



## Program Specification

### A- Basic Information

- 1- Program title: Bachelor of Electrical Communications Engineering
- 2- Program type: Single
- 3- Department (s): Electronics and Electrical Communications Engineering
- 4- Coordinator: Prof. Moawad Ibrahim Moawad
- 5- External evaluator(s): Prof. AL Sayed Mostafa Saad
- 6- Last date of program specifications approval: 21/6/2011

### B- Professional Information

#### 1- Program aims

The program aims to:

- Have strong foundations in mathematics, basic science and engineering concepts.
- Understand different techniques to do analysis for various engineering problems.
- Conduct experiments and to analyze and interpret data.
- Acquire methods and procedures to design a system or process to meet required needs.
- Work within multi-disciplinary teams.
- Identify, formulate and solve engineering problems.
- Has understanding of professional and ethical responsibilities.
- Equipped with good communication skills.
- Consider and avoid the detrimental impact of engineering solutions within social or global measures.
- Know how to use the techniques, skills and modern engineering tools necessary for engineering practice.
- Know the technology required to build Communication systems of all types; including optical systems, radar systems, mobile systems, antenna systems, microwave systems, and computer networks.
- Have acquired a good knowledge of the signal processing and image processing techniques and their applications in modern communication systems.
- Have an integrated understanding of the scientific and engineering principles underlying the major elements of the field of communication engineering.

## ***2- Intended Learning Outcomes (ILOs)***

### **Electronics and Electrical Communications engineering program**

On successful completion of the Electronics and Electrical Communications Engineering program, graduate students must have knowledge and understanding of the field of communication engineering, intellectual skills, professional and practical skills, general and transferable skills.

#### ***A- Knowledge and Understanding:***

Graduate students must be able to:

- a1) Concepts and theories of mathematics and sciences, appropriate to the discipline.
- a2) Basics of information and communication technology (ICT)
- a3) Characteristics of engineering materials related to the discipline.
- a4) Principles of design including elements design, process and/or a system related to specific disciplines.
- a5) Methodologies of solving engineering problems, data collection and interpretation
- a6) Quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
- a7) Business and management principles relevant to engineering.
- a8) Current engineering technologies as related to disciplines.
- a9) Topics related to humanitarian interests and moral issues.
- a10) Technical language and report writing
- a11) Professional ethics and impacts of engineering solutions on society and environment
- a12) Contemporary engineering topics.
- a13) Elementary science underlying electronic engineering systems and information technology; fundamentals of electrical engineering and machines, logic design, circuit analysis, signal, real-time systems and reliability analysis.
- a14) Basics of design and analyzing electronic engineering systems, while considering the constraints of applying inappropriate technology and the needs of commercial risk evaluation;
- a15) Principles of Analyzing and design of electronic circuits and components;
- a16) Principles of Analyzing and design of control systems with performance evaluation.
- a17) Communication systems
- a18) Coding and decoding techniques
- a19) Methods of fabrication of Integrated circuits
- a20) Antenna and wave propagation
- a21) Nanotechnology application
- a22) Usage of optical fiber
- a23) Microwave applications
- a24) Analysis of signal processing
- a25) Optical communication systems

### ***B- Intellectual skills:***

Graduate students must be able to:

- b1) Select appropriate mathematical and computer-based methods for modeling and analyzing problems.
- b2) Select appropriate solutions for engineering problems based on analytical thinking.
- b3) Think in a creative and innovative way in problem solving and design.
- b4) Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
- b5) Assess and evaluate the characteristics and performance of components, systems and processes.
- b6) Investigate the failure of components, systems, and processes.
- b7) Solve engineering problems, often on the basis of limited and possibly contradicting information.
- b8) Select and appraise appropriate ICT tools to a variety of engineering problems.
- b9) Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
- b10) Incorporate economic, societal, environmental dimensions and risk management in design.
- b11) Analyze results of numerical models and assess their limitations.
- b12) Create systematic and methodic approaches when dealing with new and advancing technology.
- b13) Develop innovative solutions for the practical industrial problems.
- b14) Plan, conduct and write a report on a project or assignment.
- b15) Analyze the performance of digital and analog communication, mobile communication, coding, and decoding systems.
- b16) Synthesis and integrate electronic systems for certain specific function using the right equipment.

### ***C- Professional and Practical Skills:***

Graduate students must be able to:

- c1) Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
- c2) Professionally merge the engineering knowledge, understanding, and feedback to improve design, products and/or services.
- c3) Create and/or re-design a process, component or system, and carry out specialized engineering designs.
- c4) Practice the neatness and aesthetics in design and approach.
- c5) Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results.
- c6) Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.

- c7) Apply numerical modeling methods to engineering problems.
- c8) Apply safe systems at work and observe the appropriate steps to manage risks.
- c8) Demonstrate basic organizational and project management skills.
- c9) Apply quality assurance procedures and follow codes and standards.
- c10) Exchange knowledge and skills with engineering community and industry.
- c11) Prepare and present technical reports.
- c12) Use appropriate mathematical methods or IT tools.
- c13) Practice computer programming for the design and diagnostics of digital and analog communication, mobile communication, coding, and decoding systems.
- c14) Use relevant laboratory equipment and analyze the results correctly.
- c15) Troubleshoot, maintain and repair almost all types of electronic systems using the standard tools.
- c16) Identify appropriate specifications for required devices.
- c17) Use appropriate tools to measure system performance.

***D- General and Transferable skills:***

Graduate students must be able to:

- d1) Collaborate effectively within multidisciplinary team.
- d2) Work in stressful environment and within constraints.
- d3) Communicate effectively.
- d4) Demonstrate efficient IT capabilities.
- d5) Lead and motivate individuals.
- d6) Effectively manage tasks, time, and resources.
- d7) Search for information and engage in life-long self learning discipline.
- d8) Acquire entrepreneurial skills.
- d9) Refer to relevant literatures.
  - d1) Use project management, risk analysis, quality assurance and system validation skills for a variety of projects in different fields.

***3- Academic standards***

***(3a) External references for standards (Benchmarks)***

- Leading universities
- Beneficiaries expectations
- Professional syndicates standards
- Commercial sector indicators.
- NARS (National Academic Reference Standards)
- IEEE Standards
- ABET

***(3b) Comparison of provision to external references***

## 4- Curriculum Structure and Contents

4.a- Program duration : Five Years

4.b- Program structure

4.b.i- No. of hours per week: Lectures  Lab./Exercise  total

4.b.ii- No. of hours: Compulsory  Elective  Optional

4.b.iii- No. of hours of basic sciences courses: No.  %

4.b.iv- No. of hours of courses of social No.  %

sciences and humanities

4.b.v- No. of hours of specialized courses: No.  %

4.b.vi- No. of hours of other courses: NO.  %

4.b.vii Practical/Field Training:   
Circuit design, Programming and application skills

4.b.viii-Program Levels (in credit-hours system):

## 5- Program courses

5.1- Prep. year Semester 1

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM 001	Mathematics ( 1 )	4	3		7	
FR 081	Engineering drawing and projection ( 1 )	2	4		6	a1, a2, b1, b2
PM 003	Physics ( 1 )	3	1	2	6	
PM 007	Special Chemistry	3	1	1	5	
CSE 061	Computer Fundamentals 1	2		2	4	
FR 082	Specialized English Language	2			2	a1, a2, a3, b1, b2, b3, c1, c2, c3, c4, c5, c6
		<b>16</b>	<b>9</b>	<b>5</b>	<b>30</b>	

## 5.2- Prep. year Semester 2

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM002	Mathematics ( 2 )	4	2		6	
PM 005	Mechanics	3	2		5	
PM 004	Physics ( 2 )	2	1	2	5	
FR 081	Engineering drawing and projection ( 2 )	1	4		5	
CSE 061	Computer Fundamentals 2	1		2	3	
FR 083	History of Engineering Sciences	2			2	a1, c7, d1, d2, d3, d7
<i>PM 006</i>	Production Technology (Production Engineering)	2		2	4	
		<b>15</b>	<b>9</b>	<b>6</b>	<b>30</b>	

## 5.3- 1<sup>st</sup> year Semester 1

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM101	Mathematics ( 3 )	4	2		6	
PM 103	Physics ( 3 )	3	1	1	5	
AC 141	Electrical Engineering	3	2		5	
EC 121	Electronics ( 1 )	3	2		5	a1, a3, a4, a5,a8, a10, b1, b3, b4, b6, b8, b9, c4, c9, c12, d5, d8, d9, d12
EC123	Electrical Workshop			2	2	a1, a8, b1, b7, c6, c9
CSE161	Computers Operations	2	1	2	5	
<i>FR 084</i>	Prep Training					
		<b>15</b>	<b>8</b>	<b>5</b>	<b>28</b>	

## 5.4- 1<sup>st</sup> year Semester 2

**a. Compulsory**

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM 102	Mathematics ( 4 )	4	2		6	
EC 122	Electronics ( 2 )	3	2		5	a1, a3, a5, a8, a10, b1, b3, b4, b6, b8, b9, b10, c4, c9, c12, d3, d5, d8, d9, d12
EC 124	Semiconductor Devices Physics and Technology	3	1	1	5	a2, a4, b2, b7, c5, d1, d2
FR 181	Environmental Engineering	3			3	
EC 125	Electronic Circuits Drawing	2	3		5	a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, b1, b2, b3, c1, c2, c3, d1, d2
AC 142	Lab. Test	2		4	5	c1, c2
		<b>17</b>	<b>8</b>	<b>5</b>	<b>30</b>	

**5.5- 2<sup>nd</sup> year Semester 1**

**a. Compulsory**

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM 201	Mathematics ( 5 )	3	2		5	
AC 242	Electrical Power and Machines	3	2		5	
EC 221	Communication Engineering	3	2		5	a1, a3, a4, b6, b8, b9, c8, c12, d8, d9, d12
AC 241	Control Engineering	3	2		5	
EC 222	Very Large Scale of Integrated Circuit ( VLSI)	3	1	2	6	a3, a6, a10, b2, b7, c3, c5, c6, d1, d2
EC 223	Electrical Circuits	2	2		4	a2, a3, a10, b2, b4, b6, c6, d1, d2, d3, d6, d7, d9
FR 182	1 <sup>st</sup> year Training					
		<b>17</b>	<b>11</b>	<b>2</b>	<b>30</b>	

## 5.6- 2<sup>nd</sup> year Semester 2

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
PM 202	Mathematics ( 6 )	3	2		5	
C SE 261	Computer Engineering	3	2		5	
EC 224	Electronic circuit	3	2		5	a2, a3, a10, b2, b4, b6, c3, c4, c6, d1, d2, d3, d6, d7, d9
AC 243	Measurements	3	2		5	
AC 225	<i>Lab. Test</i>	2		4	6	a3, a7, b2, c1, c2, c6, d1, d2, d3, d13
AC 226	Electronic work shop			2	2	a1, a2, a3, a4, a5, a6, a7, a8, b1, b2, b3, c1, c2, c3, c4, d1, d2, d3, d4, d5
		<b>14</b>	<b>8</b>	<b>6</b>	<b>28</b>	

## 5.7- 3<sup>rd</sup> year Semester 1

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 321	Network Theory	3	2		5	a1, a3, a6, b2, b3, c8, d1, d2, d3, d4, d8, d9
EC 322	Electromagnetic Wave Theory	4	2		6	a1, a2, a3, b2, b6, c9, c10, c12, d1, d3
EC 323	Communication Theory	3	2		5	a1, a2, a5, b2, b3, c3, c4
EC 324	Acoustics	3	2		5	a1, a2, a7, a8, a9, a10, b1, b2, b3, b4, b5, b6, b7, b8, b9, b10, b11, c3, c4, c5, c6, c7, c8, c9, c10, c11, c12, d1, d2, d3, d4, d5, d6, d7, d8, d9, d10, d11, d12, d13, d14, d15
EC 326	Laboratories 1	2		3	5	a1, a5, a6, a10, b3, b9, b11, c1, c2, c3, c4, c6, c10, d1, d8, d10, d13, d15
FR 281	2 <sup>nd</sup> Training					
	<b>Total</b>	<b>18</b>	<b>9</b>	<b>3</b>	<b>30</b>	

b- Elective- number required



Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 325	Selected Topic (1)	3	1		4	a2, a4, b2, b7, c5, d1, d2, d3, d6, d7

## 5.8- 3<sup>rd</sup> year Semester 2

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 327	Optical Communication	3	2		5	a1, a8, b1, b7, c6, c9
EC 328	Microwave Engineering	3	2		5	a1, a2, a7, a8, a9, a10, b1, b2, b3, b4, b5, b6, b7, b8, b9, b10, b11, c3, c4, c5, c6, c7, c8, c9, c10, c11, c12, d1, d2, d3, d4, d5, d6, d7, d8, d9, d10, d11, d12, d13, d14, d15
EC 329	Digital Signal Processing	3	2		5	a1, a2, a3, b1, b2, b3, b5, b6, c1, c2, c3, c4, c5, d1, d2, d3, d4, d5
EC 330	Digital Communication Systems	3	2		5	a1, a2, a3, a4, a5, a6, a7, a8, b1, b2, b3, b4, b5, c1, c2, c3, c4, c5
EC 326	Laboratories 2	1		3	4	a1, a3, b8, b11, c1, c2, c6, c8, d4, d7, d8, d10, d13
<b>Total</b>		<b>16</b>	<b>9</b>	<b>3</b>	<b>28</b>	

### b- Elective- number required

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 331	Selected Topic (2)	3	1		4	a1, a3, a5, a7, b3, b4, b6, c8, c9, c12, d1, d2, d7, d9

## 5.9- 4<sup>th</sup> year Semester 1

### a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 421	Computer Network	3	2		5	a1, a2, a3, a4, a10, b2, b3, b6, b7, c4, c8, c9, c12, d3, d4, d6, d9, d13, d14

EC 422	Information and Coding Theory	3	2		5	a3, a5, b2, b10, c6, d1, d2, d3, d6, d7, d9
EC 423	Mobile Communication Theory	2	2		4	a1, a2, a3, a4, b1, b2, b3, c1, c2
EC 424	Antenna Engineering	3	2		5	a5, a10, b1, b2, c1, c2, c3, d3, d8, d10
EC 426	Laboratories 3	2		3	5	a1, a2, a3, a4, a5, a6, a7, a8, a9, a10, a11, b1, b2, b3, c1, c2, c3, c4, d1, d2, d3, d4, d5
EC 427	Project	2			2	
	<b>Total</b>	<b>18</b>	<b>9</b>	<b>3</b>	<b>30</b>	

b- Elective- number required

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 425	Selected Topic (3)	3	1		4	a1, a2, a3, a4, b1, b2, b3, c1, c2

## 5.10- 4<sup>th</sup> year Semester 2

a. Compulsory

Code No.	Subject	Weekly Hours				Program ILO's Covered (By No.)
		Lecture	Exercise		Total	
			Tutorial	Prac		
EC 428	Advanced Communication Systems	2	2		4	a1, a2, a3, a6, a7, a8, a10, b2, b3, b6, b9, c3, c6, c10, c12, d4, d8, d11, d13, d14
EC 429	Network Planning	2	2		4	a1, a2, a3, a4, a5, a6, a7, a8, a9, b1, b2, b3, b4, c1, c2, c3, c4, c5
EC 430	Microwave Electronics	3	2		5	a1, a10, b4, b11, c1, c3, d3, d9, d12, d13, d14
EC 431	Satellite Engineering	3	2		5	a1, a2, a5, b2, b3, b5, c3, c4
FR 485	Engineering Economy Legislation and Contracts	2			2	a1, a3, a5, b1, b2, b3, b5, c1, c2, c3, c5, c7
EC 426	Laboratories 4	1		3	4	a1, a2, a3, a4, b1, b2, b3, b4, c1, c2
EC 427	Project	2	2		4	
	<b>Total</b>	<b>15</b>	<b>10</b>	<b>3</b>	<b>28</b>	

## **6- Program admission requirements**

General Secondary School Certificate with Major in Mathematics with high academic reference, at secondary school marks of > 91%, or an equivalent certificate from a foreign institute recognized by the university. The program is studied for a minimum of four years full-time.

The program is arranged normally in 10 x 14 week semesters (2 semesters per year). There are normally 28 (2 x 14) study weeks (excluding examination periods and summer session) in each year. The program is divided into 146 hours per week: 31 basic science hours per week, 103 specialized hours per week, 5 sciences and humanities hours per week, and 7 other hours per week. Currently there are no Optional courses on this program.

## **7- Regulations for progression and program completion**

(For the students to be transferred from one academic year to the next, he/she is required to have successfully passed in all subjects. However, the student may still be transferred if he/she has failed in not more than two basic subjects from the same academic year or from previous years. In such cases, students "carrying" subjects from one year to the next should re-sit for their "failed" subjects in their proper respective semesters.

Final year students who have failed in a maximum of two basic complementary ones in that year or from previous years can re-sit for their exams in those subjects in September of the same year. Should the student failed again, he/she has to re-sit for his/her exams in those subjects in their proper respective semesters thereafter as many times as necessary until he/she succeeds).

Marks from the first year to the fourth year are weighted so that determination of overall marks of the degree. The final overall marks determine the degree classification as follows:

- Less than 50% Fail
- At least 50% and less than 65% Pass
- At least 65 and less than 75 % Good
- At least 75 and less than 85 % Very good
- At least 85 and more Excellent

### **Prep. Year/Level/Semester**

- Moved to first year, Passing in all courses of the year or fail in not more than two compulsive subjects

### **First Year/Level/Semester**

- Moved to second year, Passing in all courses of the year or fail in not more than two compulsive subjects

### **Second Year Semester 1 and 2**

- Passing in all courses the year but at least two related to first and second years

### **Third Year Semester 1 and 2**

- Passing in all courses the year but at least two related to first, second, and/or third years.

### **Forth Year Semester 1 and 2**

Passing in all courses or fail in not more than two compulsive subjects. In this case, the student is allowed to enter a September Exam in the same year.

**By laws and Regulations for Undergraduate Students "Enrollment opportunities/or "regular" and "external" students:**

Academic year	Enrollment opportunities	
	Regular students	External students
Prep.	Two opportunities	None

First	Two opportunities	Two opportunities
Second	Two opportunities	Two opportunities
Third	Two opportunities	Two opportunities
Fourth	Two opportunities	Number of subjects, he/she would Be allowed to re-sit for the exam the subjects he/she has failed in indefinitely until He/she is graduated.

Once the student exhausts the number of opportunities of a being a regular" student, he/she becomes an "external" student for a certain number of times according to the above table. Once an "external" student in a certain year succeeds in his/her exams for that year to allow him/her to be transferred to the following year, he/she automatically becomes registered as a regular student again.

### ***8- Evaluation of program intended learning outcomes***

<b>Evaluator</b>	<b>Tool</b>	<b>Sample</b>
1- Senior students	questionnaire	66%
2- Alumni	questionnaire	70%
3- Stakeholders ( Employers)		
4-External Evaluator(s) (External Examiner(s))	<b>attached</b>	
<b>5- Other</b>		

#### **Annex 1**

**Attach course specification**