QUALITY GUIDE

Higher Institute of Engineering at El Shorouk Academy

Biomedical Engineering and Systems Program

First: Introduction

The science of biomedical engineering is one of the latest engineering sciences that arose with the development of modern medicine, after the doctor alone performed all the tasks of diagnosis and treatment and even the manufacture of medicine, the medical device became an essential companion for the doctor in diagnosis, treatment and monitoring of patients, and because there is an urgent need to develop medical devices and equipment to serve the health of patients and the speed of their recovery, it was necessary to intervene specialists from fields other than medicine to design these devices such as electrical engineers, mechanics, computer engineers and others. As it was These engineers must also be familiar with the medical sciences of the anatomy and physiology of the human body and to understand the mechanism of work of each system in it and harness their knowledge and specialization in what develops these devices, and therefore the need arose for an engineer who knows all these specialties on the one hand and can deal with doctors on the other hand, with attention that it is not a substitute for any of them.

Medical engineering is not limited to medical devices and maintenance, but there are other areas of medical engineering such as hospital management, prostheses, prostheses and others. Medical Engineering Harnesses physics, chemistry, mathematics and the basics of engineering to study biology, i.e. the human body mostly to reach advanced stages in the study of this body and the study of diseases it faces to work to provide better ways for good health and help treat these diseases.

Second: Establishment of the program

The Department of Biomedical Engineering and Systems was established among the first scientific departments that were established at the Higher Institute of Engineering, where it was established in 1995 by the ministerial decision issued by the Ministry of Higher Education No. 1712 on 22/11/1995 and the headquarters of the Institute at the time (Tenth of Ramadan City) and the number of departments of the Institute was five scientific departments (Communications and Computer Engineering - Medical Engineering - Chemical Engineering – Power and Electrical Machines Engineering –

Architecture – in addition to the Department of Physics and Engineering Mathematics). The Higher Institute of Engineering moved to its new headquarters in the suburb of Al-Nakheel in El Shorouk City at the beginning of the second semester of the academic year 1999/2000 after the approval of the Ministry of Higher Education on the transfer by Ministerial Resolution No. 712 dated 31/5/2000. The equivalency of the bachelor's degree granted by the Higher Institute of Engineering in Al-Shorouk in the field of biomedical engineering and systems was renewed by the ministerial decision issued by the Ministry of Higher Education No. 189 on 29/7/2020. The Department of Biomedical Engineering and Systems has met the program accreditation standards, and was approved by the Authority's Board of Directors Resolution No. 226 dated June 21 , 2023.

Third: Vision, Mission and Objectives of the Program

The Biomedical Engineering and Systems program is characterized by the elements that qualify it to be one of the competing programs at the level of the Institute and the level of other competing programs in various universities and institutes nationwide.

Vision of the Institute:

To become one of the best institutes and colleges locally and regionally

Mission of the Institute:

Preparing engineers capable of creativity through various academic programs, graduating distinguished engineers in different disciplines that meet the needs and requirements of the labor market, developing scientific research to integrate with the requirements of industry and the local community

Program Vision:

The Department of Biomedical Engineering and Systems seeks to maintain the community's confidence in its graduates and take its place among the corresponding departments in other colleges and institutes.

Program Mission:

Preparing creative engineers capable of meeting the needs of the labor market in the field of medical engineering and developing scientific research to raise the level of medical services provided in Egypt.

General objectives of the program:

1- Providing an advanced, efficient and quality-assured academic program.

- Developing and raising the efficiency of courses (theoretical and practical)

- Developing and raising the efficiency of study laboratories
- Developing and raising the efficiency of teaching and learning methods
- Develop and raise the credibility of evaluation methods
- Implementing a system to ensure the quality of the educational process

2- Providing students and graduates of the program with skills and capabilities compatible with the requirements of the labor market and appropriate to its developments.

- Developing the student's scientific, practical and personal skills in accordance with the requirements of the labor market.
- Motivating and developing students' creativity and talents

3- Supporting and developing scientific research.

- Encouraging and strengthening cooperation in the field of graduate studies with Egyptian and international universities for faculty members and members of the supporting body
- Developing and raising the efficiency of the capabilities of research laboratories
- Encouraging the use of funded research projects (scientific and applied)
- Encouraging and strengthening participation in the publication of research in scientific journals and international scientific conferences

Educational Objectives of the Program:

The study in the department qualifies its graduates to do the following:

1- Designing medical and prosthetic devices and their components and linking them to hospital networks and the Internet

2- Designing medical software, bioinformatics, medical imaging fields, archiving, compressing, storing and transferring various medical data, radiology images, heart, brain and muscle drawings, according to international standards in representing data and transferring it to and

from hospitals and medical units and communicating via the Internet, whether central or local.

3- Setting the required specifications for medical devices required by hospitals and medical units.

4- Diagnosis, maintenance and repair of medical devices.

5- Training, design and implementation in the fields of medical programming and systems

6- Hospital design , planning, installation, supervision and follow-up of all hospital equipment

7- Systems Design for Medical Devices

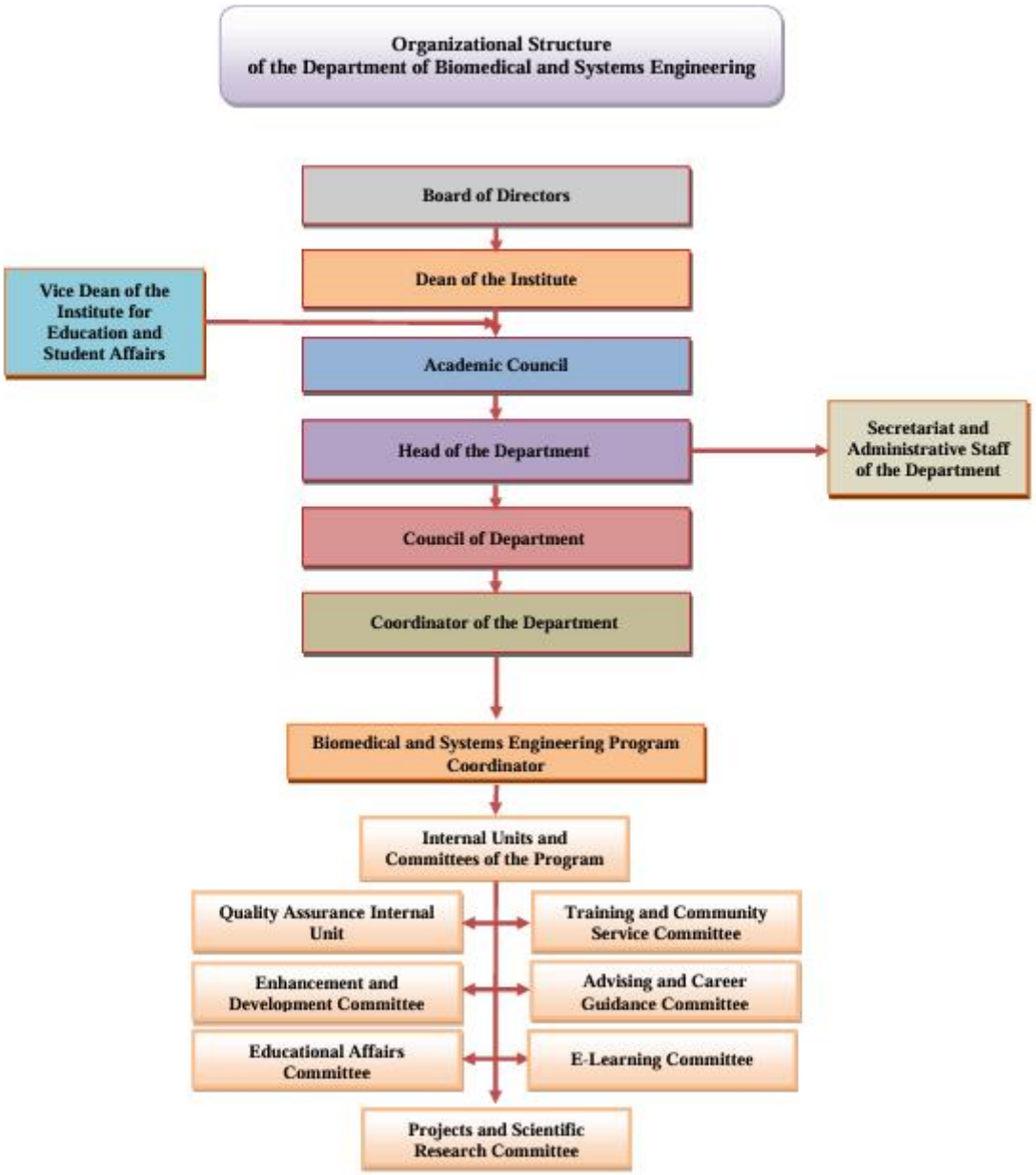
8- Identify and control the impact of biomedical engineering on society from an environmental, economic, social and cultural point of view.

9- Planning and carrying out research work, evaluating results and drawing conclusions.

Fourth: Organizational Structure of the Program

The figure below shows the organizational structure of the program, explaining the leadership of the program and the various committees emanating from it.

Arab Republic of Egypt
Ministry of Higher Education
Higher Institute of Engineering in Elshorouk



Fifth: Career Opportunities:

- Research and development (at the academic level in universities and research centers and at the level of companies producing medical devices and equipment (development engineer).
- Installation, operation and maintenance of medical devices and equipment in companies and hospitals (maintenance engineer)
- Selection and calibration of medical devices and quality assurance of health hospitals (laboratory testing and calibration engineer of medical devices in hospitals)
- Marketing and technical support for customers of doctors and technicians in healthcare hospitals (after-sales technical support engineer)
- Design and programming of hospital information systems software packages, medical image analysis and patient medical data analysis (software engineer in bioinformatics).

Sixth: Distinctive features of the Biomedical Engineering and Systems Program

1- Geographical location: The Department of Biomedical Engineering at the Higher Institute of Engineering in El Shorouk is distinguished by a privileged location, as students are sent to it from multiple governorates in Egypt, and buses transport students to different governorates.

2- All the institute's educational programs obtained the accreditation of the National Authority for Quality Assurance of Education No. 166 on May 29, 2017 and for a period of five years from this date as the first private engineering institute to obtain this accreditation and membership of the Association of Arab Universities.

3- Compatibility with the needs of the labor market, where the graduates of the department work in prestigious local and international companies, hospitals, private companies, research and academic centers - and participation with local or international universities

4- Increasing number of students in the department

5- The increasing number of international students and transfers to the department and there is a mechanism to attract international students

6- The Biomedical and Systems Engineering program is a rare major because it is found in a limited number of engineering colleges.

7- Providing distinctive curricula, including:

- The use of artificial intelligence and its applications in the medical field.
- The use of nanotechnology and lasers in biomedical engineering applications.
- The use of biomechanics through prosthetic applications.
- Use information in bioinformatics analysis to sequence genes.

8- It has a competitive ability at the international level , as the teaching assistants registered in the department were granted a scholarship to study master's degrees abroad

9- Faculty members publish scientific research in international journals

10-The Biomedical Engineering Program won the first place on the Egyptian Engineer's Day in 2019

11-Participation of faculty members in arbitration in international competitions

12-Participation of faculty members and the assisting body in the arbitration of research in international journals and as editors in scientific journals

13- . Submission of a faculty member on a patent in the field of nanotechnology

14-Participation of faculty members and supporting staff in funded research projects.

Seventh: Graduate Specifications

Specifications of the graduate of the program in Arabic and English according to the national academic standards (NARS 2018)

	Program General Graduate Attributes	***General specifications for the graduate of the program***
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 related to healthcare challenges.*	Mastered a wide range of engineering knowledge and specialized skills and is able to apply them using scientific theories and abstract thinking in real-life situations related to challenges and problems in the field of *healthcare*.
2.	*Apply analytic critical and systemic thinking to identify, diagnose and solve medical problems*	Able to apply structured critical analytical thinking to

	of wide range of complexity and variation with engineering tools and techniques.	identify, diagnose, and solve changing and complex problems in healthcare using engineering techniques and tools.
3.	*Behave professionally and adhere to engineering ethics and standards.*	Behaves professionally and adheres to the ethics and standards of the profession.
4.	*Work in and lead a heterogeneous team of professionals from different engineering specialties and healthcare workers and assume responsibility for own and team performance;*	- Able to lead - or work from within a team of professionals with different engineering disciplines and health care workers and take responsibility for his work or the work of the team he leads.
5.	*Recognize his/her role in promoting the engineering and healthcare fields and contribute in the development of the profession and the community;*	Appreciates his role in the development of the fields of engineering work and health care and contributes to the development of the profession and society.
6.	*Value the importance of the environment, both physical and natural, and work to promote sustainability and safety principles;*	He values the environment around him and works to uphold the principles of sustainability and safety.
7.	*Use techniques, skills and modern engineering tools necessary for engineering practice;*	Able to use modern engineering techniques and skills necessary to practice engineering professions.
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;*	Takes responsibility for self-education and development, is able to learn during his/her career, and demonstrates the

		ability to participate in post-graduate 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;*	Communicates efficiently in different situations and with tools and languages with those around him in the work environment and deals with academic and professional challenges creatively.
10.	*Demonstrate leadership qualities, business administration and entrepreneurial skills.*	Possess the qualities of leadership, business management, initiation and project management skills.
	Program Specific Graduate Attributes	***Specialized specifications of the program graduate***
11.	*Work to maintain health and promote human wellbeing.*	It is keen to maintain public health and promote the well-being of humanity.
12.	*Provide -quality and safe patient-centered care, focusing on primary health care and dealing with common health problems in his/her community.*	Ensures work to provide safe, quality, patient-centered care that focuses on healthcare problems in their community.
13.	*Work effectively with other health care professionals respecting their roles and their contribution to the team.*	Works efficiently with healthcare professionals and values their role and contributions to work.

Eighth: Targeted learning competencies and outcomes for the Biomedical Engineering Program in accordance with the national academic standards (NARS 2018)

National Academic Standards (NARS 2018) and Targeted Learning Outcomes and Competencies
Biomedical Engineering Program

	Competency-based NARS		*Program Competency-based NARS*	*Learning Objectives (LO's)(Measurable)*
	Level A General			
A1	**Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.**	A1	*Identify medical & health-related complex problems, formulate and solve engineering problems by applying engineering fundamentals, basic & medical sciences and mathematics.*	*A1.1. Identify & formulate problems by applying engineering fundamentals, basic & medical sciences and mathematics.* *A1.2. Solve problems by applying engineering fundamentals, basic & medical science and mathematics.*
A2	**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.**	A2	*Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use proper analyses techniques and objective engineering judgment to draw conclusions.*	*A2.1. Develop and conduct appropriate experimentation and/or simulation,* *A2.2. Analyze and interpret data* *A2.3. Assess and evaluate findings,* *A2.4. Use analyses techniques and objective engineering judgment to draw conclusions*
A3	**Apply engineering design processes to produce cost-effective solutions that meet specified needs with**	A3	*Apply engineering design processes to produce cost-effective solutions to medical and*	*A3.1. Apply engineering design processes.*

	Competency-based NARS		*Program Competency-based NARS*	*Learning Objectives (LO's)(Measurable)*
	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.		*physiological problems that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, safety and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.*	*A3.2. Acquire knowledge about global, cultural, social, economic, environmental, ethical, safety aspects.*
A4	**Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles**	A4	*Utilize contemporary technologies in different multidisciplinary interrelated fields, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.*	*A4.1. Utilize contemporary technologies in different multidisciplinary interrelated fields,* *A4.2. Acquire knowledge about codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles*
A5	**Practice research techniques and methods of investigation as an inherent part of learning.**	A5	*Practice research techniques and methods of investigation as an inherent part of learning.*	*A5.1. Practice research techniques as an inherent part of learning.* *A5.2. Practice methods of investigation as an inherent part of learning.*
A6	**Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.**	A6	*Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.*	*A6.1. Acquire basic project management skills.* *A6.2. Practice project management skills*

	Competency-based NARS		*Program Competency-based NARS*	*Learning Objectives (LO's)(Measurable)*
A7	**Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams**	A7	*Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams*	*A7.1. Acquire proper soft skills*
A8	**Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.**	A8	*Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.*	*A8.1. Acquire different communication skills*
A9	**Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.**	A9	*Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.*	*A9.1. Use creative, innovative and flexible thinking.* *A9.2. Acquire entrepreneurial and leadership skills*
A10	**Acquire and apply new knowledge and to practice self, lifelong and other learning strategies.**	A10	*Acquire and apply new knowledge and to practice self, lifelong and other learning strategies.*	*A10.1. Practice self, lifelong and other learning strategies*
	Level B Specialty (Electrical)		***(Biomedical)***	
B1		B1	*Analyze different physiological data and systems and build models of hybrid engineering systems using the proper scientific and engineering concepts, tools and*	*B1.1. Analyze different physiological systems.* *B1.2. Design engineering systems able to perform specific functions.*

	Competency-based NARS		*Program Competency-based NARS*	*Learning Objectives (LO's)(Measurable)*
			technologies to simulate, analyze and solve medical problems.	
B2		B2	*Estimate and measure the functions of physiological systems and parameters under specific conditions and evaluate their responses with proper engineering methodologies and technologies.*	*B2.1. Design experimental systems to acquire data or control function.* *B2.2. Analyze and interpret physiological data.* *B2.3. Design systems to control*
B3		B3	*Design, model and analyze multidisciplinary engineering systems or component for a specific application in healthcare(such as diagnosis and prognosis) and identify the proper engineering tools and methods to optimize this design*	*B3.1. Design multidisciplinary engineering systems or component for a specific application* *B3.2. Model and analyze multidisciplinary engineering systems* *B3.3. Identify the proper engineering tools and methods to optimize design*
B4		B4	*Adopt suitable national and international standards and codes to design, operate, inspect and maintain medical equipment and systems and healthcare services.*	*B4.1. Adopt suitable national and international standards and codes*
	Level D Inter-Disciplinary		***Medical & Healthcare Sciences***	
D1		D1	*Describe the normal structure of the human body and its major organs, systems and explain their*	*D1.1. Describe the normal structure of the human body*

	Competency-based NARS		*Program Competency-based NARS*	*Learning Objectives (LO's)(Measurable)*
			functions and Recognize and respond to the complexity, uncertainty, and ambiguity inherent with its functions	*D1.2. Recognize the complexity, uncertainty, and ambiguity*
D2		D2	*Adopt strategies and apply measures that promote patient safety and Improve the healthcare service quality*	*D2.1. Adopt strategies to promote patient safety* *D2.2. Apply measures that promote patient safety.* *D2.3. Improve the healthcare service quality*
D3		D3	*Recognize the economic, psychological, social, and cultural factors that imposed when dealing with healthcare and patient health.*	*D3.1. Recognize the economic, psychological, social, and cultural factors*

Ninth: Quality assurance, accreditation and total quality in higher education

(1) Introducing the National Authority for Quality Assurance and Higher Education Accreditation

The National Authority for Guarantee and Accreditation was established by Law No. (82) of 2006 at the Presidency of the Republic, which stipulates that this body enjoys independence and has a public legal personality, and reports to the Prime Minister, and its headquarters is in Cairo, and the Authority may establish branches in the governorates. The President of the Republic also issued Decree No. 25 of 2007 issuing the executive regulations of this law.

The National Authority for Quality Assurance and Accreditation of Education is one of the main pillars of the national plan for educational reform in Egypt, as it is responsible for spreading the culture of quality in educational institutions and society, and for developing national standards that keep pace with international standards for restructuring educational institutions and improving the quality of their operations and outputs in a way that leads to gaining community confidence in them, increasing their competitiveness locally and internationally, and serving the purposes of sustainable development in Egypt. In light of this, the

Authority seeks to continuously develop education and ensure its quality in accordance with a set of principles and values that emphasize transparency, objectivity, justice and keenness to help educational institutions to reconcile their conditions and improve their overall performance to qualify and obtain accreditation.

The Authority is not considered a supervisory body, but rather an accreditation body for educational institutions that are able to achieve the requirements of national standards, and therefore it is keen to provide all forms of guidance, guidance and support to these institutions in order to help them continuously improve the quality of their outputs through objective and realistic mechanisms for self-evaluation and accreditation, and to achieve the above, the Authority is keen to provide and disseminate sufficient and accurate information that can help educational institutions to self-evaluate, and then take the necessary steps to apply and obtain accreditation.

(2) Program Quality Awareness Plan

The awareness plan is based on the senior leadership of the institution, through faculty members, supporting staff, administrators and all employees of the institution, to students who are the cornerstone of the educational process.

(3) Quality concepts and terminology

When using these concepts and terms, the Commission emphasizes the meanings described in front of each of them , and the Commission is aware that these concepts and terms may be contained in different meanings in other references or evidence. The Authority emphasizes that these concepts have been greatly simplified to maximize the use of them in proportion to the target group of this guide .

Educational institution: A university, college or higher institute that offers educational programs leading to a university scientific curriculum (bachelor's or bachelor's) or higher degree (master's or doctorate).

Educational Program: A set of educational courses and activities determined by the institution to achieve the competencies (educational outcomes) of the graduate required for the student to obtain a degree in a particular discipline.

Program Vision: An ambitious future description of what the program wishes to achieve, or the individual, and the duration of its achievement ranges at the medium or long level, i.e. the bright future, so that the main goal of writing it is to use it as a guide in choosing the program's directions in the activities, policies and events of the program, in the present and future.

Program Mission: Carefully formulated phrases that reflect the reasons for the creation of the program, define what can be offered to society and the labor market, and present the purpose that makes it different from other programs. It explains the essence of its teaching and learning operations, the target sectors, and the human and material resources that characterize it. The program's mission may include the values and philosophy that govern the performance of the program and its management's dealings with others.

Program Objectives: The final results that the program seeks to achieve that must be precisely defined, clear, understandable, realistic, flexible and measurable.

Policies: A guide for decision-making in various areas of activity related to the educational program such as admission and transfer policy, teaching and learning policy, and financial policy. Policies must be written, adopted, understandable and flexible.

Governing Boards: The official boards of the institution and the educational program (e.g. the university council / institute administration, the college / institute council, the scientific department council) which have the legitimate authority derived from the organizational structure of the institution and have the right to develop and approve policies, educational programs, courses and budgets, and to make relevant executive decisions .

Quality Assurance of Education: The process of verifying that academic standards are compatible with the mission of the educational institution that has been defined, defined and approved by its governing boards, in a manner that conforms to national academic standards or international standards, and that the level of quality of learning opportunities, scientific research, community participation and environmental development is appropriate or exceeds the expectations of all types of end-users of the services provided by the educational institution.

Accreditation: The recognition granted by the National Authority for Quality Assurance and Accreditation of Education to the educational institution if it can prove that it has competence in institutional capacity, and achieves educational effectiveness, or grants it to the educational program in accordance with national standards or any other standards but approved by the Authority, and the institution or program has advanced systems that ensure improvement, enhancement and continuous development of quality.

National Academic Standards (NARS) National Academic Standards for various educational programs prepared by the Authority with the help of specialized experts and representatives of various sectors of beneficiaries. These standards represent the minimum required for accreditation.

Accredited Standards (ARS) are the academic standards adopted by the institution (or the educational program in the institution) and

approved by the National Authority for Quality Assurance and Accreditation provided that their level is higher than the minimum national academic standards (NARS).

Evaluation and Accreditation Standards: Standards prepared by the Commission for the evaluation and accreditation of higher education institutions or educational programs in these institutions, which are designed and reviewed by a team of specialized experts from academic leaders and representatives of various sectors of beneficiaries. The evaluation and accreditation standards for the educational program revolve around both the program management, and the educational effectiveness of the program, and the evaluation and accreditation standards are the main tool that is used in the evaluation and accreditation stage.

Program management: represents the first axis of evaluation and approval of the educational program. This pillar refers to the ability of the program to perform efficiently through the availability of a clear mission and specific objectives, conscious academic and administrative leadership, clear and appropriate organization, adequate and appropriate financial resources and supporting material facilities, and information technology.

The educational effectiveness of the program: It represents the second axis of evaluating and approving the educational program, and it means the effectiveness of the teaching and learning process in the program in accordance with the adopted academic standards

that achieve the planned mission and objectives of the program and meet the expectations of the final beneficiaries. This requires the adoption of specific and approved academic standards, good design of the program and its courses in a way that achieves the targeted learning outcomes of the program, effective policies and methods of teaching and learning, objective and stated policies for student admission with appropriate academic guidance (or student leadership) and all other forms of support to students, continuous evaluation of learning outcomes, the use of highly capable faculty members, and the availability of targeted plans for promotion and development.

Program Self-Evaluation: The process of evaluating the overall performance of the educational program by those responsible for managing the program from academic and administrative leaders, in order to reveal the strengths and weaknesses in the management of this program and its educational effectiveness.

Self-study of the program: One of the basic means of self-evaluation of the program, and depends mainly on the description and diagnosis of the current status of the program, and the identification of areas of strength and weakness in its capabilities, management, design and educational processes, and the learning resources it uses and others. In addition, the study should include a precise identification of possible areas of improvement and development, and proposals, means and responsibilities of promotion and development.

Program Evaluation and Accreditation Standards: A set of standards prepared by the Commission and related to the two main areas for evaluating and accrediting educational programs in higher education institutions, namely program management and educational effectiveness of the program.

Indicators, elements and characteristics of evaluation and accreditation: Each of the evaluation and accreditation standards specified by the authority includes a set of indicators that express the intended standard, and each indicator includes a set of related elements, and finally each element includes a set of characteristics to be measured during the evaluation and accreditation process of the program.

Distinctive features of the program: a set of characteristics that are unique to the program and distinguish it from other corresponding educational programs on the one hand, and from other programs in the same institution on the other hand, and such qualities are called competitive advantages.

The competitive position of the program: reflects the status of the educational program compared to other corresponding educational programs (or even non-corresponding in one institution) in terms of areas and elements of excellence and excellence, which helps to

determine its position among these competing programs directly or indirectly.

Quality management in the program: It is related to the mechanisms, procedures, rules and activities that are used to ensure high levels of quality in the program, which are mainly related to the standards of program management and educational effectiveness.

Community Parties: All individuals, institutions and entities that have a legitimate interest or interest or bear risks resulting from the existence and implementation of the educational program, which include for educational programs (students, parents, faculty members and their assistants, employees of the institution, representatives of the professional union associated with the program, business organizations and governmental organizations, and individuals and civil society institutions who form the local community of the institution geographically).

External Reviewer: An academic member with experience in the field of specialization who is invited by the institution to which the program belongs to review its structure, content, academic standards applied, the extent of its ability to achieve the targeted results of learning, the methods and resources of self-learning used, the available teaching and learning facilities, the evaluation

of students' work, and other activities related to its management and educational effectiveness.

Accredited Reviewers: A team of faculty members or experts in the field of higher education development from outside the institution subject to evaluation and accreditation, and related to the specializations of the programs offered by the institution and do not have conflicting interests, as they are selected, appointed, trained and accredited by the Commission to carry out the review and evaluation process during field visits to the institution. Coordinator: A faculty member nominated by the institution to coordinate the review and evaluation of the educational program before, during and after the field visit of the team of accredited auditors.

Field visit: A visit by the auditors accredited by the Authority to the place of the program for the purposes of evaluation and accreditation, during which all standards, indicators, elements and characteristics related to the axes of evaluation and accreditation in the program are reviewed and audited as contained in the self-study. The visit is carried out in coordination with the institution to which the program belongs.

Program Annual Report: A report submitted annually to the Authority on the educational program subject to evaluation and accreditation, showing the results of self-evaluation of the program's performance in the immediately preceding academic

year, areas of improvement and treatment of weaknesses in the program, areas of enhancing strengths, and any other practices to develop the performance of the program in light of previous accredited auditors' reports. Self-learning: The student's ability to continue to develop his cognitive, mental and professional abilities and skills on his own, unlike the typical methods of learning.

Learning styles: The different ways in which the learning process takes place, including face-to-face learning, distance learning, and e-learning. Targeted Learning Outcomes (LOs): The targeted outcomes of learning (knowledge, understanding and skills) that the institution seeks to achieve through its various programs related to its mission, and reflect the academic standards adopted, measurable, as well as clearly related to the different ways of evaluating students.

Evaluation of students' performance: A set of direct and indirect methods, including examinations, approved by the institution, to measure the achievement and achievement of the targeted learning outcomes (cognitive abilities and their mental, practical and professional skills) from an educational program or course.

Graduate Specifications: Expected Graduate's Competencies / Learning Outcomes (Competencies / Abilities) The graduate is expected and resulting from the acquisition of knowledge and skills once he completes a specific educational program.

Student File: A record that includes all information related to the student during the period of his study in the program, as it includes data on the courses he has completed from his studies, the grades he obtained, the courses in which he stumbled academically, the types of support he obtained, the grievance forms that he previously submitted, and others. It is considered as a complete picture of the student's academic status .

Labor Market Organizations: Government institutions, public and private companies, and NGOs that provide employment opportunities for graduates of the program.

Measurement: **A** structured process by which an object is determined by the amount of a property that we measure in terms of an appropriate unit of measurement, such as questionnaires and tests. Measurement in the educational process can be defined by the extent to which students achieve the planned goals through the achievement test and passing the skills of continuous evaluation, in which cognitive achievement is achieved, and the acquired skills of students.

Evaluation: An organized process based on measurement by which the judgment (evaluation) of the object to be evaluated is made in light of the content of the property subject to measurement and its ratio to an agreed value or a particular criterion.

Evaluation: Identify the extent to which students have achieved goals and take appropriate decisions and recommendations against them by diagnosing the strengths and weaknesses of any element of the educational system.

Quality control: It is the techniques and practical activities that are used to perform a permanent inspection of all the elements of the activity.

Quality assurance: It is an activity and a means to ensure that the requirements and standards required for the institution are met to achieve the institution's goal to reach outputs that satisfy the labor market and the needs of society.

Quality improvement: **The** executive actions and activities taken by the institution to increase the effectiveness of the activities and operations within it to benefit or benefit both the institution and the consumer.

Institutional accreditation: It is the process of evaluating the quality of the educational level of the institution, on the basis that the institution achieves the greatest amount of its goals, and that it has the resources to continue in the future.

Academic accreditation: The recognition that the programs of an educational institution have achieved or reached the minimum

standards of competence and quality set in advance by the accreditation body.

Quality Management Unit: The unit responsible for quality management within the organization and has all the documents and manuals for quality management within the institution.

Academic Advisor: Provides academic advising services by following up on the student's performance and assisting him in choosing or changing courses every semester ..... etc. and is considered in the credit hour system, as for the academic regulations in the semester system, it is replaced by the academic leader.

Specifications of a good student: possesses a set of knowledge, skills, experiences and trends in the field of specialization and in the field of life and citizenship in a moral framework has identified the Commission set of standards must be met in the graduate seeks everyone) professor - student - leaders .... etc. (to achieve them through the quality system.

Struggling students: people with learning difficulties . Those who did not achieve the targeted educational results and those who were exposed to failure .

Community participation: Effective integration between the community and the institution through mutual contribution to

continuous efforts to improve education, increase its effectiveness, solve societal problems and provide services to its members and institutions for the benefit and benefit of society and the educational institution .

Academic Advising: Introducing students to academic programs, regulations and laws within the college / institute, as well as revealing their tendencies and abilities and providing them with the opportunity to benefit from the expertise of faculty members to help them solve their problems by appropriate scientific methods for each case and also aims to help the student discover himself and make his own decisions, especially how to overcome the difficulties facing his academic path, which is specific to the credit hour system, as for the academic regulations in the semester system, it is replaced by student leadership.

Strategic planning: Determining the vision and mission of the institution, its goals and strategic objectives that must be achieved in a long period of time (5 years or more) as well as the means necessary to achieve this .

Strategic Plan: It represents the outcome of the strategic planning process and must be written and approved and define the vision and mission of the institution, its goals and strategic objectives, the available and future means to achieve this, and reflect the university/academic strategy .

The executive plan of the institution' s strategy: includes the various activities and tasks required to be carried out in order to achieve the goals and strategic objectives of the institution with an accurate definition of responsibilities, timetable, follow-up and evaluation indicators and levels of achievement.

Corrective and preventive actions: It is the set of actions that the institution decides to take to meet unmet standards or to enhance the performance of some standards already met to maintain their fulfillment, and this is developed through organized procedures that determine the tasks, distribution of roles and time specified for implementation, and are followed up in what is known as the improvement plan.

Development: Those planned efforts made by members of the institution's community to develop the level of its performance .

Development plans: Determine the tasks required for the development process, implementation responsibilities, time frame, follow-up mechanism, and alternative procedures in case of implementation failure.

Appropriate mechanism: a method announced and adopted by the college / institute commensurate with its nature and the nature of

students in it, such as the complaint box - submitting a request or grievance - sending an e-mail .

Questionnaire: Standardized tools for surveying or collecting data on a specific topic (s) prepared according to scientific conditions and their results are analyzed statistically to know opinions.

Feedback: Benefit from the results of the evaluation process and correct the path towards the desired goal

Program / Course File: A file containing the course description, reports for previous years, teaching and evaluation activities, student comments, expert opinion, measures taken to improve it, procedures being implemented, and everything related to the course to include better performance, as the experiences of the past year are used to improve performance and ensure the advancement and improvement of performance regardless of who is responsible for the course.

Program / Course Description: It includes a definition of academic standards, objectives, targeted educational outcomes, teaching strategies, evaluation, and determines the courses, the distribution of their hours, and everything related to the program for the success of its implementation.

Cooperative education: Cooperative education is a student-centered learning style where students work in heterogeneous groups (which include different levels of knowledge and skill) to achieve a common educational goal The number of members of each group ranges between 4-6 individuals and one of the most important postulates of cooperative learning is that students are not allowed to be passive recipients, but rather they are urged to actively participate in learning to interact with their colleagues, explain to them what they have learned, listen to their views, and encourage and support each other .

Office hours: Specific hours in which faculty members are present in their offices to receive students, discuss any educational problems related to them, and work to guide them to solve them.

Student Evaluation: A set of methods, including examinations approved by the institution, to measure the achievement and achievement of the targeted learning outcomes (students' cognitive, mental and professional abilities and skills (from an educational program or a specific course).

Stages of obtaining program accreditation:

- Forming a team to manage and prepare self-study in the program.
- Preparation of self-study .

- Apply for program accreditation to the Education Quality Assurance and Accreditation Authority.
- Upload the required documents on the Authority's website.
- Formation of the field visit team.
- Examination of documents, audit and review by the field visit team .
- Sending the initial report from the Authority to the program management.
- Respond to the initial report from the program management and send it to the authority.
- Resolution of the Authority's Board of Directors regarding accreditation.

(4) Various opinion polls (Evaluation Guide):

Proposed implementation mechanisms		Target Group	Subject	number prototype
Distribution mechanism	Time			
First: - Methodology for preparing the guideline for opinion polls				
Second: - Student opinion polls (15 models)				
electronic	End of each vertical chapter	All Students	Educational Effectiveness	1

electronic	End of the school year	All Students	Institutional Capacity	2
electronic	After the end of the internship period	Students benefiting from the training	Summer Training	3
electronic	First month of the first semester	Preparatory Year – Fourth Etisalat	Admission and Transfer Policies	4
Paper	End of the school year	Students benefiting from support	Support systems for struggling students	5
electronic	End of each semester	All Students	Computer laboratories - and specialized	6
Paper	End of each semester	Students who frequent the library	Library	7
electronic	End of the school year	Fourth Year for All Programs	Vision and Mission of the Institute	8
electronic	End of the school year	For all bands except band	Academic Leadership Assessment	9
electronic	After the end of the course	Students benefiting from the training	Training & Workshops	10
Paper	Before preparing the strategic plan	Sample of students	Teaching and Learning Strategies	11
electronic	End of the school year	All students	Hybrid education	12
electronic	End of each semester	All Students	Complaints and Suggestions Mechanism	13
electronic	End of the school year	All Students	Academic Major	14
electronic	End of each semester	All Students	Website Evaluation	15
Third: Opinion polls for graduates and employers (5 models)				
electronic	Annually	Employers	Specifications of the institute's graduates	1
electronic	Annually	Graduates	Quality of educational service	2
electronic	Annually	Beneficiaries	External environment	3
electronic	Annually	Beneficiaries	Website Evaluation	4
electronic	Annually	Graduates	Services provided by the program	5
Fourth: - Opinion polls for faculty members (12 models)				
electronic	End of the pandemic period	Faculty Members and Supporting	E-Learning	1
electronic	End of the school year	Faculty Members and Supporting	Vision and Mission of the Institute	2
electronic	End of the school year	Faculty Members and Supporting	Job satisfaction	3
electronic	Annually	Faculty Members and Supporting	Academic Leadership	4
electronic	End of each semester	Faculty Members and Supporting	Training Needs	5
electronic	After preparing the teaching and	Faculty Members and Supporting	Teaching and Learning Strategy	6
electronic	End of the school year	Faculty Members and Supporting	Hybrid education	7

electronic	End of the school year	Faculty Members	The opinion of the head of the department in the	8
electronic	End of the school year	Faculty Members and Supporting	Website Evaluation	9
electronic	End of each training course	Beneficiaries of the training	Training & Workshops	10
electronic	Annually	Faculty Members and Supporting	Scientific Research	11
electronic	Annually	Faculty Members and Supporting	Credibility and ethics	12
Fifth: - Opinion polls for the administrative body (6 models)				
electronic	End of the school year	Administrative apparatus	Job satisfaction	1
electronic	Annually	Administrative apparatus	Academic Leaders	2
electronic	Annually	Administrative apparatus	Vision and Mission of the Institute	3
electronic	End of each semester	Administrative apparatus	Training Needs	4
electronic	Annually	Administrative apparatus	Website Evaluation	5
electronic	End of each training course	Beneficiaries of the training	Training & Workshops	6
Sixth: - Opinion polls for community service (1 sample)				
electronic	Annually	Community Parties	Community service and environmental	1

:Tenth: Program Accreditation Certificate

الهَيئةُ القَوميّةُ لِضَمَانِ جَودَةِ التَّعْليمِ والاعتِمَاد

شَهَادَةُ اعتِمَاد

تشهَدُ الهَيئةُ القوميّةُ لِضَمَانِ جَودَةِ التَعليمِ والاعتِمَادِ أنّ:

برنامج الهندسه الطبيه الحيويه والمنظومات - المعهد العالى للهندسة بالشروق-
وزارة التعليم العالى

قدْ استوفى معَاييرَ الاعتماد البرامجى، وقدْ تمّ اعتمَادُه بقرار مَجلس إدارة الهَيئة

رقم ٢٢٦ بتاريخ ٢١ يونيو ٢٠٢٣

تنتهي صلاحيةُ هذه الشهادة في
٢٠ يونيو ٢٠٢٨

رئيس مجلس إدارة الهيئة
أ.د/ علاء كمال الدين عشماوى

تسري صلاحيةُ هذه الشهادة لمدة خمس سنوات، وتخضعُ المؤسسة طوال هذه الفترة للمتابعة والمراجعة طبقًا لنص المادة ٨، ٩ من اللائحة التنفيذيّة لقانون إنشاء الهيئة.