Ministry of Higher Education

The Higher Technological Institute (HTI)

Tenth of Ramadan

Electrical Engineering Program

(Electronic and Communication Engineering)

Matrices for illustrating compatibility of Graduate Attributes with its program Competencies and objectives

1. Program Competencies

The Electrical Engineering (Electronic and Communication Engineering) Program adopted (ARS) as reference academic standards guided by (NARS 2018). This program must satisfy the following competencies.

1.1 Competencies for Engineering Graduates (level "A")

The Engineering Graduate must be able to:

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

1.2 Competencies for Electrical Engineering Specializations (level "B")

In addition to the Competencies for All Engineering Programs the basic Electrical Engineering graduate and similar programs must be able to:

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

1.3 Competencies for Electronics and Communication Engineering Specializations (level "C")

Level (C)	C.1	Identify, analyze, and design a model for different types of analog and digital modulation techniques in different communication systems
	C.2	Identify, analyze, and design a model for different types of multiple access and Multiplexing techniques in different communication systems
	C.3	Measure and evaluate the quality performance of transmission and reception for the information in different communication systems and analyze the performance of antenna and microwave applications by applying the effect of different fading channels
	C.4	Design and implement mathematical and practical a model for different communication systems based on the concepts of coding, decoding, encryption and decryption on the transmitted and received signal
	C.5	Design and implement electronic circuits and embedded systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance.

2. Program Objectives

The graduates of the electrical engineering (electronic and communication engineering) program should be able to:

1	Applying basic concepts in mathematics and engineering sciences to provide solutions to engineering problems related to electronics and communications engineering.
2	Continuous development of academic curriculum in line with the rapid technological development and the requirements of the labor market.
3	Acquiring the graduate, the skill of working efficiently through disciplined work groups.
4	Acquiring the graduate, the skills of entrepreneurship, leadership, adaptation and adapting to changes in the work environment.
5	The ability of the graduate to continuous self-learning and sustainable professional and life development.
6	Developing the capabilities and skills of academic staff, academic staff assistants and the administrative staff participating in the program by training courses and workshops to develop the educational process.
7	Concerning on scientific research to serve society and the environment.
8	Activating and supporting student activities in the department and providing the services and capabilities necessary for implementation.

3. Graduate Attributes

3.1 The General Engineering Graduate must be able to:

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

9	Communicate effectively using different modes, tools, and languages with various audiences to deal with academic/professional challenges in a critical and creative manner.
10	Demonstrate leadership qualities, business administration and entrepreneurial skills.

3.2 Special specifications for a graduate of the program of Electronics and Communications Engineering:

The Graduate must be able to:

1	Mastering a wide range of basic concepts of mathematics and engineering sciences and mastering the use of modern technological methods related to electronics and communications engineering and linking them with other engineering sciences.
2	Enabling students to design and analyse electronic devices as well as ensuring the level of engineering performance of the electronic systems and their operating efficiency.
3	Design, Analyze, operate, and maintain analog and digital communication systems, embedded systems, computer networks, software, and coding systems.
4	Applying control theory and measurement principles for industrial systems, signal conversion, adaptation, and treatment
5	Knowing and studying the impact of engineering solutions on society and the environment related to electronics and communications engineering and contributing to the development of the profession and the surrounding community.

4. Matrix for illustrating compatibility of program objectives with its program Competencies.

Program Objectives	Program Competencies																			
	General										Specialty					Sub-Specialty				
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
Objective # 1	√										√	√				√	√	√		
Objective # 2		√		√						√										
Objective # 3							√	√					√							√
Objective # 4						√				√					√				√	
Objective # 5					√					√				√						
Objective # 6		√							√											
Objective # 7	√		√							√					√				√	
Objective # 8							√	√	√											

5. Matrix for illustrating compatibility of Graduate Attributes with its program Competencies.

Program Objectives	Program Competencies																			
	General										Specialty					Sub-Specialty				
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
Attribute #1										√										
Attribute #2									√											
Attribute #3			√																	
Attribute #4							√													
Attribute #5	√	√	√																	
Attribute #6															√					
Attribute #7				√																
Attribute #8					√															
Attribute #9								√												
Attribute #10						√														
Attribute #11	√																			
Attribute #12												√						√		
Attribute #13		√											√			√	√			√
Attribute #14											√			√					√	
Attribute #15			√																	

6. Matrix for illustrating compatibility of Graduate Attributes with the Program Objectives

To judge the compatibility Graduate Attributes with the Program Objectives, the following matrix is used:

Program Objectives / Graduate Attributes	Objective # 1	Objective # 2	Objective # 3	Objective # 4	Objective # 5	Objective # 6	Objective # 7	Objective # 8
Attribute #1							√	
Attribute #2	√							
Attribute #3			√		√			
Attribute #4			√	√				
Attribute #5		√						
Attribute #6								√
Attribute #7				√	√			
Attribute #8					√			
Attribute #9			√			√		√
Attribute #10				√				
Attribute #11	√						√	
Attribute #12	√							
Attribute #13	√							
Attribute #14	√							
Attribute #15					√		√	

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