Electronics and Communication Engineering
Program Specifications (2022-2023)

Regulation 2010

General

A. Basic Information

1- Program Title:	Electronic and Communication Engineering
2- Program type:	Single
3- Department responsibility:	Electronic and Communication Engineering
4- Coordinator:	Prof. Dr. Osama El-Ghandour
5- External evaluator:	Prof. Dr.
6- Internal evaluator:	Dr. Osama Mohamed Elmowafy
7- Year of specification approval:	3/9/2022
8- Dates of regulation approval:	2010

B. Professional Information

Institute Vision

The vision is for the Higher Institute of Engineering and Technology in the Fifth Settlement to be recognized for its leadership in engineering sciences at the local, regional, and international levels in the field of engineering education through academic programs that meet the needs of the local community and achieve the goals of sustainable development.

Institute Mission

The mission is to prepare distinguished engineering cadres capable of keeping pace with global technological development and able to compete, work collectively, and innovate to meet the needs of the local and regional market through the provision of outstanding educational programs. This is done by adopting the latest methods of education, learning, and knowledge exchange in accordance with national academic standards, regulations, and professional ethics, contributing to the development of the cognitive abilities of individuals in the community.

Program Vision

Working towards enhancing and Aspiration of academic, scientific and research Leadership and Excellence at the local and regional levels through a distinguished academic program in the Electronic and Communication Engineering

Program Mission

The Electronic and Communication Engineering program aims to prepare the graduates having high practical and scientific efficiency and capable of scientific research and competing in the field of electronics and communications to accommodate with community service and satisfy its needs at the local and regional levels using implementing information system and communication technology.

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

1. Program Aims

The ECE program aims to prepare its graduates to have the ability to analyze, synthesize, and design engineering systems through the following aims:

AM1. Solve and analysis communication and electronic engineering problems based on physical sciences and mathematics.

AM2. Acquire scientific research skills and perform continuous development through self-learning and knowledge.

AM3. Identify, analyse, and solve practical problems, making use of appropriate engineering tools, programs and techniques.

AM4. Acquire the required skills to perform laboratory and field experiments and interpret their results.

AM5. Identify the latest components and Communication and electronic devices, and become familiar with the technology of implementing communication and electronic systems using these electronic components. And then improve the skills in handling and dealing with electronics and communication technology including the fabrication, characterization, and installation of components, devices, and systems.

AM6. Identify the project management methods, and efficiently utilize available resources and learn design management techniques. And Manage time efficiently by assigning specific tasks within designated time schedules to accomplish work within the specified deadlines

AM7. Perform effectively as an individual or as a member of a multi-disciplinary professional team with possessing a firm understanding of engineering ethical, legal, and professional responsibilities.

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

2. The attributes of Electronic and Communication Engineering

According to the National Academic Reference Standard (NARS 2022), the graduates of the ECE program must satisfy the following attributes:

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

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

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

3. Learning Outcomes (LO's)

3.1. Competencies of engineering graduate (Level A)

The Engineering Graduate must be able to:

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

3.2. Competencies of basic electrical engineering (Level B)

The ECE engineering graduate must be able to:

B- Electrical NARS Competencies in 2018		
Level B (NARS)	B.1	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.
	B.2	Design model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
	B.3	Design and implement elements, modules, sub-systems or systems using technological and professional tools.
	B.4	Estimate and measure the performance of an electrical/electronic/ 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 equipment, systems and services.

3.3. High specialized competencies (Level C)

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

C- Communication and Electronic Engineering ARS		
Level C (ARS)	C.1	Use appropriate mathematical methods or IT tools for modeling and analyzing electronic and communication systems
	C.2	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems
	C.3	Use the appropriate tools and equipment to measure system performance and analyze the results correctly

To judge the compatibility of program aims with its competencies, see the matrix in **Appendix 1.6.**

For the matching matrix of program aims and program learning outcomes, see **Appendix 1.7**

For the matching matrix of Courses and program competencies, see **Appendix 1.8**

For the matching matrix of program course learning outcomes and program competencies, see **Appendix 1.9**

For the program competencies derivatives, see **Appendix 1.10**

For the matching matrix of Courses and program aims, see **Appendix 1.11**

For the matching matrix of Courses and course learning outcomes, see **Appendix 1.12**

For the matching matrix of Courses and Teaching and Learning methods, see **Appendix 1.13**

4. Academic Standards of Program

The ECE program adopted exactly as National Academic Reference Standards (**NARS**) of engineering program (August 2022) which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE.

5. Program Structure and Contents

a. Program duration 10 semesters (5-years)

b. Program Structure:

i.	No. of hours: 180	:	165 Compulsory		15 Elective
ii.	No. of contact hours: 302	:	173 Lectures		101 Tutorial 19 Lab 9 Project
iii.	Contact hours of Lectures: 173 hours = 57.3%				
iv.	Contact hours of Tutorials: 102 hours = 33.8%				
v.	Contact hours of Lab: 18 hours = 6%				
vi.	Contact hours of Project: 9 hours = 2.9%				

c. Program Years:

Year	Hours		
	Compulsory	Elective	Total
Preparatory	36	0	36
First	38	0	38
Second	36	0	36
Third	33	3	36
Fourth	22	12	34
Subtotal Hours			180

d. Program Levels and Courses

Preparatory Year / First level

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 0101	Mathematics (1)	4	2	0	6	4	3	75	-	75	150		4		
PHM 0102	Physics (1)	4	1	1	6	4	3	30	30	90	150		4		
PHM 0103	Mechanics (1)	2	2	0	4	2	2	40	-	60	100		2		
MCE 0101	Engineering drawing & projection (1)	2	4	0	6	2	3	40	-	60	100		2		
CSE 0101	Computer technology	2	0	1	3	2	2	30	10	60	100	2			
HUM0101	English Technical language	2	-	0	2	2	2	40	-	60	100	2			
Total		**16**	**9**	**2**	**30**	**16**	**15**	**265**	**30**	**405**	**700**	**4**	**12**		

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 0201	Mathematics (2)	4	2	0	6	4	3	75	-	75	150		4		
PHM 0202	Physics (2)	4	1	1	6	4	3	30	30	90	150		4		
PHM 0203	Mechanics (2)	2	2	0	4	2	2	40	-	60	100		2		
MCE 0201	Engineering drawing & projection (2)	2	4	0	6	2	3	40	-	60	100		2		
MCE 0202	Production technology	4	3	0	7	4	3	40	-	60	100	4			
PHM 0204	Chemistry	4	1	1	3	4	3	40	-	60	100		4		
Total		**20**	**13**	**2**	**32**	**20**	**17**	**265**	**30**	**405**	**700**	**4**	**16**		

First Year / Second Level

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
EPE1211	Electrical circuits (1)	3	2	0	5	3	3	40	0	60	100			3	
PHM 1111	Mathematics (3)	4	2	0	6	4	3	75	-	75	150		4		
PHM 1112	Physics (3)	4	1	1	6	4	3	30	30	90	150		4		
PHM 1113	Mechanics (3)	3	2	0	5	3	3	40	-	60	100		3		
CVE1111	Civil Engineering	3	2	0	5	3	3	40	-	60	100		3		
HUM XX02	Technical writing	2	1	0	3	2	2	40	-	60	100	2			
Total		**19**	**10**	**1**		**19**					**700**	**2**	**14**	**3**	

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 1211	Mathematics (4)	4	2	0	6	4	3	75	-	75	150		4		
HUM XX03	Economic engineering	2	1	0	3	2	2	40	-	60	100	2			
CSE 1211	Computer programming	3	2	0	5	3	3	40	0	60	100			3	
EPE 1211	Electrical circuits (2)	3	2	0	5	3	3	40	0	60	100			3	
EPE 1212	Electrical Measurements	3	2	0	5	3	3	40	0	60	100			3	
ECE 1211	Electronics engineering	4	2	0	6	4	3	40	0	60	100			4	
Total		**19**	**11**	**0**	**30**	**19**					**650**	**2**	**4**	**13**	

Second Year / Third Level

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 2111	Mathematics (5)	3	2	0	5	3	3	75	-	75	150		3		
CSE 2111	Logic Circuits	3	2	0	5	3	3	40	0	60	100			3	
EPE 2112	Magnetic fields	4	2	0	6	4	3	60	0	90	150			4	
EPE 2111	Electrical testing (1)	0	0	3	3	1	2	40	20	40	100			1	
MCE 2111	Mechanical Engineering	3	2	0	5	3	3	40	0	60	100			3	
ECE 2111	Electronic Circuits (1)	4	2	0	5	4	3	40	0	60	100			4	
Total		**17**	**10**	**3**	**30**	**18**					**700**		**3**	**15**	

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
PHM 2211	Mathematics (6)	3	2	0	5	3	3	75	-	75	150		3		
EPE 2211	Electrical testing (2)	**0**	**0**	**3**	**3**	**1**	**2**	40	20	40	100			1	
CSE 2212	System dynamics and control components	**4**	**2**	**0**	**6**	**4**	3	40	0	60	100			4	
EPE 2212	Energy conversion	**4**	**2**	**0**	**6**	**4**	3	**60**	**0**	**90**	**150**			**4**	
ECE 2211	Signals	**3**	**2**	**0**	**5**	**3**	3	40	0	60	100			**3**	
CSE 2211	Computer organization (1)	**3**	**2**	**0**	**5**	**3**	3	40	0	60	100			**3**	
Total		**17**	**10**	**3**	**30**	**18**					**700**		**3**	**15**	

Third Year / Fourth Level

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
ECE3101	Communication sys. (1)	3	2		5	3	3	40		60	100				3
ECE3102	Electronic testing and measurement (1)	2		3	5	2	2	40	20	40	100			2	
ECE3103	Electronic Devices	4	2		6	4	3	40		60	100				4
ECE3104	Digital circuit	3	2		5	3	3	40		60	100				3
ECE3105	Electromagnetic waves	4	2		6	4	3	40		60	100				4
HUMxx05	Marketing and managements	2	1		3	2	2	40		60	100	2			
Total		**18**	**9**	**3**	**30**	**18**					**600**	**2**		**2**	**14**

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
ECE3201	Communication sys. (2)	3	2		5	3	3	40		60	100				**3**
ECE3202	Electronic testing and measurement (2)	2		3	5	2	2	40	20	40	100			**2**	
ECE3203	Opto-Electronics	**4**	**2**		**6**	**4**	**3**	**40**		**60**	**100**				**4**
ECE3204	Electronic circuit (2)	**4**	**2**		**6**	**4**	**3**	**40**		**60**	**100**			**4**	
ECE326x	specialized elective course (1)	**3**	**1**		**4**	**3**	**3**	**40**		**60**	**100**				**3**
HUMxx04	Project managements	**2**	**2**		**4**	**2**	**2**	**40**		**60**	**100**	**2**			
Total		**18**	**9**	**3**	**30**	**18**					**600**	**2**		**6**	**10**

Fourth Year / Fifth Level

First Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
ECE4101	Electronic testing and measurement (3)			3	3	1	2	40	20	40	100			1	
ECE4102	Electronic microwaves Engineering	3	2		5	3	3	40		60	100				3
ECE4103	Communication sys. (3)	4	2		6	4	3	40		60	100				4
ECE4104	Integrated circuits	4	2		6	4	3	40		60	100				4
ECE416x	specialized elective course (2)	**3**	**1**		**4**	**3**	**3**	**40**		**60**	**100**				3
ECE417x	specialized elective course (3)	**3**	**1**		**4**	**3**	**3**	**40**		**60**	**100**				**3**
ECE4199	Graduation Project			2	2	-		100			100				
Total		**17**	**8**	**5**	**30**	**18**					**600**			**1**	**17**

Second Semester

Code	Course Name	Teaching Hours						Marking				Subject Area			
		Lectures	Exercises	Practical	Total hours	Eqiv. Credit hours	Wr. Exam Dur.	Year work	Practical Exam	Written Exam	Total	Univ. Req.	Faculty Req.	General Req.	Special Req.
ECE4201	Electronic testing and measurement (4)			3	3	1	2	40	20	40	100			**1**	
ECE4202	Network	3	2		5	3	3	40		60	100				**3**
ECE4203	Antenna	3	2		5	3	3	40		60	100				**3**
ECE426x	specialized elective course (4)	3	2		5	3	3	40		60	100				3
ECE427x	specialized elective course (5)	3	2		5	3	3	40		60	100				3
ECE4299	Graduation Project			7	7	3		100			100				**3**
Total		**12**	**8**	**10**	**30**	**16**					**600**			**1**	**15**

Note: According to Head of department approval, the following courses are moved as follow **Appendix 7**:

1. Antenna (ECE4202) is moved from Fourth year (fifth level)\ Second semester to be in third year (fourth level)\ Second semester
2. Marketing and managements (HUMxx05) is moved from third year (fourth level)\ First semester to be in Fourth year (fifth level)\ Second semester
3. Project managements (HUMxx05) is moved from third year (fourth level)\ second semester to be in third year (fourth level)\ first semester
4. Chemistry become on second semester of first level only

Total teaching hours and subject's distribution over the subject areas Electronics and Communication engineering

	Semester	Course teaching hours	Univ. Req.	Faculty Req.	General. Req.	Special Req.
Prep.	1st	16	4	12		
	2nd	20	4	16		
First	1st	19	2	14	3	
	2nd	19	2	4	13	
Second	1st	18		3	15	
	2nd	18		3	15	
Third	1st	18	2		2	14
	2nd	18	2		6	10
Fourth	1st	18			1	17
	2nd	16			1	15
Total of Five Years		180	16	52	56	56
% of Five Years		100%	**8.9%**	**28.9%**	**31.1%**	**31.1%**
Reference Frame 2022			**8%**	**20%**	**35%**	**30%**
			Min.	**Min.**	**Min.**	**Max.**

The above table shows the agreement with Reference Frame 2022 requirements.

Specialized Elective Courses

Course Code	Course Title	Weekly Hrs.				Total Marks Score			Examination Duration (Hrs.)	Total Marks
		Lectures	Tutorial	Practical	Total Hours	Final	Semester works	Practical /		
ECE326x - Specialized Elective Course (1)										
ECE3261	Microprocessor and its applications	3	1	-	3	60	40	-	3	100
ECE3262	Digital Signal Processing	3	1	-	3	60	40	-	3	100
ECE3263	Electromagnetic waves applications	3	1	-	3	60	40	-	3	100
ECE416x - Specialized Elective Course (2)										
ECE4161	Electronic measurement instrumentations	3	1	-	3	60	40	-	3	100
ECE4162	Satellite	3	1	-	3	60	40	-	3	100
ECE4163	Integrated Circuit technology	3	1	-	3	60	40	-	3	100
ECE417x - Specialized Elective Course (3)										
ECE4171	Optical communication systems	3	1	-	3	60	40	-	3	100
ECE4172	Applications specific Integrated circuit	3	1	-	3	60	40	-	3	100
ECE4173	Integrated Circuit applications	3	1	-	3	60	40	-	3	100
ECE426x- Specialized Elective Course (4)										
ECE4261	Mobile Communications	3	2	-	3	60	40	-	3	100
ECE4262	Selected topics in communication system	3	2	-	3	60	40	-	3	100
ECE4263	Analog Integrated circuits	3	2	-	3	60	40	-	3	100
ECE427x - Specialized Elective Course (5)										
ECE4271	Selected topics in Electronics	3	2	-	3	60	40	-	3	100
ECE4272	Information Theory	3	2	-	3	60	40	-	3	100
ECE4273	Selected topics in microwaves	3	2	-	3	60	40	-	3	100

6. Courses Specifications

These courses specifications were revised and approved in 2022. Program– courses LO's Matrix is given in **Appendix 1.8.** Course specifications are listed in **Appendix 2.**

7. Program admission requirements

The Minister of Higher Education shall determine, based on the recommendations of the Board of Directors, the start and end dates of the academic year, examination schedules, and holidays at the institute. The actual duration of study for each academic semester, including the examination period, shall not be less than seventeen (17) weeks.

At the end of each academic year, the Minister of Higher Education determines the number of students to be admitted to each institute from the citizens of the Arab Republic of Egypt or other countries (foreign students) based on the needs of the following academic year and the qualifications of high school graduates or equivalent certificates. The admission of students to the institute shall be done through the Admission Coordination Office, unless the Minister of Higher Education issues a different decision.

The program Accepts:

- Secondary Egyptian Schools Graduates (mathematics section).
- Secondary School Certificate Graduates of other countries
- Technical Diploma of 3 or 5 years or industrial technical Graduates.

All acceptances are eligible to join this program if they meet the minimum grades set by Admission office of the Ministry of Higher Education.

The program admission restricted to:

- The medical examination proves that he is free from any infectious diseases and that he is fit to continue his studies
- To be a full-time student.
- To be of good repute

Student Transfer from One Program to Another within the Institute:

- A student may transfer from one academic program to another within the institute with the approval of the Institute's Council and the relevant departments, in accordance with the admission regulations set by the institute, as long as they have not exceeded 50% of the graduation requirements. If the student's registration in the new department is approved, registration begins from the start of the next main academic semester after the submission and approval of the request. A comparison will be made between the academic courses the student has already completed in the previous program and the required courses for the new academic program. A student is not permitted to transfer more than once during their study period at the institute, regardless of the reasons.

Transfer of Students between Semester System and Credit Hours System:

- It is permissible to accept the transfer of students from an engineering program operating under the semester system to any of the programs listed in the institute's regulations (which operate according to the credit hours system). This is in accordance with the admission regulations set by the Ministry of Higher Education. A comparison will be made between the academic courses the student has already completed in the semester system program and the equivalent courses in the credit hours system programs at the institute.

8. Regulations for progression and program completion

a. The Institute employs a credit hour system rather than a two-semester approach for its curriculum. This structure provides students with the flexibility to select their courses. This approach fosters critical thinking, encourages independent reading, and facilitates the integration of diverse scientific subjects. It also equips students with research skills, library utilization, self-study, and practical experience. Students can choose their courses for each semester following this schedule:

Semester	Start Date	Duration
First Semester	Third Saturday of September	15 weeks
Second Semester	Second Saturday of February	15 weeks
Summer Semester	First Saturday of July	8 weeks

b. Credit hours are allocated as follows: one credit hour for each theoretical lecture hour and two credit hours for courses without theoretical lectures. Students are limited to a maximum of 21 credit hours per semester, with a maximum of six courses. In exceptional cases, the dean of the Institute can add one or more courses.

c. Student performance is assessed continuously during the semester, including final semester examinations. Semester work contributes to the final grade and includes periodic exams, theoretical and practical exercises, research, and regular attendance. The final semester examination accounts for up to 70% of the final grade for courses without practical training and 60% for courses with practical training, depending on the course's nature as outlined in the curriculum plan. Practical courses may be assessed without a final semester examination.

d. The graduation requirements to earn a Bachelor's degree in Communication and Electronic Engineering program is of 180 credit hours. The distribution of these credit hours is as follows:

1. University requirements: 16 credit hours, accounting for 8.9% of the total required hours.
2. Institute requirements: 52 credit hours, accounting for 28.9% of the total required hours requirements.
3. General and specific specialization requirements: 112 credit hours, which is 62.2% of the total required hours.

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

f. The grades of the successful student in a course and in the general grade are evaluated as follows:

- Distinction (A^+): from 95% of the total mark and upwards. (GPA = 4)
- Distinction (A): from 90% to less than 95% of the total mark. (GPA = 3.7)
- Distinction (A^-): from 85% to less than 90% of the total mark. (GPA = 3.3)
- Very good (B^+): from 80% to less than 85% of the total mark. (GPA = 3)
- Very good (B): from 75% to less than 80% of the total mark. (GPA = 2.7)
- Good (C^+): from 70% to less than 75% of the total mark. (GPA = 2.3)
- Good (C): from 65% to less than 70% of the total mark. (GPA = 2)
- Pass (D^+): from 60% to less than 65% of the total mark. (GPA = 1.7)
- Pass (D): from 55% to less than 60% of the total mark. (GPA = 1.3)
- Pass (D^-): from 50% to less than 55% of the total mark. (GPA = 1)

g. The grades of a failing student in a course are less than 50% of the total mark. (GPA = 0)

h. The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study and can be calculated as follow:

$$\text{GPA} = \frac{Summtion\ of\ (pointsXNumbers\ of\ houres)\ for\ all\ courses\ completed\ in\ this\ semester}{No\ of\ credit\ hours\ for\ all\ courses\ completed\ in\ this\ semester}$$

i. . The students are then arranged serially according to their cumulative sum.

Grade	Percentage		GPA	
	From	Up to		
Excellent (+)	95%	100%	4	A+
Excellent	90%	95%	3.7	A
Excellent (-)	85%	90%	3.3	A-
Very good (+)	80%	85%	3	B+
Very good	75%	80%	2.7	B
Good (+)	70%	75%	2.3	C+
Good	65%	70%	2	C
Pass (+)	60%	65%	1.7	D+
Pass	55%	60%	1.3	D
Pass (-)	50%	55%	1	D-
Failed	0%	50%	0	F

j. The maximum number of courses a student can register for is 18-20 credit hours in the first and second semesters. In the summer semester, when the study period is half of that in the regular semesters, a student can register for a maximum of 6 credit hours or a maximum of two courses. A student cannot register for courses with prerequisites until they fulfill the conditions for passing those prerequisites. During the first two weeks of the semester, students can add or change courses with approval from their academic advisor, provided they stay within the maximum credit hours allowed. Students can cancel their registration for any course within the first eight weeks of regular semesters (first and second) or three weeks of the summer semester, without a refund. The regular semester registration must not fall below 9 credit hours for undergraduate students. Withdrawal from all registered courses in any semester is allowed for exceptional and compelling reasons approved by the Institute's Board of Directors, at least two weeks before the final semester examination, without a refund. Students can re-register for the withdrawn courses after settling the required tuition fees. This will not count as a failure.

k. A student's total absences in any course must not exceed 25% of the total class hours during the semester. Exceeding this limit may lead to the dean canceling the student's registration for the course upon notification from the course instructor, with no refund of fees. After an

absence of one or more semesters for compelling reasons approved by the Institute's Board of Directors, students can resume their studies. Successfully completed courses will be considered, and they must meet any new requirements in the semester they return. Tuition fees for the period of absence must be settled. If a student has been absent for more than 6 regular semesters, they can return as a new student, and their previously earned grades will not be considered

9. Teaching and Learning Methods

1- Interactive lectures
2- Tutorials
3- Practical
4- Projects
5- Assignments
6- Researches/Reports
7- Self-Learning
8- Brain storming
9- Modeling and Simulation
10- Sit visits
11- Presentation
12- Discussions

10. Assessment Methods

Method (tool)	LO's
1. Written exam	To assess competencies: A &B & C
2. Quizzes and reports	To assess competencies: A &B & C
3. Oral exams	To assess competencies: A, B & C
4. Practical	To assess competencies: A &B & C
5. Project applied on a practical field problem	To assess competencies: A &B & C
6. Presentation	To assess competencies: A &B & C
7. Assignments	To assess competencies: A &B & C
8. Researches	To assess competencies: A &B & C
9. Self-Learning	To assess competencies: A &B & C
10. Simulations	To assess competencies: A, B & C

11. Program Evaluation

Evaluator	Tool	Sample
1. Senior students	Surveys	%73.75
2. Alumni	Surveys	%92.64
3. Stakeholders (Employers)	Surveys	%100
4. External Evaluator(s) (External Examiner(s))	Reviewing according to an external evaluator Checklist report	Approved
5. Internal Evaluator(s) (Internal Examiner(s))	Report	%82.1
6. Others	(Academic staff, teaching assistance)	79.97%

Appendix 8 clarify the survey results

Quality Coordinator	**Dr / Amira Nabil**	Amira Nabil
Program Coordinator	**Ass. Prof. Dr. Osama El-Ghandour**	
Head of Electronic and Communication Engineering Program	**Ass. Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3 / 9 / 2022**	

برنامج هندسة الالكترونيات والاتصالات
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Appendices

Appendix 1 *Matrices*

- **Appendix 1.1: Matching matrix of institute mission and program mission.**
- **Appendix 1.2: Matching matrix of program mission and program aims.**
- **Appendix 1.3: Matching matrix of program mission and program attributes.**
- **Appendix 1.4: Matching matrix of program attributes and program aims.**
- **Appendix 1.5: Matching matrix of program attributes and program competencies**
- **Appendix 1.6: Matching matrix of program aims and program competencies.**
- **Appendix 1.7: Matching matrix of program competencies and program learning outcomes.**
- **Appendix 1.8: Matching matrix of Courses and program Competencies.**
- **Appendix 1.9: Matching matrix of program competencies and program CLOs.**
- **Appendix 1.10: Program Competencies derivatives**
- **Appendix 1.11: Matching matrix of Courses and program Aims**
- **Appendix 1.12: Matching matrix of Courses and Course Learning outcomes**
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Appendix 2 *Courses Specifications*

Appendix 3 *External Evaluator Report*

Appendix 4 *Internal Evaluator Report*

Appendix 5 *Staff Members*

Appendix 6 *Approvals for Program and courses specification*

Appendix 7 *Approvals for NASR (Program and Institute Approval), ARS and Moved courses*

Appendix 8 *Surveys Analysis*

Appendix 1.1

Matching matrix of institute mission and program mission

Key Words of Program Mission \ Key Words of Institute Mission	Prepare distinguished engineering cadres	Keeping pace with global technological development and able to compete, work collectively, and innovate to meet the needs of the local and regional market	Adopting the latest methods of education, learning, and knowledge exchange in accordance with national academic standards, regulations, and professional ethics, contributing to the development of the cognitive abilities of individuals in the community.
Prepare a graduates having high practical and scientific efficiency	√		
Capable of scientific research and competing in the field of electronics and communications to accommodate with community service and satisfy its needs at the local and regional levels		√	
Using implementing information system and communication technology.			√

Appendix 1.2

Matching matrix of program mission and program aims

Key Words of Program Mission / Program Aims	*Prepare a graduates having high practical and scientific efficiency*	Capable of competing in the field of electronics and communications to accommodate with community service and satisfy its needs at the local, regional and international levels	*Using implementing information system and communication technology*
AM1	√		
AM 2	√		
AM 3		√	
AM 4			√
AM 5	√	√	
AM 6			√
AM 7	√	√	

Appendix 1.3

Matching matrix of program mission and program attributes

Key Words of Program Mission / Attributes	*Prepare a graduates having high practical and scientific efficiency*	Capable of competing in the field of electronics and communications to accommodate with community service and satisfy its needs at the local, regional and international levels	*Using implementing information system and communication technology*
1		√	
2	√		
3		√	
4	√		
5		√	
6		√	
7			√
8	√		
9		√	
10	√		

Appendix 1.4

Matching matrix of program attributes and program aims

Program Aims	Program Attributes									
	1	2	3	4	5	6	7	8	9	10
AM1	√	√								
AM2								√		
AM3		√					√			
AM4							√			
AM5					√		√			
AM6				√						√
AM7			√	√		√			√	

The attributes of Communication and electronic engineer	***Program Aims***
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.	AM1. Applying Communication and electronic engineering based on physical sciences and mathematics.
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.	AM2. Combine scientific research skills with continuous development through self-learning and acquiring additional skills and knowledge.
2. Apply analytic critical and systemic thinking to identify, diagnose and solve engineering problems with a wide range of complexity and variation. 7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	AM3. Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques.
7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	AM4. Acquire the required skills to perform laboratory and field experiments and interpret their results.
5. Recognize his/her role in promoting the engineering field and contribute in the development of the profession and the community. 7. Use techniques, skills, and modern engineering tools necessary for engineering practice.	AM5. Identify the latest components and Communication and electronic devices, and become familiar with the technology of implementing communication and electronic systems using these electronic components. And then improve the skills in handling and dealing with electronics and

The attributes of Communication and electronic engineer	*Program Aims*
	communication technology including the fabrication, characterization, and installation of components, devices, and systems.
4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance. 10. Demonstrate leadership qualities, business administration and entrepreneurial skills.	*AM6.* Identify the project management methods, and efficiently utilize available resources and learn design management techniques. And Manage time efficiently by assigning specific tasks within designated time schedules to accomplish work within the specified deadlines
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. 6. Value the importance of the environment, both physical and natural, and work to promote sustainability principles. 9. Communicate effectively using different modes, tools, and languages with various audiences; to deal with	AM7. Perform effectively as an individual or as a member of a multi-disciplinary professional team with possessing a firm understanding of engineering ethical, legal, and professional responsibilities.

Appendix 1.5

Matching matrix of program attributes and program competencies

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

Appendix 1.6

Matching matrix of program aims and program competencies

Program Aims	Program Competencies																	
	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
AM1	√															√		
AM2					√				√	√								
AM3		√										√						
AM4		√												√			√	√
AM5											√		√		√			
AM6						√												
AM7			√	√			√	√										

Appendix 1.7

Matching matrix of program competences and program learning outcomes

Program Aims	Program Learning Outcomes																	
	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10	PL11	PL12	PL13	PL14	PL15	PL16	PL17	PL18
A1	√																	
A2		√																
A3			√															
A4				√														
A5					√													
A6						√												
A7							√											
A8								√										
A9									√									
A10										√								
B1											√							
B2												√						
B3													√					
B4														√				
B5															√			
C1																√		
C2																	√	
C3																		√

Appendix 1.8: Matching matrix of Courses and program Competencies

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
PHM 0101	Mathematics (1)	√																	
PHM 0102	Physics (1)	√																	
PHM 0103	Mechanics (1)	√																	
MCE 0101	Engineering drawing & projection (1)	√							√	√									
CSE 0101	Computer technology	√							√										
HUM0101	English Technical language							√	√										
PHM 0201	Mathematics (2)		√																
PHM 0202	Physics (2)		√																
PHM 0203	Mechanics (2)	√	√																
MCE 0201	Engineering drawing & projection (2)		√						√	√									
MCE 0202	Production technology			√				√											
PHM 0204	Chemistry	√	√	√															
EPM 111	Electrical circuits (1)		√										√						

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
PHM 1111	Mathematics (3)	√										√							
PHM 1112	Physics (3)		√										√						
PHM 1113	Mechanics (3)										√	√							
CVE1111	Civil Engineering					√	√												
HUM XX02	Technical writing								√	√									
PHM 1211	Mathematics (4)		√										√						
HUM XX03	Economic engineering			√		√		√											
CSE 1211	Computer programming		√							√									
EPE 1211	Electrical circuits (2)						√						√						
EPE 1212	Electrical Measurements		√												√				
ECE 1211	Electronics engineering	√											√						
PHM 2111	Mathematics (5)								√				√						
CSE 2111	Logic Circuits			√									√						
EPE 2112	magnetic fields-Electro	√							√										
EPE 2111	Electrical testing (1)		√																

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
MCE 2111	Mechanical Engineering	√										√							
ECE 2111	Electronic Circuits (1)												√	√					
PHM 2211	Mathematics (6)									√				√					
EPE 2211	Electrical testing (2)							√							√				
CSE 2212	System dynamics and control components				√							√							
EPE 2212	Energy conversion					√						√							
ECE 2211	Signals	√					√												
CSE 2211	Computer organization (1)										√			√					
ECE3101	Communication sys. (1)	√															√		
ECE3102	Electronic testing and measurement (1)																		√
ECE3103	Electronic Devices					√							√						
ECE3104	Digital circuit												√						
ECE3105	Electromagnetic waves	√													√				
HUMxx05	Marketing and managements	√								√									
ECE3201	Communication sys. (2)												√					√	

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
ECE3202	Electronic testing and measurement (2)																		√
ECE3203	Opto-Electronics					√		√											
ECE3204	Electronic circuit (2)												√						
ECE3261	specialized elective course (1) Microprocessor and its applications															√		√	
ECE3262	specialized elective course (1) Digital signal processing												√						
ECE3263	specialized elective course (1) Electromagnetic waves applications														√				√
HUMxx04	Project managements		√							√									
ECE4101	Electronic testing and measurement (3)																		√
ECE4102	Electronic microwaves Engineering	√																√	
ECE4103	Communication sys. (3)														√			√	
ECE4104	Integrated circuits	√												√					
ECE4161	specialized elective course (2) Electronic measurement instrumentation													√					
ECE4162	specialized elective course (2)														√			√	

Course Code	Course Name	Engineering Competencies (2018)										“Department” Electrical Engineering Competencies (NARS)					“Discipline” Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
	Satellite																		
ECE4163	specialized elective course (2) Integrated circuit technology	√	√																
ECE4171	specialized elective course (3) Optical communication systems											√	√						
ECE4172	specialized elective course (3) Application specific integrated circuit												√						
ECE4173	specialized elective course (3) Integrated circuit application			√										√					
ECE4201	Electronic testing and measurement (4)																		√
ECE4202	Network															√			
ECE4203	Antenna													√					√
ECE4261	specialized elective course (4) Mobile communications														√			√	
ECE4262	specialized elective course (4) Selected topics in communication systems													√				√	
ECE4263	specialized elective course (4) Analog Integrated circuits		√											√					

Course Code	Course Name	Engineering Competencies (2018)										"Department" Electrical Engineering Competencies (NARS)					"Discipline" Communication and electronic Engineering Competencies (ARS)		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3
ECE4271	specialized elective course (5) Selected topics in Electronics					√							√						
ECE4272	specialized elective course (5) Information theory														√		√		
ECE4273	specialized elective course (5) Selected topics in microwaves					√								√					
ECE4299	Graduation Project													√					√
ECE4299	Graduation Project													√					√

Appendix 1.9

Matching matrix of program competencies and program CLOs

	A.1	A.2	A.3	A.4	A.5	A.6	A.7	A.8	A.9	A.10	B.1	B.2	B.3	B.4	B.5	C.1	C.2	C.3
CLO.1	√																	
CLO.2	√																	
CLO.3	√																	
CLO.4		√																
CLO.5		√																
CLO.6			√															
CLO.7				√														
CLO.8					√													
CLO.9						√												
CLO.10						√												
CLO.11						√												
CLO.12							√											
CLO.13								√										
CLO.14									√									
CLO.15										√								
CLO.16										√								
CLO.17											√							
CLO.18											√							
CLO.19											√							
CLO.20												√						
CLO.21												√						
CLO.22												√						
CLO.23													√					
CLO.24													√					
CLO.25														√				
CLO.26														√				
CLO.27															√			
CLO.28																√		
CLO.29																√		
CLO.30																	√	
CLO.31																		√
CLO.32																		√

Appendix 1.10

Program Competencies derivatives

Program Competencies	Program Learning Outcomes	Course Learning Outcomes	Derivate
A1	PL1	CLO.1	Identify, complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
		CLO.2	Formulate complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
		CLO.3	Solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
A2	PL2	CLO.4	Develop appropriate experimentation and/or simulation, to analyze, interpret data, assess, and evaluate findings, and using statistical analyses and objective engineering judgment to draw conclusions.
		CLO.5	Conduct appropriate experimentation and/or simulation, to analyze, interpret data, assess, evaluate findings, and using statistical analyses and objective engineering judgment to draw conclusions.
A3	PL3	CLO.6	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.
A4	PL4	CLO.7	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
A5	PL5	CLO.8	Practice research techniques and methods of investigation as an inherent part of learning.
A6	PL6	CLO.9	Plan, implementation of engineering projects, taking into consideration other trades requirements.
		CLO.10	Supervise implementation of engineering projects, taking into consideration other trades requirements.
		CLO.11	Monitor implementation of engineering projects, taking into consideration other trades requirements.
A7	PL7	CLO.12	Function efficiently as an individual and as a member of multi-disciplinary and multi- cultural teams.
A8	PL8	CLO.13	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.
A9	PL9	CLO.14	Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
A10	PL10	CLO.15	Acquire new knowledge; and practice self, lifelong and other learning strategies.
		CLO.16	Apply new knowledge; and practice self, lifelong and other learning strategies.
B1	PL11	CLO.17	Select, electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.
		CLO.18	Model electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.

		CLO.19	Analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems.
B2	PL12	CLO.20	Design, an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
		CLO.21	Model an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
		CLO.22	Analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
B3	PL13	CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
		CLO.24	Implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
B4	PL14	CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
		CLO.26	Measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
B5	PL15	CLO.27	Adopt suitable national and international standards and codes to design, build, operate, inspect, and maintain electrical/electronic/digital equipment, systems and services.
C1	PL16	CLO.28	Use appropriate mathematical methods or IT tools for modeling
		CLO.29	analyzing electronic and communication systems
C2	PL17	CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems
C3	PL18	CLO.31	Use the appropriate tools and equipment to measure system performance
		CLO.32	analyze the system performance's results correctly

Appendix 1.11

Matching matrix of Courses and program Aims

Course Code	Course Name	Program Aims						
		AM.1	AM.2	AM.3	AM.4	AM.5	AM.6	AM.7
PHM 0101	Mathematics (1)	√						
PHM 0102	Physics (1)	√						
PHM 0103	Mechanics (1)	√						
MCE 0101	Engineering drawing & projection (1)	√						
CSE 0101	Computer technology			√				
HUM0101	English Technical language		√					
PHM 0201	Mathematics (2)	√						
PHM 0202	Physics (2)	√						
PHM 0203	Mechanics (2)							
MCE 0201	Engineering drawing & projection (2)	√						
MCE 0202	Production technology			√				
PHM 0204	Chemistry	√						
EPM 111	Electrical circuits (1)	√						
PHM 1111	Mathematics (3)	√						
PHM 1112	Physics (3)	√						
PHM 1113	Mechanics (3)	√						
CVE1111	Civil Engineering		√		√			
HUM XX02	Technical writing		√					
PHM 1211	Mathematics (4)	√						
HUM XX03	Economic engineering						√	
CSE 1211	Computer programming			√				
EPE 1211	Electrical circuits (2)		√					
EPE 1212	Electrical Measurements	√		√				
ECE 1211	Electronics engineering	√				√		
PHM 2111	Mathematics (5)	√						
CSE 2111	Logic Circuits					√		
EPE 2112	magnetic fields-Electro	√						
EPE 2111	Electrical testing (1)		√					

Course Code	Course Name	Program Aims						
		AM.1	AM.2	AM.3	AM.4	AM.5	AM.6	AM.7
MCE 2111	Mechanical Engineering			√				
ECE 2111	Electronic Circuits (1)					√		
PHM 2211	Mathematics (6)	√						
EPE 2211	Electrical testing (2)				√			
CSE 2212	System dynamics and control components			√				
EPE 2212	Energy conversion	√						
ECE 2211	Signals			√		√		
CSE 2211	Computer organization (1)					√		
ECE3101	Communication sys. (1)	√				√		
ECE3102	Electronic testing and measurement (1)				√			
ECE3103	Electronic Devices	√						
ECE3104	Digital circuit					√		
ECE3105	Electromagnetic waves			√				
HUMxx05	Marketing and managements						√	
ECE3201	Communication sys. (2)	√				√		
ECE3202	Electronic testing and measurement (2)				√			
ECE3203	Opto-Electronics					√		
ECE3204	Electronic circuit (2)			√				
ECE3261	specialized elective course (1) Microprocessor and its applications			√				
ECE3262	specialized elective course (1) Digital signal processing			√				
ECE3263	specialized elective course (1) Electromagnetic waves applications			√		√		
HUMxx04	Project managements						√	
ECE4101	Electronic testing and measurement (3)				√			
ECE4102	Electronic microwaves Engineering		√	√				
ECE4103	Communication sys. (3)			√				
ECE4104	Integrated circuits	√						
ECE4161	specialized elective course (2) Electronic measurement instrumentation			√	√			
ECE4162	specialized elective course (2) Satellite		√	√				
ECE4163	specialized elective course (2)	√						

Course Code	Course Name	Program Aims						
		AM.1	AM.2	AM.3	AM.4	AM.5	AM.6	AM.7
	Integrated circuit technology							
ECE4171	**specialized elective course (3) Optical communication systems**					√		
ECE4172	**specialized elective course (3) Application specific integrated circuit**			√				√
ECE4173	**specialized elective course (3) Integrated circuit application**			√				
ECE4201	**Electronic testing and measurement (4)**				√			
ECE4202	**Network**					√		
ECE4203	**Antenna**					√		
ECE4261	**specialized elective course (4) Mobile communications**			√				
ECE4262	**specialized elective course (4) Selected topics in communication systems**	√						
ECE4263	**specialized elective course (4) Analog Integrated circuits**	√						
ECE4271	**specialized elective course (5) Selected topics in Electronics**	√		√				
ECE4272	**specialized elective course (5) Information theory**			√				
ECE4273	**specialized elective course (5) Selected topics in microwaves**			√				
ECE4299	**Graduation Project**			√			√	√

Appendix 1.12

Matching matrix of Courses and Course Learning outcomes

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
PHM 0101	Mathematics (1)	√	√	√																														
PHM 0102	Physics (1)	√	√	√																														
PHM 0103	Mechanics (1)	√	√	√																														
MCE 0101	Engineering drawing & projection (1)	√	√											√	√																			
CSE 0101	Computer technology		√	√										√																				
HUM0101	English Technical language												√	√																				
PHM 0201	Mathematics (2)				√	√																												
PHM 0202	Physics (2)				√	√																												
PHM 0203	Mechanics (2)	√	√	√	√																													
MCE 0201	Engineering drawing &				√	√								√	√																			

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
	projection (2)																																	
MCE 0202	Production technology						√						√																					
PHM 0204	Chemistry	√		√		√	√																											
EPM 111	Electrical circuits (1)															√	√	√		√														
PHM 1111	Mathematics (3)	√		√														√		√														
PHM 1112	Physics (3)				√	√																	√											
PHM 1113	Mechanics (3)															√	√	√																
CVE1111	Civil Engineering			√									√			√																		
HUM XX02	Technical writing													√	√																			
PHM 1211	Mathematics (4)				√	√																	√											
HUM XX03	Economic engineering						√		√																									
CSE 1211	Computer programming					√									√																			
EPE 1211	Electrical circuits (2)										√	√										√	√											

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
EPE 1212	Electrical Measurements																						√				√							
ECE 1211	Electronics engineering	√		√																			√											
PHM 2111	Mathematics (5)													√								√												
CSE 2111	Logic Circuits						√														√													
EPE 2112	-Electro magnetic fields	√	√	√																														
EPE 2111	Electrical testing (1)				√	√																	√											
MCE 2111	Mechanical Engineering	√		√																√														
ECE 2111	Electronic Circuits (1)																				√		√	√	√									
PHM 2211	Mathematics (6)														√									√	√									
EPE 2211	Electrical testing (2)												√													√	√							
CSE 2212	System dynamics and control							√										√	√	√														

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
	components																																	
EPE 2212	Energy conversion								√									√	√	√														
ECE 2211	Signals	√	√	√						√																								
CSE 2211	Computer organization (1)															√	√							√										
ECE3101	Communication sys. (1)	√	√																										√	√				
ECE3102	Electronic testing and measurement (1)																															√	√	
ECE3103	Electronic Devices								√													√	√											
ECE3104	Digital circuit																				√		√											
ECE3105	Electromagnetic waves	√	√	√																						√	√							
HUMxx05	Marketing and managements	√		√											√																			
ECE3201	Communication sys. (2)																				√	√							√					
ECE3202	Electronic testing and																															√	√	

Course Code	Course Name	Learning Outcomes																														
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
	measurement (2)																																
ECE3203	Opto-Electronics								√				√																				
ECE3204	Electronic circuit (2)																					√	√										
ECE3261	specialized elective course (1) Microprocessor and its applications																											√			√		
ECE3262	specialized elective course (1) Digital signal processing																				√	√											
ECE3263	specialized elective course (1) Electromagnetic waves applications																									√	√					√	
HUMxx04	Project managements				√										√																		

Course Code	Course Name	Learning Outcomes																															
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
ECE4101	Electronic testing and measurement (3)																															√	√
ECE4102	Electronic microwaves Engineering																									√	√				√		
ECE4103	Communication sys. (3)																									√							
ECE4104	Integrated circuits	√																								√							
ECE4161	specialized elective course (2) Electronic measurement instrumentation																							√	√								
ECE4162	specialized elective course (2) Satellite																									√					√		
ECE4163	specialized elective course (2)	√	√																														

Course Code	Course Name	Learning Outcomes																															
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
	Integrated circuit technology																																
ECE4171	specialized elective course (3) Optical communication systems																	√	√	√	√	√	√	√									
ECE4172	specialized elective course (3) Application specific integrated circuit																					√	√										
ECE4173	specialized elective course (3) Integrated circuit application						√																	√									
ECE4201	Electronic testing and measurement (4)																															√	√

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
ECE4202	Network																											√						
ECE4203	Antenna																							√	√							√	√
ECE4261	specialized elective course (4) Mobile communications																									√					√			
ECE4262	specialized elective course (4) Selected topics in communication systems																							√							√			
ECE4263	specialized elective course (4) Analog Integrated circuits				√																			√										
ECE4271	specialized elective course (5) Selected topics in Electronics								√												√													

Course Code	Course Name	Learning Outcomes																																
		CL O.1	CL O.2	CL O.3	CL O.4	CL O.5	CL O.6	CL O.7	CL O.8	CL O.9	CL O.10	CL O.11	CL O.12	CL O.13	CL O.14	CL O.15	CL O.16	CL O.17	CL O.18	CL O.19	CL O.20	CL O.21	CL O.22	CL O.23	CL O.24	CL O.25	CL O.26	CL O.27	CL O.28	CL O.29	CL O.30	CL O.31	CL O.32
ECE4272	specialized elective course (5) Information theory																										√			√			
ECE4273	specialized elective course (5) Selected topics in microwave								√												√		√										
ECE4299	Graduation Project																							√	√							√	√

Appendix 1.13

Matching matrix of Courses and Teaching and Learning methods

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
PHM 0101	Mathematics (1)	√	√			√	√	√	√				√
PHM 0102	Physics (1)	√	√	√		√		√	√				
PHM 0103	Mechanics (1)	√	√				√	√	√			√	√
MCE 0101	Engineering drawing & projection (1)	√	√			√	√						
CSE 0101	Computer technology	√	√			√	√						√
HUM0101	English Technical language	√				√	√	√	√			√	
PHM 0201	Mathematics (2)	√	√			√	√	√	√				√
PHM 0202	Physics (2)	√	√	√		√	√	√	√				
PHM 0203	Mechanics (2)	√	√				√	√	√			√	√
MCE 0201	Engineering drawing & projection (2)	√	√			√	√						
MCE 0202	Production technology	√	√	√					√			√	√

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Researchreports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
PHM 0204	Chemistry	√	√	√		√	√	√	√				
EPM 111	Electrical circuits (1)	√	√			√	√	√				√	√
PHM 1111	Mathematics (3)	√	√			√	√	√	√				√
PHM 1112	Physics (3)	√	√	√		√	√	√	√				
PHM 1113	Mechanics (3)	√	√			√				√			
CVE1111	Civil Engineering	√	√			√							
HUM XX02	Technical writing	√	√			√	√	√	√			√	√
PHM 1211	Mathematics (4)	√	√			√	√	√	√				
HUM XX03	Economic engineering	√	√			√	√	√	√			√	√
CSE 1211	Computer programming	√	√	√		√				√			
EPE 1211	Electrical circuits (2)	√	√			√	√	√				√	√
EPE 1212	Electrical Measurements	√	√		√		√			√			√
ECE 1211	Electronics engineering	√	√			√				√			
PHM 2111	Mathematics (5)	√	√			√				√			

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Researchreports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CSE 2111	Logic Circuits	√	√			√			√				√
EPE 2112	magnetic fields-Electro	√	√	√	√		√	√			√		√
EPE 2111	Electrical testing (1)			√	√								√
MCE 2111	Mechanical Engineering	√	√			√			√				√
ECE 2111	Electronic Circuits (1)	√	√			√				√			
PHM 2211	Mathematics (6)	√	√			√				√			
EPE 2211	Electrical testing (2)			√			√		√	√			√
CSE 2212	System dynamics and control components	√	√	√		√	√	√	√	√			√
EPE 2212	Energy conversion	√	√				√	√		√		√	√
ECE 2211	Signals	√	√		√	√	√	√		√		√	√
CSE 2211	Computer organization (1)	√	√			√			√				√
ECE3101	Communication sys. (1)	√	√		√			√					√
ECE3102	Electronic testing and measurement (1)	√	√	√	√	√	√	√				√	√

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Researchreports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
ECE3103	Electronic Devices	√	√			√	√					√	
ECE3104	Digital circuit	√	√			√							
ECE3105	Electromagnetic waves	√	√			√	√				√	√	√
HUMxx05	Marketing and managements	√	√			√	√		√			√	
ECE3201	Communication sys. (2)	√	√		√			√					√
ECE3202	Electronic testing and measurement (2)	√	√	√	√	√	√	√				√	√
ECE3203	Opto-Electronics	√	√	√	√		√	√			√	√	
ECE3204	Electronic circuit (2)	√	√			√							
ECE3261	specialized elective course (1) Microprocessor and its applications	√	√		√								√
ECE3262	specialized elective course (1) Digital signal processing	√	√		√		√						

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
ECE3263	specialized elective course (1) Electromagnetic waves applications	√	√	√			√	√					√
HUMxx04	Project managements	√	√			√			√				
ECE4101	Electronic testing and measurement (3)			√									√
ECE4102	Electronic microwaves Engineering	√	√	√	√	√	√	√		√	√	√	√
ECE4103	Communication sys. (3)	√	√										
ECE4104	Integrated circuits	√	√		√								√
ECE4161	specialized elective course (2) Electronic measurement instrumentation	√	√			√	√						√
ECE4162	specialized elective course (2) Satellite	√	√		√	√	√						
ECE4163	specialized elective course (2)	√	√		√	√				√			

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
	Integrated circuit technology												
ECE4171	specialized elective course (3) Optical communication systems	√	√	√	√	√	√	√	√		√	√	√
ECE4172	specialized elective course (3) Application specific integrated circuit	√	√			√							
ECE4173	specialized elective course (3) Integrated circuit application	√	√		√	√							
ECE4201	Electronic testing and measurement (4)			√									√
ECE4202	Network	√	√	√			√		√				√
ECE4203	Antenna	√	√	√	√		√	√	√	√	√	√	√
ECE4261	specialized elective course (4)	√	√		√	√						√	√

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Researchreports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
	Mobile communications												
ECE4262	**specialized elective course (4) Selected topics in communication systems**	√	√		√			√					
ECE4263	**specialized elective course (4) Analog Integrated circuits**	√	√		√			√					
ECE4271	**specialized elective course (5) Selected topics in Electronics**	√	√			√							
ECE4272	**specialized elective course (5) Information theory**	√	√			√							
ECE4273	**specialized elective course (5) Selected topics in microwaves**	√	√	√			√	√					

Course Code	Course Name	Teaching and Learning Methods											
		Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
ECE4299	Graduation Project	√		√	√			√					