 283	**Transformers Substations**	-	-	2	2	-	-	50	-	50
EPM 284	**Renewable Energy**	-	-	2	2	-	-	50	-	50
Field Training Courses Qualifying for The Graduation Project										
EPM 382	**Control of Industrial Systems**	-	-	2	2	-	-	50	-	50
EPM 383	**Electrical Systems Protection**	-	-	2	2	-	-	50	-	50
EPM 384	**Electrical Installations**	-	-	2	2	-	-	50	-	50

Humanities Elective Courses

Course Code	Course Title	Weekly Hrs.				Total Marks Score			Examination Duration (Hrs.)	Total Marks
		Lectures	Tutorial	Practical	Total Hours	Final	Semester works	Practical		
Humanities Elective Course 1 (HUM 1XX1)										
HUM 132	**Engineering Economy**	2	1	-	3	50	25	-	2	75
HUM 133	**Electrical Safety and Risk Assessment**	2	1	-	3	50	25	-	2	75
Humanities Elective Course 2 (HUM 1XX2)										
HUM 134	**Business Administration and Communication Skills**	2	1	-	3	50	25	-	2	75
HUM 135	**Electrical Projects Management and Installations**	2	1	-	3	50	25	-	2	75
Humanities Elective Course 3 (HUM 4XX)										
HUM 431	**The Environmental Impact of Projects**	2	1	-	3	50	25	-	2	75
HUM 432	**Environment and Community Service**	2	1	-	3	50	25	-	2	75

6. Courses Specifications

These courses specifications were revised and approved in 2019. Program– courses LO's Matrix is given in **Appendix 1.6.** Course specifications are listed in **Appendix 2.**

7. Program admission requirements

- Secondary Egyptian Schools Graduates.

- Secondary School Certificate Graduates of other countries are eligible to join this program if they met the minimum grades set by Admission Office of the Ministry of Higher Education.
- The study begins with a preparatory year for all students before specialization in Electrical Power and Machines Engineering. Students' departmental allocation is in accordance with the institute Council regulations.

8. Regulations for progression and program completion

a. The student is considered successful if he passes the examinations in all courses of his class.

b. The student is promoted to the next higher level if he fails in not more than two subjects of his class or from lower classes,

c. In addition to the two subjects mentioned in the previous item, the student who fails in two subjects in humanities and social sciences, whether from his class or from lower classes, is admitted to the transfer to the consecutive higher level. Passing successfully in all courses before obtaining the B.Sc. degree is a prerequisite.

d. The referred student has to sit the examination in the courses in which he has failed together with the students studying the same courses. The student gets a pass grade when he passes the examination successfully. In case the student was considered absent with acceptable excuse in a course, he gets the actual grade,

e. The grades of the successful student in a course and in the general grade are evaluated as follows:
- Distinction: from 85% of the total mark and upwards.
- Very good: from 75% to less than 85% of the total mark.
- Good: from 65% to less than 75% of the total mark
- Pass: from 50% to less than 65% of the total mark

f. The grades of a failing student in a course are estimated in one of' the following grades:
- Weak: from 30% to less than 50% of the total mark
- Very weak: less than 30% of the total mark.

g. The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study. The students are then arranged serially according to their cumulative sum.

h. The student is awarded an honor degree ii his cumulative sum is distinction or very good provided that he gets a grade not less than very good in any class of study other than the preparatory year. Moreover, he should have not failed in any examination he has sat in any class other than the preparatory year.

Grade	Percentage	
	From	Up to
Distinction	85%	100%
Very good	75%	85%
Good	65%	75%
Pass	50%	65%
The grades of a failing student in a course are estimated in one of' the following grades:		
Weak	30%	50%
Very weak		less than 30%

9. Teaching and Learning Methods

1- Interactive lectures
2- Mini – project
3- Problem-Based Learning (PBL) sessions
4- Practical
5- Flipped classroom
6- Self-learning

10. Assessment Methods

Method (tool)	LO's
1. Written exam	To assess competencies: A & B
2. Quizzes and reports	To assess competencies: A & B
3. Oral exams	To assess competencies: A, B & C
4. Practical	To assess competencies: A, B & C
5. Project applied on a practical field problem	To assess competencies: A, B & C

11. Program Evaluation

Evaluator	Tool	Sample
1. Senior students	Meeting Questionnaire	25%
2. Alumni	Meeting	5%
3. Stakeholders (Employers)	Meeting Questionnaire	Samples representative from all sectors
4. External Evaluator(s) (External Examiner(s))	Reviewing according to an external evaluator Checklist report	Reports **Appendix 3**
5. Internal Evaluator(s) (Internal Examiner(s))	Report	Reports
6. Others	None	

Head of
Electrical Power Engineering Program
Prof. Dr. Aboul Fotouh Abdel Rehiem Mohamed

Date 5 / 9 / 2024

Appendices

Appendix 1 *Matrices*

- **Appendix 1.1 : Matching matrix of institute mission and program mission.**
- **Appendix 1.2 : Matching matrix of program mission and program aims.**
- **Appendix 1.3 : Matching matrix of program mission and program attributes.**
- **Appendix 1.4: Matching matrix of program attributes and program aims.**
- **Appendix 1.5: Matching matrix of program attributes and program competencies**
- **Appendix 1.6: Matching matrix of program aims and program competencies.**
- **Appendix 1.7: Matching matrix of Courses and program Competencies.**

Appendix 2 *Staff Members*

Appendix 3 *External Evaluator Report*

Appendix 4 *Courses Specifications*

Appendix 1.1

Matching matrix of institute mission and program mission

Key Words of Institute Mission / Key Words of Program Mission	Preparation of creative engineers	Distinguished graduate engineers in different disciplines	Meet the needs and requirements of the labor market	The development of scientific research to integrate with the industry and the local community requirements
Preparing distinguished engineers capable of creativity [1]	√			
innovation and craftsmanship [2]		√		√
meet the requirements of the labor market [3]			√	

Appendix 1.2

Matching matrix of program mission and program aims

Key Words of Program Mission / Program Aims	*Preparing distinguished engineers capable of creativity* [1]	innovation and craftsmanship [2]	*meet the requirements of the labor market* [3]
X1	√		
X2	√		
X3		√	
X4		√	
X5			√
X6			√
X7	√		

Appendix 1.3

Matching matrix of program mission and program attributes

Key Words of Program Mission / Attributes	*Preparing distinguished engineers capable of creativity* [1]	innovation and craftsmanship [2]	*meet the requirements of the labor market* [3]
1	√		
2	√		
3			√
4			√
5	√	√	
6			√
7		√	
8			√
9		√	
10			√

Appendix 1.4

Matching matrix of program attributes and program aims

Program Aims	Program Attributes									
	1	2	3	4	5	6	7	8	9	10
X1			√	√	√			√		√
X2	√	√				√	√			
X3					√				√	
X4				√	√				√	
X5					√				√	√
X6					√		√			
X7	√	√								

The attributes of Electrical power and machines engineer	***Program Aims***
3. Behave professionally and adhere to engineering ethics and standards. 4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance. 5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 8. Assume full responsibility for own learning and self-development, engage in lifelong learning and demonstrate the capacity to engage in post- graduate and research studies. 10. Demonstrate leadership qualities, business administration and entrepreneurial skills	*X1. Enter professional employment and/or graduate study in several areas of Electrical engineering including; distribution systems, Control, and Electric Power systems.*
1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations. 2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation. 6. Improve the analysis and solving problems skills for electrical engineers 7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	*X2. Identify, analyze, and solve practical problems, making use of appropriate engineering tools and techniques*
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 9. Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	*X3. Work with contemporary laboratory instrumentation, design and perform experiments, and analyze and interpret the results.*
4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance.	*X4. Communicate effectively through speaking, writing, and using graphics,*

The attributes of Electrical power and machines engineer	*Program Aims*
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. Value the importance of the environment, both physical and natural, and work to promote sustainability principles. 9. Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner.	*functioning collaboratively within multi-disciplinary problem-solving teams.*
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 9. Communicate effectively using different modes, tools and languages with various audiences; to deal with academic/professional challenges in a critical and creative manner. 10. Demonstrate leadership qualities, business administration and entrepreneurial skills.	*X5. Use their understanding of professional, ethical, and social responsibilities and the importance of life-long learning in the conduct of their careers.*
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	*X6. Adapt successfully to changing technologies, and apply their skills in new contents to meet the demands of society*
1. Master a wide spectrum of engineering knowledge and specialized skills and can apply acquired knowledge using theories and abstract thinking in real life situations. 2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation.	*X7. Provide an efficient program environment which encourages continuous self-learning and progression in career.*

Appendix 1.5

Matching matrix of program attributes and program competencies

Program Attributes	Program Competencies																		
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
1	√										√				√	√			√
2		√							√			√				√		√	√
3				√									√		√		√		√
4						√	√												
5						√	√												
6			√	√										√					
7					√								√				√		√
8					√				√	√									
9								√											
10						√													

Appendix 1.6

Matching matrix of program aims and program competencies

Program Aims	Program Competencies																		
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
X1										√		√	√						√
X2	√					√					√		√			√		√	
X3		√												√			√		
X4							√	√	√										√
X5			√																
X6				√															
X7					√					√					√				

Appendix 1.7: Matching matrix of Courses and program Competencies

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
PHM 011	Mathematics (1)	√	√																	
PHM 013	Physics (1)	√	√																	
PHM 015	Mechanics (1)	√	√	√							√									
ARC 011	Engineering drawing & projection (1)		√						√	√										
CHE 011	Chemistry (1)	√	√	√																
HUM 013	Computer skills	√	√								√									
HUM 011	Technical language (1)							√	√		√									
PHM 012	Mathematics (2)	√	√																	
PHM 014	Physics (2)	√	√																	
PHM 016	Mechanics (2)	√	√	√							√									
ARC 012	Engineering drawing & projection (2)		√						√	√										
HUM 017	Production technology			√	√		√		√		√									
HUM 014	History of Eng. & Tech.			√	√	√		√			√									
HUM 012	Technical language (2)							√	√		√									

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 111	Electrical circuits (1)											√	√							
PHM 133	Economics and statistics		√																	
EPM 113	Electrical & magnetic fields											√								
HUM 131	Technical writing, research and analysis								√	√										
HUM 1XX1	Selective course humanities (1)			√																
PHM 131	Mathematics (3)	√																		
PHM 134	Physics (3)	√	√																	
PHM 132	Mathematics (4)	√																		
PHM 135	Physics (4)	√	√																	
CVE 112	Civil Engineering				√															
EPM 112	Electrical circuits (2)												√							
EPM 114	Basis of energy conversion											√								
EPM 121	Electrical Measurements (1)											√								
HUM 1XX2	Selective course humanities (2)							√												
PHM 231	Mathematics (5)	√																		
EPM 213	Electrical circuits (3)													√						

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 241	Electrical Machines (1)											√								
EPM 222	Electrical Measurements (2)												√							
EPM 291	Mechanical Engineering											√								
ECE 231	Electronics and Logic Circuits													√						
HUM 231	Contracts, Laws, Quantities and Specs.						√													
PHM 232	Mathematics (6)	√																		
EPM 231	Electrical power generation and Eco. Oper.												√							
EPM 242	Electrical Machines (2)																√	√		
EPM 252	Automatic Control system (1)												√							
EPM 292	Thermo Dynamics											√								
ECE 249	Signals and Communication Systems													√						
EPM 271	Computer programming											√								
EPM 331	Electrical Power sys. (1)											√								
EPM 333	Protection equip. & sys. (1)																√			
EPM 343	Electrical Machines (3)																√	√		

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 323	Electrical testing (1)														√					
EPM 372	Electrical Power Simulations													√	√					
HUM 331	Projects management				√		√													
EPM 381	Training																√	√		
EPM 332	Electrical Power sys. (2)																√			
EPM 334	Protection equip. & sys. (2)																	√	√	
EPM 335	New and Renewable Energy																		√	
EPM 324	Electrical testing (2)																	√		
EPM 336	Electrical Installations & standard specification																	√		
EPM 353	Automatic Control system (2)																		√	
EPM 362	Power Electronics (1)																			√
EPM 431	Electrical Power sys. Analysis (1)																		√	
EPM 430	High Voltage Engineering																√			
EPM 463	Power Electronics (2)																	√		√

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 473	Specialized elective course (1) (Computer application in power sys.) - ETAP																		√	
EPM 451	Specialized elective course (1) (Programmable logic control – PLC)																	√		√
EPM 434	Specialized elective course (1) (Advanced in protection sys.)																			√
EPM 445	Specialized Selective course (2) (Special Machines)																√			
EPM 448	Specialized Selective course (2) (Machine Design)																√			
EPM 435	Specialized Selective course (2) (Modern power systems)																		√	
HUM 4XX	Elective course humanities (3)				√															

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 432	Electrical Power sys. Analysis (2)																		√	
EPM 447	Utilization of elec. Power															√				
EPM 446	Electrical Drives and traction systems																			√
EPM 454	Specialized elective course (3) (Digital Control)																			√
EPM 455	Specialized elective course (3) (Control System technique)																			√
EPM 456	Specialized elective course (3) (Industrial Control Systems)																			√
EPM 436	Specialized elective course (4) (Electrical Power Quality)																√			
EPM 437	Specialized elective course (4) (Power system planning)																		√	

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Electrical Power and Machines Engineering Competencies (ARS)			
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4
EPM 438	Specialized elective course (4) (Reliability of Electric Power System)																√			
EPM 439	Specialized elective course (5) (Advanced in High Voltage Engineering)																√			
EPM 433	Specialized elective course (5) (Power system control)																			√
EPM 464	Specialized elective course (5) (Advanced in power electronics)																			√
EPM 481	Graduation Project (1)																√	√	√	√