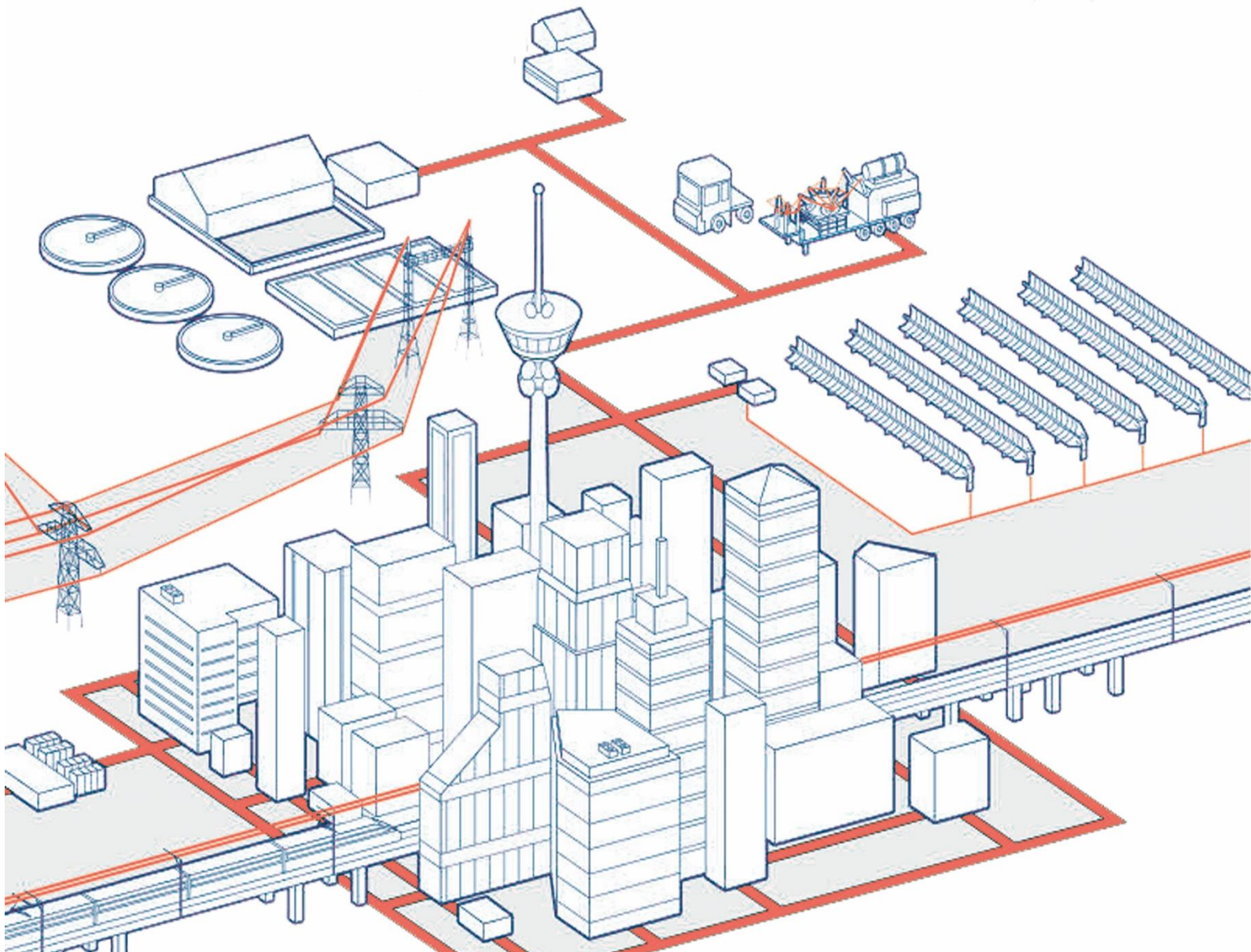


Student Guide

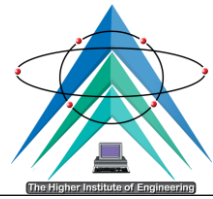
of Electrical Power and Machines Department

2024-2025

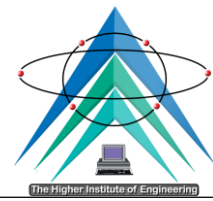




Ministry of Higher Education and Scientific Research
Higher Institute of Engineering in EL-Shourouk
Electrical Power and Machines Engineering Department
Electrical Power and Machines Program

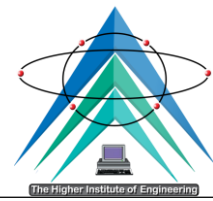


Electrical Power and Machines Engineering (EPM) Program Student Guide

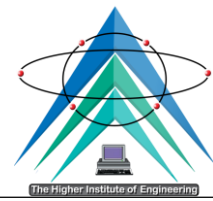


List of Contents

Introduction to the Guide.....	6
First: Basic information about the program.....	6
Second: Definition of the program.....	7
Third: Vision, Mission and Objectives of the Program.....	9
(1) Program Vision.....	9
(2) Program Mission.....	9
(3) Program objectives.....	9
(3-1) General objectives of the program.....	9
(3-2) Educational objectives of the program.....	10
Fourth: Distinctive features of the program.....	11
Fifth: Specifications of the program graduate... ..	12
(5-1) General specifications of the graduate.....	12
(5-2) Special specifications of the graduate	13
Sixth: Fields of work of the program graduate.....	13
Seventh: Organizational structure.....	17
Department of Electrical Power and Machines Engineering.....	17
Eighth: Definition of the program committees.....	18
Ninth: Departments and units supporting the program.....	
(1) Student Support Unit.....	19
(2) Education and Student Affairs Department.....	19
(3) Unit Development and e-learning	19
(4) Scientific Library	20



(5) Student Care Department	20
(6) Examinations Department	20
(7) Crisis and Disaster Management Unit	20
(8) Follow-up Department	21
(9) Legal Affairs Department	21
(10) Security Department	21
(11) Transportation Department	21
(12) Medical Administration	22
(13) Graduate Affairs Unit	22



Introduction to the guide

The program aims to prepare and qualify students to practice the profession of electrical power and machinery engineering effectively in the Egyptian and global labor markets. This is achieved by providing them with the appropriate knowledge and skills to interact with electrical problems specific to a society that is changing in its behavior and patterns, as well as qualifying them to deal with various environmental problems, available resources, and modern technology. This is through 63 courses (60 theoretical and practical courses, in addition to three summer field training courses) totaling 300 contact hours. During which the student interacts with the processes of effective teaching and learning to enhance the educational process in the program.

The program also qualifies the student to participate in various specialized research fields that feed society with all the pillars of development and sustainable development, as well as developing the student's personality and enhancing his abilities to become responsible, work under pressure, and work in a team spirit, and to continue searching for information within the framework of self-learning, which leads to achieving the desired success criteria and makes him ready to face any challenges that may face the needs of the labor market or active community participation.

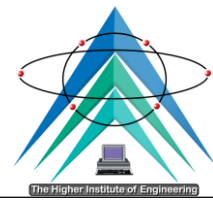
Therefore, the program provides a suitable environment for the student through the appropriate institutional capacity, effective resources, and a basic database represented by modern scientific references available in the institute's library and lectures by faculty members, as well as the existence of an easy-to-communicate information network.

First: Basic information about the program

Name of the institution to which the program is affiliated: Higher Institute of Engineering in EL-Shorouk.

Type of institution: Private higher institute with fees.

Name of the university / academy affiliated to the institution: The institute is affiliated to the Ministry of Higher Education and Scientific Research.



Name of the scientific department to which the program is affiliated:

Electrical Power and Machines Engineering

Date of establishment: 1995

Duration of study: Five (5) years

Language of study: English

Geographical location: Cairo Governorate EL- Shorouk City – EL-Nakhil Suburb
- P.O. Box 3 - Telephone 19644

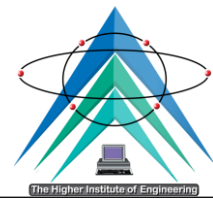
Website: www.hie.sha.edu.eg

Second: definition of the program

The Electrical Power and Machines Engineering program is a rapidly growing field of study, gaining popularity due to its pivotal role in modern society. This program equips engineers with the knowledge and skills to understand, design, analyze, and operate electrical power systems and machines, which are essential components of various industries and infrastructure. The program's emphasis on power generation, transmission, distribution, and utilization aligns with the increasing demand for sustainable and efficient energy solutions. Additionally, the program delves into the design and control of electrical machines, such as generators, motors, and transformers, which are crucial for powering diverse applications ranging from transportation and manufacturing to renewable energy systems. With its blend of electrical engineering principles and machine design expertise, the Electrical Power and Machines Engineering program empowers graduates to contribute significantly to the advancement of technology and address the evolving energy challenges of the 21st century.

1. Electrical Power Engineering:

Electrical Power Engineering is a field focused on the generation, transmission, distribution, and utilization of electrical energy. It deals with the design, operation, and maintenance of power systems that include power plants, substations, transmission lines, and distribution networks. Power engineers work on a wide range of technologies, from small-scale renewable energy systems to large high-voltage transmission networks.



This discipline is concerned with ensuring the efficient and reliable delivery of electrical energy from the generation source, such as a power plant or renewable source (solar, wind, hydro), to end-users, which may include homes, businesses, and industries. Electrical power engineers also work on improving the efficiency of electrical systems, reducing losses, and integrating new sources of energy like solar and wind into the grid.

Common tasks for electrical power engineers include designing transformers, generators, and electric motors; optimizing the performance of power grids; conducting load flow studies, fault analysis, and stability assessments; and implementing smart grid technologies to enhance reliability and efficiency. Power engineers also ensure that systems comply with safety standards and manage the maintenance and protection of power systems.

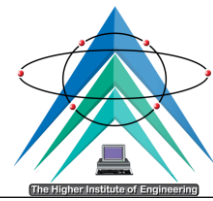
2. Electrical Machines Engineering:

Electrical Machines Engineering focuses on the design, development, and operation of electrical machines such as motors, generators, and transformers. These machines are crucial components in almost every aspect of modern life, providing mechanical power from electrical energy and vice versa.

This field involves studying the principles of electromagnetism, machine dynamics, and power electronics to optimize machine performance and efficiency. Engineers in this field are responsible for the design and maintenance of machines that are used in applications ranging from small household appliances to large industrial systems, electric vehicles, and power generation facilities.

Electrical machine engineers are involved in tasks such as designing rotating machines (e.g., synchronous motors, induction motors), analyzing machine efficiency, reducing losses in machines, and selecting appropriate materials for various applications. They also develop innovative machine control systems to improve performance in complex environments like renewable energy integration or industrial automation.

Moreover, electrical machines engineering plays a key role in the electric vehicle industry, where the design of efficient electric motors and drive systems is essential for achieving higher performance and longer driving ranges. Other key applications include electric trains, wind turbines, and aerospace systems.



3. Power Systems and Electrical Machines Integration:

The combination of electrical power engineering and machines engineering forms the backbone of modern industrial and energy systems. Power engineers and machine engineers collaborate to ensure that the machines converting electrical energy to mechanical energy (and vice versa) operate efficiently and reliably within the power grid. From designing smart grids and improving renewable energy integration to developing energy storage systems and advanced electric drives, these two fields play a critical role in shaping the future of energy.

Third: Vision, Mission and Objectives of the Program

(1) Program Vision

Advancing the educational process to ensure quality assurance and keep pace with outstanding programs in education and scientific research.

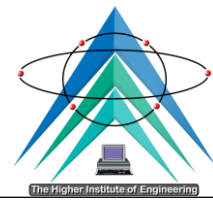
(2) Program Mission

To prepare distinguished engineers capable of creativity, innovation, and scientific research to meet the demands of the labor market in the field of electrical power and machines engineering.

(3) Program Objectives

(3-1) General Objectives of the Program

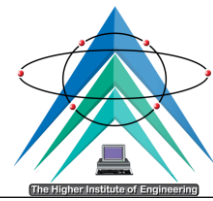
- **Preparing competent engineers** equipped with the fundamental skills and knowledge in all areas of electrical power and machines engineering, with the ability to apply modern and advanced methods in designing, implementing, and managing various projects related to the field.
- **Developing engineers** with strong communication skills, ensuring collaboration and teamwork in multidisciplinary projects. They will also possess the ability to continue learning, acquiring new skills and experiences to enhance professional performance, foster creative thinking, and plan work based on societal values and professional ethics.
- **Providing technical consultations** to solve electrical problems encountered by various engineering sectors, while also preserving and protecting the environment.



- **Establishing strong relationships and connections** with local, regional, and international companies, factories, and institutions to enhance and support the educational activities of the program, linking it to the industry in its various and diverse fields.

(3-2) Educational objectives of the program

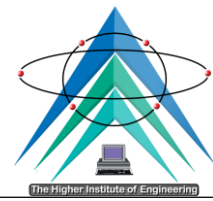
- 1- **Applying Basic Engineering Sciences:** Utilize foundational principles in mathematics, physics, and electrical engineering to model, analyze, and design electrical power systems and machines.
- 2- **Design and Analysis of Electrical Machines:** Gain proficiency in the design, operation, maintenance, and testing of electrical machines, including transformers, motors, and generators. This includes understanding their performance under various operating conditions and applying solutions to enhance efficiency and reliability.
- 3- **Power Systems Modeling and Optimization:** Develop skills in analyzing, modeling, and simulating electrical power systems, including generation, transmission, and distribution networks. Use modern computational tools to optimize the performance, stability, and reliability of power systems.
- 4- **Control Systems and Automation:** Apply control theory and digital signal processing techniques in designing, implementing, and operating control systems for power networks and industrial electrical machines. This includes the use of programmable logic controllers (PLCs) and modern automation technologies for efficient system operation.
- 5- **Renewable Energy and Smart Grids:** Understand the integration of renewable energy sources, such as solar and wind power, into the electrical grid. Study advanced topics like smart grid technologies, energy storage systems, and the environmental impact of power generation.
- 6- **Electrical Safety and Standards:** Apply international and local safety standards in designing electrical systems, ensuring compliance with regulatory codes, and implementing best practices in electrical installations and machine operations.
- 7- **Advanced Topics in Power Electronics:** Gain expertise in power electronics and their applications in controlling electrical machines and systems, including converters, inverters, and motor drives. Develop the skills to design power electronic circuits for efficient energy conversion and control.



- 8- **Energy Management and Sustainability:** Analyze energy consumption patterns and develop strategies for energy management, focusing on sustainable practices in power generation, transmission, and consumption.
- 9- **Research and Development in Electrical Engineering:** Foster self-learning and research skills, enabling students to conduct scientific research, develop new technologies, and contribute to the advancement of electrical power and machines engineering.
- 10- **Project Design and Implementation:** Design and implement applied and research projects that address real-world problems in electrical power and machines engineering, focusing on innovation and adherence to the highest quality and safety standards.

Fourth: Distinctive features of the program

- 1- The program belongs to the Higher Institute of Engineering in El Shorouk, which was the first private institute in Egypt to receive accreditation from the National Authority for Quality Assurance and Accreditation of Education. The institute also holds membership in the Association of Arab Universities and the Union of Arab Engineers.
- 2- The program focuses on the educational process and its development in line with the digital revolution, ensuring that the curriculum evolves to meet this goal.
- 3- The program offers scientific courses that align with the state's vision for sustainable development.
- 4- The institute's prime location provides its graduates with competitive job opportunities in the field of electrical power and machines engineering.
- 5- The program gives students the opportunity to engage with the labor market through field training.
- 6- The program offers students seminars and educational workshops.
- 7- The program provides students with distinguished faculty members who have practical work experience and expertise in various scientific disciplines.
- 8- The program is distinguished by the increasing number of enrollments due to its honorable history since its establishment in 1995.



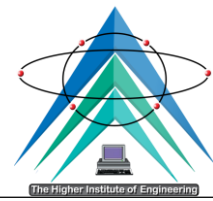
- 9- Graduates of the program are now engineers holding prestigious positions both within and outside the country.
- 10- The institute has been ranked first among institutes by the Engineering Sector Committee for three consecutive years.
- 11- The program has won the first prize at Egyptian Engineering Day for three consecutive years.
- 12- The program offers community services through its distinguished courses, which equip its students to serve society and the environment effectively.
- 13- The program provides students and graduates with international exposure through conferences and international competitions.

Fifth: Program Graduate Specifications

(5-1) General Graduate Specifications

A graduate of the Electrical Power and Machines Engineering Program must be able to do the following:

- 1- Master a wide range of engineering knowledge and specialized skills, and apply that knowledge in real-life situations.
- 2- Apply analytical thinking to identify, diagnose, and solve engineering problems.
- 3- Act professionally and adhere to the ethics and standards of electrical engineering.
- 4- Lead a diverse team of professionals from various engineering disciplines and take responsibility for the team's performance.
- 5- Recognize their role in advancing the engineering field and contributing to the development of the profession and society.
- 6- Show concern for the physical and natural environment, and promote sustainability principles.
- 7- Use modern engineering techniques, skills, and tools necessary for engineering practice.



- 8- Take full responsibility for learning and self-development, engage in lifelong learning, and demonstrate the ability to participate in postgraduate and research studies.
- 9- Communicate effectively using various methods, tools, and languages with different audiences to address academic/professional challenges critically and creatively.
- 10- Exhibit leadership qualities, business management skills, and entrepreneurial capabilities.

(5-2) Special specifications for the graduate

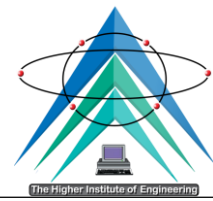
- 1- Mastering the knowledge acquired in modeling, designing, implementing, and operating electrical power systems, machines, and their control systems. This includes determining specifications, selecting appropriate equipment, and ensuring efficient operation, maintenance, and repair of power generation, transmission, and distribution systems.
- 2- Applying, developing, and designing renewable energy systems, power electronics, and smart grid technologies, as well as integrating electrical power systems with modern automation, monitoring, and protection techniques. This includes the development of energy management systems, load forecasting methods, and machine learning applications for optimizing power system performance.

Sixth: Fields of work for the program graduate

The field of specialization in Electrical Power and Machines engineering is a broad field, as there are many jobs that the student can work in after graduation, such as:

1- Field: Power Systems Engineering

- Electricity Distribution Companies
- Job Title: Power Distribution Engineer
- Role: Managing the design, operation, and maintenance of the electrical distribution network, including transformers, substations, and power lines. They ensure the safe and efficient delivery of electricity to consumers, prevent outages, and respond to electrical faults.



2- Field: Transportation Electrification

- Transportation, Tunnels, and Road Authorities
- Job Title: Electrical Infrastructure Engineer
- Role: Maintaining electrical systems for traffic control, tunnel lighting, and electric vehicle charging stations. In tunnels and roads, they ensure the safety and reliability of electrical installations, including ventilation systems and emergency lighting.

3- Field: Facility Electrical Engineering

- Airports and Ports
- Job Title: Airport Electrical Engineer
- Role: Overseeing electrical power systems that run the airport, including runway lighting, baggage handling, and terminal operations. For ports, they manage electrical systems that power cranes, docks, and control towers.

4- Field: Renewable Energy Engineering

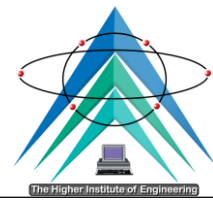
- New and Renewable Energy Authority
- Job Title: Wind and Solar Energy Engineer
- Role: Designing, installing, and managing wind turbines, solar panels, and other renewable energy sources. They optimize renewable energy systems for efficiency and ensure integration with the existing power grid.

5- Field: Power Plant Engineering

- Power Generation Companies
- Job Title: Power Generation Engineer
- Role: Working in power plants, including thermal, hydroelectric, and nuclear plants. They oversee the operation and maintenance of generators, turbines, and transformers to ensure continuous power production.

6- Field: Power Systems Consulting

- Engineering and Consulting Offices



- Job Title: Electrical Consulting Engineer
- Role: Providing expert advice on electrical system design, feasibility studies, and project management for clients. They develop strategies to improve electrical system efficiency and reliability for large-scale infrastructure projects.

7- Field: Generation and Transmission Engineering

- Electrical Power Generation Plants
- Job Title: Electrical Plant Maintenance Engineer
- Role: Conducting routine maintenance and troubleshooting of electrical machines such as turbines, generators, and transformers. They ensure that power generation equipment operates efficiently and safely.

8- Field: Industrial Electrical Engineering

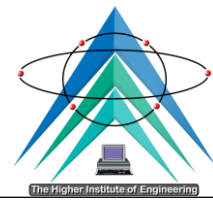
- Oil and Petrochemical Sectors
- Job Title: Electrical Engineer in Oil and Gas
- Role: Designing, installing, and maintaining electrical systems in oil refineries, offshore platforms, and petrochemical plants. They work on high-voltage equipment, motor control centers, and ensure compliance with hazardous area regulations.

9- Field: Energy Policy and Planning

- Ministry of Electricity and Energy and Associated Authorities
- Job Title: Power Systems Planning Engineer
- Role: Developing national strategies for electricity supply and demand. They work on long-term planning, integrating renewable energy, and ensuring the stability and sustainability of the electrical grid.

10- Field: Electrical Machinery Design

- Electrical Appliances and Components Factories
- Job Title: Electrical Design Engineer



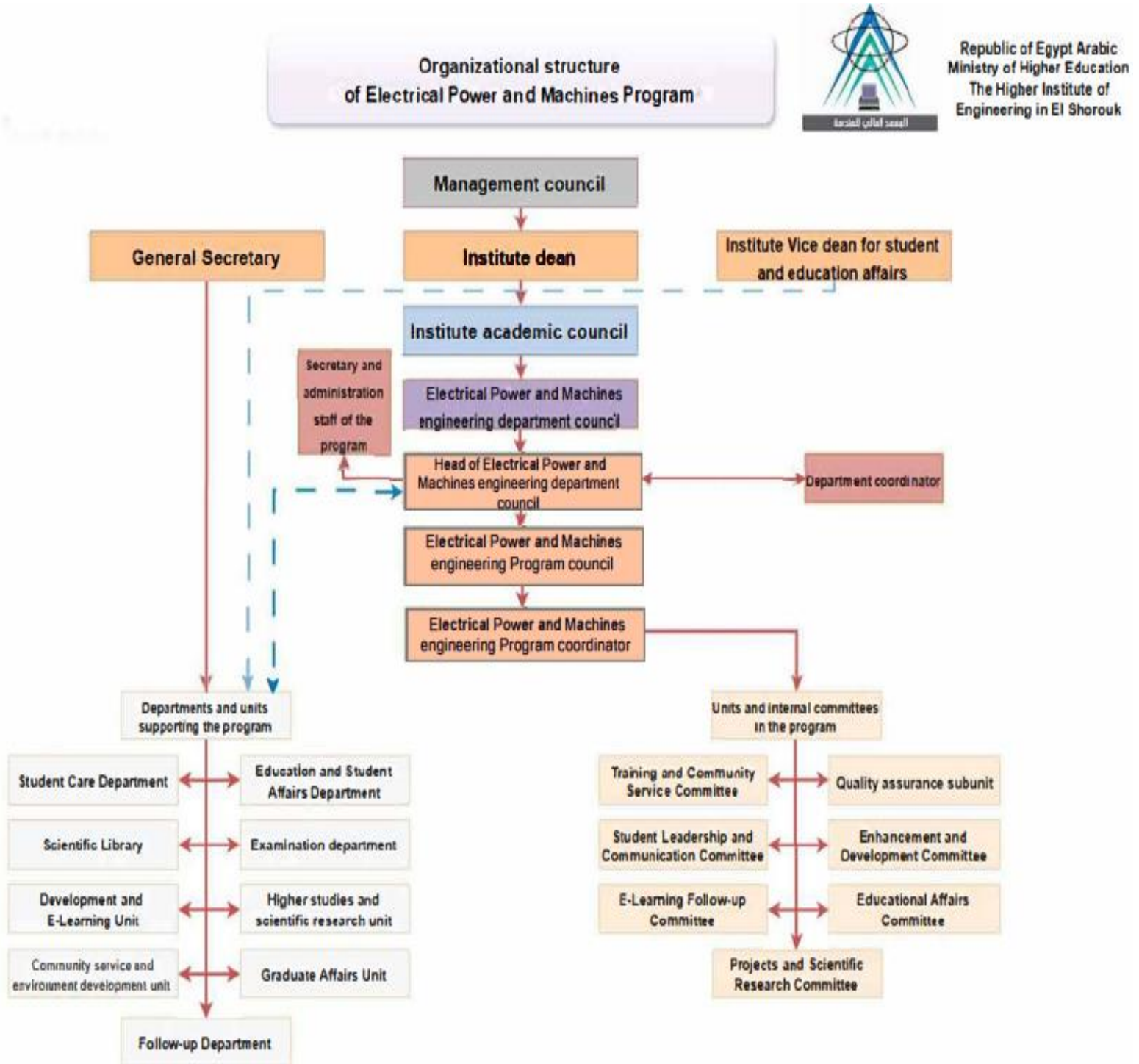
- Role: Designing electrical machines and components like motors, transformers, and household appliances. They work on improving the efficiency, safety, and performance of electrical devices.

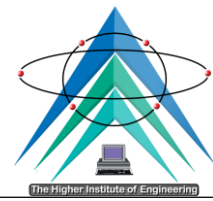
11- Field: Facilities Electrical Engineering

- Hospitals, Hotels, and Tourist Resorts
- Job Title: Facilities Electrical Engineer
- Role: Maintaining critical power systems in large facilities such as hospitals and hotels. This includes managing backup power systems (generators, UPS), lighting, HVAC systems, and ensuring continuous power supply for critical infrastructure.

Seventh: Organizational Structure

(1) Department of Electrical Power and Machines Engineering





Eighth: Definition of the program committees

The program includes seven internal committees as follows:

1- The Enhancement and Development Committee: It is responsible for everything related to the review, enhancement and development of curricula, study regulations and laboratories, as well as the plans and reports of the work of the various committees and other works to achieve the improvement of the level of performance.

2- The Quality Committee: It is responsible for everything related to the quality work in the program and the preparation and processing for the accreditation of the National Authority for Quality Assurance and Accreditation of Education and files of the engineering sector and others, as well as following up and evaluating the level of performance.

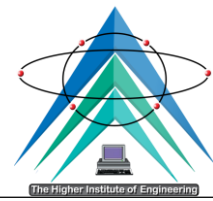
3- The Educational Affairs Committee: It is responsible for everything related to the work of educational affairs, from preparing schedules and work of exams and the scientific library and following up the progress of the educational process.

4- The Training and Community Service Committee: It is responsible for everything related to the work and procedures of training, as well as activating cooperation and communication with graduates and community institutions.

5- Student Leadership and Communication Committee: It is responsible for everything related to students, communicating with them, guiding them, following them up and working to overcome any obstacles they face during their study period, and any other work that would provide a distinguished level of services provided to students.

6- E-Learning Follow-up Committee: It is responsible for everything related to the provided electronic services and providing the necessary support to raise the level of electronic services provided.

7- Projects and Scientific Research Committee: It is responsible for everything related to research and applied projects, whether graduation projects for students or others, as well as following up research activity.



Ninth: Departments and units supporting the program

(1) Student Support Unit

- **How to announce the unit:**

A-Communication with the Student Union to advertise the unit's services.

- **Unit activities**

A- Make special certificates of appreciation for outstanding students and present them in a distinguished ceremony attended by the Chairman of the Board of Directors of the Academy, the Vice Chairman of the Board of Directors of the Academy, the Dean of the Higher Institute of Engineering, the vice dean of the Higher Institute of Engineering, and the heads of departments.

B- Photographing the certificate presentation ceremony for outstanding students to motivate them to study and uploading photos of the celebration on the academy's official website.

C- Conducting make-up lectures for students who recently applied to the institute in the preparatory class in coordination with the Department of Mathematics and Engineering Physics.

D- Conducting make-up lectures for students who have been transferred and are loaded with materials after the issuance of the Clearing Committee's decision in coordination with the Student Affairs Program Department.

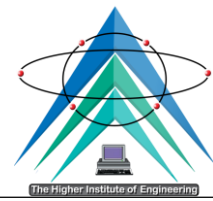
E- Providing the necessary moral and social support to students, whether outstanding or struggling.

(2) Education and Student Affairs Department

Supporting student affairs for the program through tuition fee exemptions and the exemption percentage is based on the type of exemption (social - siblings - academic excellence - grants).

(3) Development and E-Learning Unit

- Preparing students' email and training on the mechanism of use.



- Preparing the e-learning platform (Moodle) with the curricula for faculty members and students to use in the educational process.
- Training students to use the e-learning platform and preparing explanatory videos for that.
- Providing the necessary technical support for students.
- Sending any instructions or correspondence to students.

(4) Scientific Library

- Arranging books and scientific references in the library for easy access by students.
- Providing the necessary loans for books and scientific references in the library for students.
- Purchasing the necessary books and references based on the needs of the courses and the department.
- Making statistics on the average number of students of the program who visit to study and borrow.

(5) Student Care department

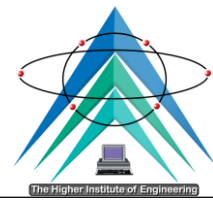
- Receiving and welcoming new students.
- Organizing student union elections.
- Holding student activities and participating in various tournaments and competitions.

(6) Examination Management

- Examination preparations including preparing schedules, seating numbers and distributing students.
- Receiving student petitions regarding the grades of the year's work.

(7) Crisis and Disaster Management Unit

- Providing the necessary precautionary measures, especially during the Covid-19 pandemic, in coordination with the institute's administration to limit the spread of the Covid-19 virus.



- Providing procedures and controls that are applied for the safety of workers and students.
- Spreading awareness of safety and security issues through educational seminars and lectures.
- Following up on fire and alarm equipment and devices in buildings and ensuring their safety.
- Following up and reviewing the procedures followed in the event of a fire, God forbid, and reviewing follow up reports on fire extinguishers and alarm devices and their validity.
- Following up cafeterias and visiting them.

(8) Follow-up Department

- Coordination between the program regarding the preparation of study schedules and other programs at the institute, such as providing halls, lecture rooms, etc.
- Following up student attendance on the absence monitoring program and providing reports on student absence rates and notifying them.

(9) Legal Affairs Department

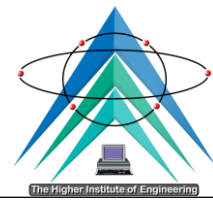
- Settling student disputes by presenting them to the Student Disciplinary Council and imposing appropriate penalties in accordance with the regulations in force in this regard.
- Reviewing the agreements and contracts that are legally implemented, such as the cooperation agreement with the Egyptian Space Agency and the cooperation agreement with Huawei and any other agreements for the benefit of students.

(10) Security Department

- Securing the institute in a way that preserves the safety of all employees, students and facilities.
- Reporting and finding any lost items or financial amounts for students.

(11) Transportation Management

- Providing transportation lines for program employees, including faculty members, support staff, administrative staff, and students.



- Providing any requirements regarding the allocation of cars for the purpose of special missions or errands for the program.

(12) Medical Management

- Providing Covid-19 vaccines for students as part of a cooperation agreement between El- Shorouk Academy and the Ministry of Health and Population.
- Providing medical seminars to raise awareness of Covid-19 and epidemic diseases in coordination with the Crisis and Disaster Management Unit.
- Transferring a number of students to conduct a Covid-19 virus analysis and swab test after the initial symptoms appear on them. Also, transferring students to external hospitals after conducting a medical examination on them.
- Providing medical services and first aid to all students.
- Providing first aid in laboratories and training laboratory specialists on how to use them.

(13) Graduate Affairs Unit

- Preparing, following up, updating and conducting the necessary statistics on graduates' database.
- Preparing a database for institutions and companies related to graduates.
- Documenting communication ties with graduates and relevant institutions by inviting them to scientific and employment forums and any other events that are organized.