Student Guide of Computers and Control Engineering (CCE) Program 2024/2025

Student Guide

Computers and Control Engineering (CCE) Program Student Guide

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Introduction to the guide

This guide aims to introduce the student with the basic data and information for the Computer Engineering and Control Program, which includes the definition of the program, the vision, mission and objectives of the program, the distinctive features of the program, as well as the graduate specifications and fields of work. The guide also includes the departments and units supporting the program, as well as the curricula of the 2013 and 2019 regulations according to what is available in the study regulations.

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: Communications and Computer 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 Computer and Control Engineering program is considered one of the most advanced, popular and widespread programs recently among the various programs in engineering faculties at the local and regional levels in order to understand and keep pace with the era of modern technology and smart and embedded systems, as well as the multiplicity and spread of various applications and uses of this specialization in all aspects of life in addition to the overlap between it and many other engineering branches. This program supports two different fields, which are Computer and Control Engineering.

1. Computer Engineering:

Computer engineering is concerned with the design of software and hardware, starting from the design units of individual microcontrollers, microprocessors, personal computers, and supercomputers to the design of electrical circuits.

This field of engineering focuses not only on how computer systems themselves work, but also on how they are embedded and manipulated more broadly to create new technologies and continuously meet ever-changing needs. The computer engineering covers various areas such as communications, networking, robotics, artificial intelligence (AI), design, operating systems, databases, protection systems, and expert systems.

Common tasks for computer engineers include writing soft wares and firmwares for embedded microcontrollers, designing high-end integrated circuit chips, designing analog sensors, designing mixed-signal printed circuit boards, and designing operating systems.

Computer engineers are also well suited to robotics research, which relies heavily on the use of digital systems to control and monitor electrical systems such as motors, communications, and sensors.

2. Control Engineering:

Control engineering is concerned with the analysis and design of means to influence the behavior of different systems so that they operate in a desired manner. Systems may be electrical, mechanical, chemical, biological, or even financial, or a hybrid of all of these. Since automatic control combines different systems, it is a common way of thinking between them; in order to get the ideal designs. For example, you need two fields in some designs; the first is developing mathematical models, and the other is the simulation engineering of models using electronic computers.

Automatic control is one of the industrial systems that create and innovate new technologies using computer system designs to monitor industrial processes. It is noteworthy that "SCADA, DCS" are programs that control automatic systems; such as mechanical machines, industrial and chemical processes in production lines, which are used by most automatic control engineers in factories, companies and various institutions; to control the drive circuits inside them.

Control engineering also has multiple fields; such as communications, networks, control and operating systems, algorithms, robots, and designs, so

the applications of control engineering are theoretically unlimited; starting from dishwashers, passing through robots, and reaching missiles and spaceships.

Third: Vision, Mission and Objectives of the Program

(1) Program Vision

Local and regional leadership in the field of computer engineering and control via preparing a scientifically, research- and professionally creative generation that meets the requirements of the labor market, society and the surrounding environment.

(2) Program Mission

Preparing competent specialized engineers in the field of computer and control engineering who are able to meet the needs of the labor market, advance in research fields and contribute to serving society and developing the environment for local and regional leadership.

(3) Program Objectives

(3-1) General Objectives of the Program

1. Preparing engineering cadres with a high level of understanding, knowledge and psychological preparation capable of building, analyzing and developing computer and control systems via Educational objectives of the program.

2. Providing a distinguished educational level for students via the following:

• Continuous development of academic programs and educational and applied systems in line with the requirements of preparing a distinguished graduate.

• Providing students with comprehensive multidisciplinary training in computer and control engineering.

• Continuous development of laboratories with modern devices and programs in line with the needs of the labor market.

3. Developing the skills of faculty members, assistants and administrative staff via the following:

• Attending specialized courses in modern technologies at all levels.

• Attending scientific seminars and conferences with the aim of deepening the concepts of technology and modern knowledge.

4. Supporting scientific research and community service via the following:

• Developing and enhancing the value of scientific and academic research and raising the level of scientific activities and research in response to the needs of society according to the highest quality standards.

• Exchanging experiences and information and concluding agreements with similar bodies, institutions and relevant companies

(3-2) Educational objectives of the program

1. Applying basic engineering sciences, algorithmic principles and computer science theories in modeling and designing computer and control systems.

2. Analyzing, modeling, designing, implementing and testing various control systems with aid of computer. Also, operating control systems, maintening and repairing. As well as design and implementation of embedded systems and electronic devices related to computers and modern software systems used in building computer systems.

3. Modeling, designing and implementing database systems, analyzing and designing computer networks and communications and measurement systems .As well as, determining the specifications and equipment required for them. Also, designing websites and mobile phone applications.

4. Applying the acquired knowledge in implementing pattern and signal recognition techniques, image processing and analysis. As well as, modeling and designing artificial intelligence systems for use in various fields.

5. Applying engineering methods, tools and skills in the field of computer and control technology to be able to analyze and model engineering problems and choose the optimal solution for them.

6. Developing self-learning skills and focusing on how to conduct scientific research, effective communication, technical presentations and preparing reports, and instilling teamwork ethics.

7. Designing and implementing applied and research projects in response to the society needs and the environment developing according to the highest quality standards.

Fourth: Distinctive features of the program

1. The program is distinguished by its connection to the historical status of the institute, as the institute was established in 1995 AD. The program grants a

bachelor's degree in engineering after five years of study. Over the course of more than twenty-five years, the Electronics, Communications and computer Engineering Program at the Higher Institute of Engineering (HIE) in EL-Shorouk city is considered one of the centers of excellence in engineering education in Egypt. A number of twenty four batches have graduated, on average four hundreds and eighty- five engineers, until the end of the academic year 2023/2022.

2. Partnerships and agreements with Huawei and the establishment of the Huawei Academy at the institute, which helps in training students, faculty members and their assistants in modern technological fields and topics, in addition to linking what is taught in some courses to what is available in the labor market and providing international exams for students.

3. Partnerships and agreements with the Egyptian Space Agency(ESA), which allow students to train in space and satellite technology, in addition to participating with the agency in graduation projects proposed by the Egyptian Space Agency(ESA).

4. The existence of a research plan for the program that is consistent with the research plan of the Egyptian state.

5. Conducting many applied researches and projects to serve the community in cooperation with many state institutions (such as Armed Forces Research Center - Electronics Research Institute – EL-Shorouk City Authority - Ain Shams University) to complete these researches and projects.

6. Cooperating with many state institutions in the field of student training and field visits (such as Benha Electronic Industries Company - National Authority for Military Production - Arab Organization for Industrialization - Telecommunications Egyptian Company - Huawei Company - Radio and Television Union - Egyptian Space Agency.

7. The program is distinguished by the fact that a large number of faculty members have obtained scientific degrees from prestigious universities and distinguished scientific schools.

8. Student participation in student activities by participating in local competitions and obtaining advanced positions.

9. The presence of student families in partnership and cooperation with institutions such as the Institute of Electrical and Electronics Engineers (IEEE).

10. The availability of a number of incoming students to the program.

11. The program is a professional entity specialized scientifically in teaching specialized courses in the field of computer and control engineering.

12. The program is an interactive entity that carries out its tasks through students, administrators and faculty members in a dynamic environment inside and outside the institute.

13. The existence of a clear and announced organizational structure that allows for easy organization of work and interconnection between the program and the institute's departments and units.

14. Continuous development to keep pace with new variables and labor market requirements.

15. Reliance on technological development and communication and the use of modern means in teaching and communication, which contributes to raising the efficiency of time utilization for faculty members, assisting staff, administrators and students.

Fifth: Program Graduate Specifications

(5-1) General Graduate Specifications

A graduate of the Computer and Control Engineering Program must be able to do the following:

1. Master a wide range of engineering knowledge and specialized skills and be able to apply the acquired knowledge using theories and abstract thinking in real-life situations.

2. Apply analytical and systematic thinking to identify engineering problems in their diversity and different degrees of complexity and provide appropriate and innovative solutions to them.

3. Act professionally and adhere to the ethics and standards of the engineering profession.

4. Lead or work within a diverse team of professionals from various engineering disciplines and be able to bear personal responsibility and team performance.

5. Realize and distinguish his role in enhancing the engineering field and contributing to the development of the profession and society.

6. Appreciate the importance of the environment, both physical and natural, and work to promote the principles of sustainability.

7. Apply and use modern technologies, skills and tools necessary to practice the engineering profession.

8. Take full responsibility for learning and self-development, engage in lifelong learning and demonstrate the ability to participate in graduate studies and research.

9. Effective communication using various media, tools and languages with different audiences to deal with academic/professional challenges in a professional and creative manner.

10. Demonstrate outstanding leadership qualities, business management and project management skills.

(5-2) Special specifications for the graduate

1. Mastering the knowledge acquired in modeling, designing, implementing and operating computers and computer-related electronic devices, network systems, automatic control systems and embedded systems, as well as determining the specifications and equipment necessary for them, maintaining and repairing them.

2. Applying, developing and designing various artificial intelligence systems, image processing and pattern recognition techniques, as well as developing and designing databases, websites, mobile phone applications and satellites.

Sixth: Fields of work for the program graduate

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

6-1 First: Fields of computer engineering

A. Software Engineering:

• Software Developer "Design, Implement, Test and Maintain Soft wares of Various Types" (Desktop Applications - Mobile Applications - … etc.)

• Computer Game Designer

B. Computer Networks:

• Computer Network Development (Computer Network Development Engineer)

• Computer Network Management (Computer Network Operation Engineer)

• Computer Network Testing (Test Engineer)

• Computer Network Maintenance (Site Maintenance Engineer)

• Securing and Protecting Computer Networks (Network Protection Engineer).

• Support and Technical Support Office in Wired and Wireless Telecommunications Companies (Technical and Technical Support Engineer).

C. Artificial Intelligence and Machine Learning:

• System Designers and Analysts (Cognitive Systems, Visual Computing, … etc.)

• Supervising the Work of Computers and Robots

• Specialization in the Field of Machine Learning

D. Data Science

• Technical Support Specialist.

• Data Analysts.

• Work in the Field of Education.

C. Websites (Web)

• Website designers and interfaces (Web pages)

• Website developers (Web pages)

• Database designers and specialists

6-2 Second: Control engineering fields

• Companies specialized in various industrial systems such as paper, iron and steel, textile, chemical, petrochemical, pharmaceutical, spinning and weaving, and food industries.

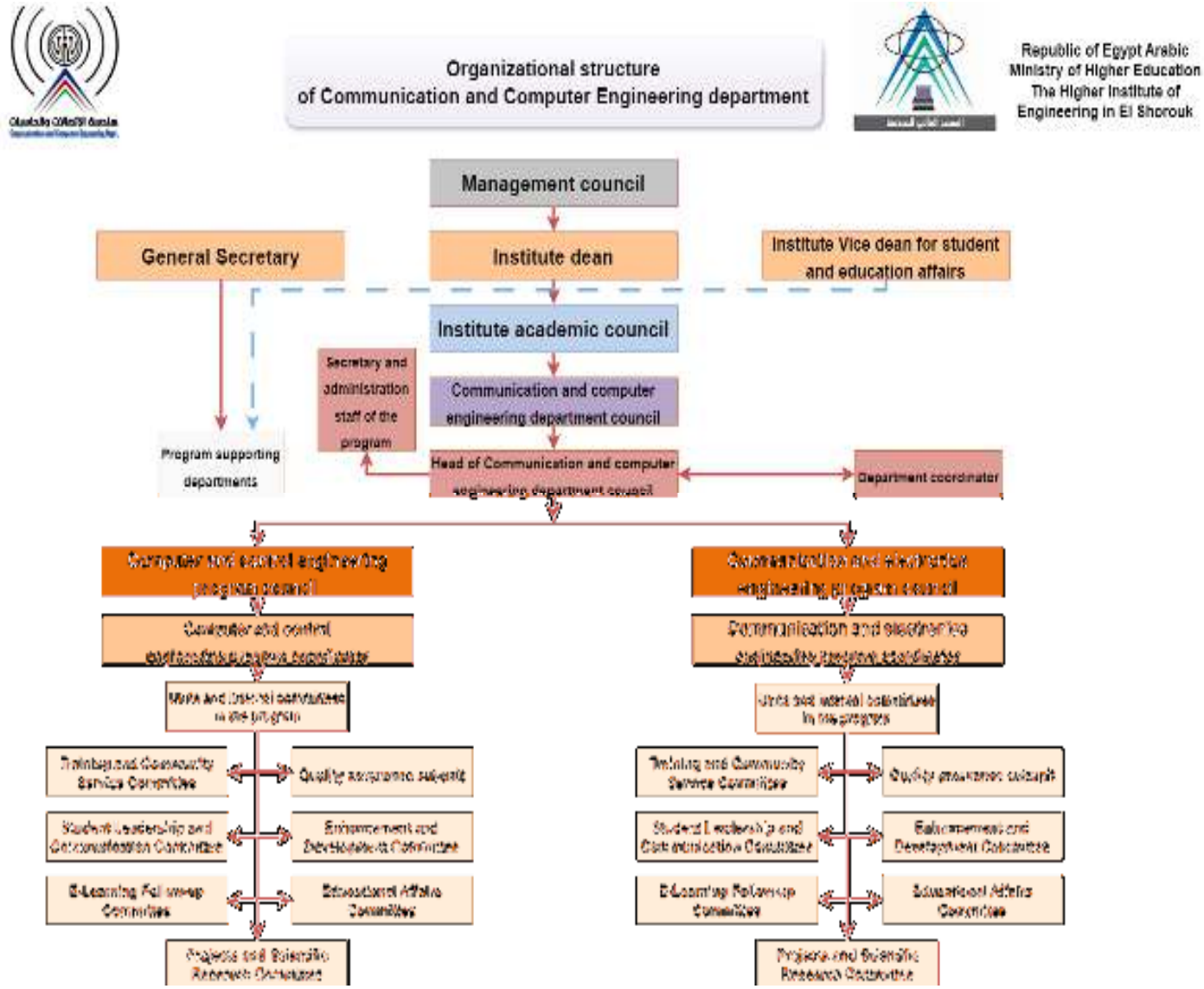
• Oil and natural gas exploration and refining companies

• Companies specialized in firefighting and industrial security systems

• Companies specialized in monitoring systems, securing facilities and assets, and building management

- Power generation, transmission, and distribution stations
- Water and sewage stations
- Remote sensing bodies and companies
- Companies specialized in intelligent transportation systems
- Companies specialized in designing, implementing, and testing fiber optic networks.
- Companies specialized in developing and testing control devices and measuring devices.
- Companies and factories specialized in manufacturing panels, circuits, and electrical supply cables
- Industrial control and automation field.
- Companies specialized in developing and calibrating electrical medical devices.
- Manufacturing quality - Quality control engineer.
- Companies specialized in electrical works, load distribution, automatic control in buildings, and low current systems.

Seventh: Organizational Structure



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.