Program Specifications of Electrical Engineering

(Electronics and Communications Engineering)

A-Basic Information

(1) Program Title: Electronics and Communications Engineering
(2) Program Type: Single
(3) Department: Electrical Engineering
(4) Coordinator: Prof. Dr Hala M. Abd ElKader
(5) External Evaluator: Prof. Dr Abd-Elmaksood Ibrahim Taalab was nominated by the faculty council on 8/2014
(6) Last date of program specifications approval: faculty council on 10/05/2006

B-Professional Information

1. Program Aims

The main objective of the program is to support the graduate by the sufficient theoretical and practical information, basic science and humanities which allow the graduates to work efficiently in local and international markets. By the end of this program the student will be able:

- To use current advanced techniques, skills, and tools necessary for computing practices to specify, design, and implement Electronics and Communications - based systems.
- To recognize the information requirements of various business activities on both operational and decision making levels.
- To tackle business problems using system analysis tools and techniques.
- To demonstrate inductive reasoning abilities, figuring general rules and conclusions about seemingly unrelated events.
- To manage Projects related to Electronics and Communications systems in diverse fields of applications.
- To implement phases of the Electronics and Communications system development life cycle, procurement and installation of hardware, software design, data manipulation and system operations.

According to the National Academic Reference Standard issued by NAQAA in 2009, the program in Electrical Engineering (Computer Systems Engineering) must satisfy the following Learning Outcomes:

2. Intended Learning Outcomes (ILOs)

a. Knowledge And Understanding:

By the end of this program the student will be able:

a.1) Define concepts and theories of mathematics, appropriate to the discipline.
a.2) Define concepts and theories of sciences, appropriate to the discipline.
a.3) Define basics of information and communication technology (ICT).
a.4) Demonstrate characteristics of engineering materials related to discipline.
a.5) Describe principles of design including elements design, process and/or a system related to specific disciplines.
a.6) Demonstrate methodologies of data collection interpretation and solving engineering problems.
a.7) Describe quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
a.8) List business management principles relevant to engineering.
a.9) Define current engineering technologies as related to disciplines.
a.10) Demonstrate topics related to humanitarian interests.
a.11) Demonstrate topics related to moral issues.
a.12) Define technical language and report writing.
a.13) Illustrate professional ethics and impacts of engineering solutions on society and environment.
a.14) Demonstrate contemporary engineering topics.
a.15) Illustrate elementary science underlying electronic engineering systems.
a.16) Illustrate elementary science underlying information technology.
a.17) Illustrate the constraints of applying inappropriate technology and the needs of commercial risk evaluation.
a.18) Mention basics of design and analyzing electronic engineering systems.
a.19) Describe principles of analyzing and design of electronic circuits and components.
a.20) Describe principles of analyzing and design of control systems with performance evaluation.
a.21) List biomedical instrumentation.
a.22) Illustrate communication systems
a.23) Illustrate coding and decoding techniques.
a.24) List microwave applications.
a.25) Demonstrate antenna and wave propagation.
a.26) Mention Methods of Nanotechnology application.
a.27) Define usage of optical fiber.
a.28) Mention Methods of fabrication of integrated circuits.
a.29) Describe analysis of signal processing.
a.30) Define optical communication systems.

b. Intellectual Skills

The Electronics and Communications Engineering graduate should be able to:

b.1) Select appropriate mathematical methods for modeling.
b.2) Select appropriate computer-based methods for analyzing problems.
b.3) Select appropriate solutions for engineering problems based on analytical thinking.
b.4) Think in a creative and innovative way in problem solving and design.

b.5) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
b.6) Assess and evaluate the characteristics and performance of components, systems and processes.
b.7) Investigate the failure of components, systems, and processes.
b.8) Solve engineering problems, often on the basis of limited and possibly contradicting information.
b.9) Select and appraise appropriate ICT tools to a variety of engineering problems.
b.10) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
b.11) Incorporate economic, social, environmental dimensions and risk management in design.
b.12) Analyze results of numerical models and appreciate their limitations.
b.13) Create systematic and methodic approaches when dealing with new and advancing technology.
b.14) Develop innovative solutions for the practical industrial problems.
b.15) Plan, conduct and write a report on a project or assignment.
b.16) Analyze the performance of digital and analog communication systems.
b.17) Analyze the performance of mobile communication, coding and decoding systems.
b.18) Synthesize and integrate electronic systems for certain specific function using the right equipment.

c. Professional And Practical Skills

The Electronics and Communications Engineering graduates must show ability to:

c.1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems.
c.2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, product and/or services.
c.3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
c.4) Practice the neatness and aesthetics in design and approach.
c.5) Use computational facilities and techniques, measuring instruments, workshops and laboratories equipment to design experiments, collect, analyze, and interpret results.
c.6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
c.7) Apply numerical modeling methods to engineering problems.
c.8) Apply safe systems at work and observe the appropriate steps to manage risks.
c.9) Demonstrate basic organizational and project management skills.
c.10) Apply quality assurance procedures and follow codes and standards.
c.11) Exchange knowledge and skills with engineering community and industry.
c.12) Prepare and present technical reports.
c.13) Use appropriate mathematical methods or IT tools.
c.14) Practice computer programming for the design and diagnostics of digital and analog communication systems.
c.15) Practice computer programming for the design and diagnostics of mobile communication, coding and decoding systems.
c.16) Use relevant laboratory equipment and analyze the results correctly.
c.17) Troubleshoot, maintain and repair almost all types of electronic systems using the standard

tools.
c.18) Identify appropriate specifications for required devices.
c.19) Use appropriate tools to measure system performance.

d. General And Transferable Skills

Graduates will have an educated view of the world including:

d.1. Collaborate effectively within multidisciplinary team.
d.2.Work in stressful environment and within constraints.
d.3.Communicate effectively.
d.4.Demonstrate efficient IT capabilities.
d.5.Lead and motivate individuals.
d.6.Effectively manage tasks, time, and resources.
d.7.Search for information and engage in life-long self learning discipline.
d.8.Acquire entrepreneurial skills.
d.9.Refer to relevant literatures.
d.10. Write technical reports and presentation.
d.11. Share ideas and communicate with others according to the rules of professional ethics.
d.12. Think creatively and solve problems.

3. Academic Standards

3.a.Nationally: National Academic References Standards (NARS)

The faculty adopted the NARS issued by NAQAA in 2009 approved by the faculty in 20/6/2010

3.b. External References For Standards (Benchmarks): (ABET)

The external references for standards considered in the development of this program were the National Academic Reference Standards (NARS) prepared by the engineering education sector of the supreme council of universities in Egypt and those of the American Accreditation Board for Engineering and Technology (ABET).

4. Curriculum Structure and Contents

4.a.Program duration: 10 semesters (5-years)

4.b. Program structure: Contact hours system

i. Contact hours: **238 + 58** hr. for preparatory year
130 Lectures
108 Tutorial /Exercises
238 Total

ii. Equivalent hours: **184+43.5** for preparatory year
155 Compulsory
29 Elective

iii. Equivalent hours of basic science: **47.5** hours = **21** %

iv. Equivalent hours of social science and humanities: **24** hours= **4** %

v. Equivalent hours of specialized courses: **128.5** hours = **69** %

4.c. Indicative curricula Content by Subject Area

Table 1: Indicative curricula content by subject area

	Subject Area	%	Tolerance
A	Humanities and Social Sciences (Univ. Req.)	8	9-12 %
B	Mathematics and Basic Sciences	23	20-26 %
C	Basic Engineering Sciences (Faculty/Spec. Req.)	21	20-23 %
D	Applied Engineering and Design	23	20-22 %
E	Computer Applications and ICT*	10	9-11 %
F	Projects* and Practice	9.5	8-10 %
	Subtotal	94.5	92-94 %
G	Discretionary (Institution character-identifying) subjects	5.5	6-8 %
	Total	100	100%

Practical/Field Training: the students must carry out **3** weeks of field training after the freshman year and after the sophomore year.

5. Program Course

Year of program 1 (Preparatory Year) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lec.	Tut.	Prac.	Total	
MPH 001	Mathematics (A)	4	2	-	6	Attached Table
MPH 012	Mechanics	2	2	-	4	
MPH 013	Physics (A)	4	1	2	7	
MPH 014	Chemistry	4	-	2	6	
MEC 001	Engineering drawing and isometric	1	4	-	5	
GEN 001	Technical language	-	2	-	2	

Year of program 1 (Preparatory Year) Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lec.	Tut.	Prac.	Total	
MPH 021	Mathematics (B)	4	2	-	6	Attached Table
MPH 012	Mechanics	2	2	-	4	
MPH 023	Physics (B)	4	-	2	6	
MEC 001	Engineering drawing and isometric	-	4	-	4	
ELC 006	Computer science	2	1	-	3	
MEC 002	Engineering production	2	-	3	5	

Year of program 2 (First Year Electronics, Communication and Computer Systems Engineering) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE111	Principles of Electronic Engineering	4	2	-	6	Attached Table
ECE112	Electrical Circuits (1)	4	2	-	6	
ECE113C	Computer Programming	4	-	2	6	
MPE/CVG181	Civil and Mechanical Engineering	3	2	-	5	
EMP181	Math (2)(A)	3	2	-	5	
GEN181	Engineering legislation	2	-	-	2	

Year of program 2 (First Year Electronics, Communication and Computer Systems Engineering) Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE121	Electronics (1)	4	3	-	7	Attached Table
ECE122	Electrical Circuits (2)	3	2	-	5	
ECE123	Lab (1)	-	-	4	4	
ECE124C	Computer Applications(1)	3	4	-	7	
EMP182	Math (2)(B)	3	2	-	5	
GEN182	English Language (2)	-	2	-	2	

Year of program 3 (Second Year Electronics, Communication and Computer Systems Engineering) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE211	Electrical and Electronics measurements	4	2	-	6	Attached Table
ECE212	Electromagnetic fundamentals	4	2	-	6	
ECE213C	Computer Organization (1)	3	2	-	5	
ECE214C	Computer Programming (2)	4	2	-	6	
EMP281	Math (3)(A)	3	2	-	5	
GEN28x	Elective Humanities	2	-	-	2	

Humanities Courses

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
GEN28x	Elective Course Humanities					
GEN281	Industrial Sociology	2	-	-	2	Attached Table
GEN282	Behavior Anizaty	2	-	-	2	
GEN283	Elective Humanities 1	2	-	-	2	

Year of program 3 (Second Year Electronics, Communication and Computer Systems Engineering) Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE221	Signal Analysis	4	2	-	6	Attached Table
ECE222	Electronics (2)	4	3	-	7	
ECE223	Lab (2)	-	-	4	4	
ECE224C	Logic Circuits	4	2	-	6	
EMP282	Math (3)(B)	3	2	-	5	
GEN280	Technical Reporting (1)	-	2	-	2	

Year of program 4 (Third Year Electronics, Communication Engineering) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE311	Communication Systems	4	2	-	6	Attached Table
ECE312	Electronic Circuits(A)	4	2	-	6	
ECE313	Electromagnetic Waves	4	2	-	6	
ECE314	Lab(3)(A)	-	-	4	4	
ECE34x	Elective Course(1) from Table(1)	4	2	-	6	
GEN38x	Elective Course Humanities	2	-	-	2	

Table (1)

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE34x	Elective Course(1) from Table(1)					
ECE341	Introduction in LSI circuits	4	2	-	6	Attached Table
ECE342	Advanced Electronic measurements	4	2	-	6	
ECE343	Computer aided Electronic design	4	2	-	6	

Humanities Courses

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
GEN38x	Elective Course Humanities					
GEN381	Project Management	2	-	-	2	Attached Table
GEN382	Environmental impact	2	-	-	2	
GEN383	Engineering Ethics	2	-	-	2	

Year of program 4 (Third Year Electronics and Communications Engineering)
Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE321	Control System(1)	3	2	-	5	Attached Table
ECE322	Electronic Circuit (B)	3	3	-	6	
ECE323	Communication Networks	3	-	2	5	
ECE324	Lab(3)(B)	-	-	4	4	
ECE34x	Elective Course(2) from Table(2)	4	2	-	6	
EMP381	Power and Electrical machines	3	1	-	4	

b- Elective

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE34x	Elective Course(2) from Table(2)					
ECE344	Microwaves fundamentals	4	2	-	6	Attached Table
ECE345	Optical Semiconductor	4	2	-	6	
ECE346	Transmission Lines	4	2	-	6	

Year of program 5 (Fourth Year Electronics and Communications Engineering)
Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE411	Antenna and Wave Propagation	3	2	-	5	Attached Table
ECE412	Digital Signal Processing	3	2	-	5	
ECE413	Microprocessor Systems	3	2	-	5	
ECE414	Project	-	-	3	3	
ECE44x	Elective Course (3) From Table (3)	4	2	-	6	
ECE44x	Elective Course (4) From Table (4)	4	2	-	6	

b- Elective

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE44x	Elective Course (3) From Table (3)					
ECE441	Microwave Electronics	3	2	-	5	Attached Table
ECE442	Principles of medical Engineering	3	2	-	5	
ECE443	Selected Topics (1)	3	2	-	5	

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE44x	Elective Course (4) From Table (4)					
ECE444	Industrial Electronics	3	2	-	5	Attached Table
ECE445	Adaptive Filtering	3	2	-	5	
ECE446	Surface Acoustic wave devices	3	2	-	5	

Year of program 5 (Fourth Year Electronics and Communications Engineering)
Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE421	Digital Communication	2	2	-	4	Attached Table
ECE422	Advanced Electronic Systems	2	2	-	4	
ECE423	Optical Communication	3	2	-	5	
ECE424	Lab(4)	-	-	4	4	
ECE414	Project	-	-	5	5	
ECE44x	Elective Course (5) from Table (5)	4	2	-	6	

b- Elective

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE44x	Elective Course (5) from Table (5)					
ECE447	Robot Engineering	3	2	-	5	Attached Table
ECE448	Selected Topic (2)	3	2	-	5	
ECE449	Radar Systems	3	2	-	5	

6. Program admission requirements

Having Egyptian Secondary education or equivalent certificate with major in Mathematics, then after passing the preparatory year and fulfilling the admission requirements the students will be able to attend the department.

7. Regulations for progression and program completion First Year/ Level/ Semester

a. The student is considered successful if he passes the examinations in all courses of his class.
b. The student is promoted to the next higher level if he fails in not more than two subjects of his class or from lower classes,
c. The referred student has to sit the examination in the courses in which he has failed together with the students studying the same courses. The student gets a pass grade when he passes the examination successfully. In case the student was considered absent with acceptable excuse in a course, he gets the actual grade,
d. The grades of the successful student in a course and in the general grade are evaluated as follows
   - Distinction: from 85% of the total mark and upwards.
   - Very good from 75% to less than 85% of the total mark.
   - Good from 65% to less than 75% of the total mark
   - Pass: from 50% to less than 65% of the total mark

- -The grades of a failing student in a course are estimated in one of' the following grades:
- Weak: from 30% to less than 50% of the total mark
- Very weak: less than 30% of the total mark.
- The B.Sc. general grade for students is based on the cumulative marks obtained during all the years of study. The students are then arranged serially according their cumulative sum.
- The student is awarded an honor degree if his cumulative sum is distinction or very good provided that he gets a grade not less than very good in any class of study other than the preparatory year. Moreover, he should have not failed in any examination he has sat in any class other than the preparatory year.

8. Evaluation of program Intended Learning Outcomes

Evaluator	Tool	Sample
1-Senior students	Evaluation sheet	50 %
2-Alumni	Evaluation sheet & interview	5%
3-Stakeholders (Employers)	Evaluation sheet & interview	5
4-External Evaluator(s) (External Examiner(s))		2
5-Other		

Program Coordinators:

Prof. Dr Hala M. Abd ElKader

- Head of Department:

Prof. Dr. Sayed Abo-Elsood Ward