



Program Specifications of Electrical Engineering
(Computer Systems Engineering)

A-Basic Information

- (1) Program Title: Computer Systems Engineering
(2) Program Type: Single
(3) Department: Electrical Engineering
(4) Coordinator: Prof. Dr Sayed Ward
(5) External Evaluator: Prof. Dr Mohamed Abdelmaqsoud Ta'lab
(6) Last date of program specifications approval: faculty council on 10/05/2006

B-Professional Information

1. Program Aims

The computer systems engineering program aims to provide students with knowledge and skills in the computer engineering field which qualify graduates to work efficiently in local and international markets. In pursuit of this mission, the main objectives of the Computer Systems Engineering program are:

- The ability to use current advanced techniques, skills, and tools necessary for computing practices to specify, design, and implement computer-based systems.
- Recognize the information requirements of various business activities on both operational and decision making levels.
- Tackle business problems using computer system analysis tools and techniques.
- Implement phases of the computer system development life cycle, procurement and installation of hardware, software design, data manipulation and system operations.
- Manage Projects related to computer systems in diverse fields of applications.

2. Graduate Attributes

The computer engineer should be able to:

1. Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
2. Identify, formulate and solve engineering problems.
3. Exploit the techniques, skills and up-to-date engineering tools, necessary for engineering practice.
4. Design a system, component and process to meet the required needs within realistic constraints.

5. Consider the detrimental impacts of engineering solutions on society and environment.
6. Design and conduct experiments and analyze and interpret data.
7. Demonstrate knowledge of contemporary engineering issues.
8. Work efficiently within multi-disciplinary teams.
9. Display professional responsibilities and ethical, societal and cultural concerns.
10. Communicate effectively.
11. Recognize the need to engage in self- and life-long learning.
12. Manage engineering projects subjected to economic, environmental and social constraints.
13. Apply knowledge of computing, mathematics, physics and logical skills appropriate to the computer engineering discipline.
14. Analyze a problem, and identify and define the computing requirements appropriate to its solution.
15. Design, implement and evaluate a computer-based system, process, component, or program to meet desired needs.
16. Use general computer and software tools professionally.
17. Analyze operations, realize requirements and constraints of projects and, consequently, achieve an appropriate cost effective design.
18. Perform troubleshooting in computer systems.
19. Exhibit competency in English as a second language as suitable for the discipline.
20. Demonstrate inductive reasoning abilities, figuring general rules and conclusions about seemingly unrelated events.
21. Analyze the local and global impact of computing on individuals, organizations and society.
22. Use current advanced techniques, skills, and tools necessary for computing practices.

3. Intended Learning Outcomes (ILOs)

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

a. Knowledge And Understanding:

Graduates will gain the appropriate knowledge and understanding to be able to:

- a1. Recognize the concepts and theories of mathematics and sciences, appropriate to the computer engineering area.
- a2. Describe the basics of information and communication technology (ICT)
- a3. Define characteristics of engineering materials in the computer engineering area.
- a4. Identify the principles of design including elements design, process and/or a system in the computer engineering area.
- a5. Describe the different methodologies of solving engineering problems.
- a6. Define quality assurance , codes of practice and standards, health and safety requirements and environmental issues.
- a7. Recognize business and management principles relevant to engineering.
- a8. Discover current engineering technologies in the computer engineering area.
- a9. Identify topics related to humanitarian interests and moral issues.
- a10. Recognize technical language and report writing.
- a11. Link between professional ethics and socio-economical impact of engineering solutions
- a12. Identify contemporary engineering topics.

- a13. Identify engineering principles in the fields of logic design, circuit analysis, machine and assembly languages, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, signal processing, operating systems, real-time systems and reliability analysis.
- a14. Define the quality assessment of computer systems.
- a15. Conduct related research and current advances in the field of computer software and hardware.
- a16. Analyze technologies of data, image and graphics representation and organization on computer storage media.
- a17. Explore modern trends in information technology and its fundamental role in business enterprises.

b. Intellectual Skills

The Computer Systems Engineering graduate should 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, system, 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 decision considering balanced cost, benefits, safety, quality, reliability, and environmental impact.
- b10. Incorporate economic, social, environmental dimensions and risk management in design.
- b11. Analyze results of numerical models and appreciate their limitations.
- b12. Create systematic and methodic approaches in dealing with new and advancing technology,
- b13. Select the appropriate mathematical tools, computing methods, design techniques for modeling and analyzing computer systems.
- b14. Select, synthesize, and apply suitable IT tools to computer engineering problems.
- b15. Propose various computer-based solutions to business system problems cost-benefit analysis should be performed especially in sensitive domains where direct and indirect costs are involved.
- b16. Identifying symptoms in problematic situations.
- b17. Innovating solutions based on non- traditional thinking and the use of latest technologies.
- b18. Capability of integrating computer objects running on different system configurations.

c. Professional And Practical Skills

The Computer Systems Engineering graduates must show ability to:

- c1. Apply knowledge of mathematics, science, information technology, design, business context and engineering practice to solve engineering problems
- c2. Professionally merge engineering knowledge and understanding 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, measuring instruments, workshops and laboratories equipment to design experiments and 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.
- c9. Demonstrates basic organizational and project management skills.
- c10. Apply quality assurance procedures and follow codes and standards.
- c11. Exchange knowledge and skills to engineering community and industry
- c12. Prepare and present technical reports.
- c13. Design and operate computer-based systems specifically designed for business applications.
- c14. Use appropriate specialized computer software, computational tools and design packages throughout the phases of the life cycle of system development.
- c15. Write computer programs on professional levels achieving acceptable quality measures in software development.
- c16. Conducting user support activities competently.

d. General And Transferable Skills

Graduates will have an educated view of the world including:

- 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.
- d10. Write technical reports and presentation.
- d11. Share ideas and communicate with others according to the rules of professional ethics.
- d12. Develop skills related to creative and critical thinking as well as problem solving.

4. Academic Standards

The National Academic References Standards (NARS) are adopted in designing the current program.

5. Curriculum Structure and Contents

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

4.b. **Program structure: Contact hours system**

- i. Week contact hours: **298 hours**
- ii. Equivalent hours: **186 Credit hours**

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.)	9	9-12 %
B	Mathematics and Basic Sciences	24	20-26 %
C	Basic Engineering Sciences (Faculty/Spec. Req.)	23	20-23 %
D	Applied Engineering and Design	23	20-22 %
E	Computer Applications and ICT*	11	9-11 %
F	Projects* and Practice	10	8-10 %
	Subtotal	100	92-94 %
G	Discretionary (Institution character-identifying) subjects	0	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.

6. 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	
EMP 001	Mathematics (A)	4	2	-	6	Attached Table
EMP 012	Mechanics	2	2	-	4	
EMP 013	Physics (A)	4	1	2	7	
EMP 014	Chemistry	4	-	2	6	
MDP 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	
EMP 021	Mathematics (B)	4	2	-	6	

EMP 012	Mechanics	2	2	-	4	Attached Table
EMP 023	Physics (B)	4	-	2	6	
MDP 001	Engineering drawing and isometric	-	4	-	4	
ECE006C	Computer science	2	1	-	3	
MDP 002	Engineering production	2	-	3	5	
GEN 002	History	-	2	-	2	

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 (1)	4	-	2	6	
MP/CVL181	Civil and Mechanical Engineering	3	2	-	5	
EMP181	Math (2)(A)	3	2	-	5	
GNRL181	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	Tests (1)	-	-	4	4	
ECE124C	Computer Applications(1)	3	4	-	7	
EMP182	Math (2)(B)*	3	2	-	5	
GNRL182	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	
MPE281	Math (3)(A)*	3	2	-	5	
GEN28x	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					Attached Table
GEN281	Industrial Sociology	2	-	-	2	
GEN282	Behavior Anizaty	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	
ECE211	Signal Analysis	4	2	-	6	Attached Table
ECE222	Electronics (2)	4	3	-	7	
ECE223	Tests (2)	-	-	4	4	
ECE224C	Logic Circuits	4	2	-	6	
MPE282	Math (3)(B)*	3	2	-	5	
GNRL280	Technical reports (1)	-	2	-	2	

Year of program 4 (Third Year Computer Systems Engineering) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE311C	Microprocessor	4	2	-	6	Attached Table
ECE312C	Automatic control (1)	3	2	-	5	
ECE313C	Operating System	4	2	-	6	
ECE314C	System Analysis (1)	4	2	-	6	
ECE315C	Data Structure	3	2	-	5	
GEN38x	Humanities	2	-	-	2	

Humanities Courses

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

Year of program 4 (Third Year Computer Systems Engineering) Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE321	Electronic Circuits (A)	3	2	-	5	Attached Table
ECE322C	Computer Architecture	4	2	-	6	
ECE323C	Database Design	3	-	2	5	
ECE324C	Test(3)	-	-	4	4	
ECE34xC	Elective Course(1) from list(1)	4	2	-	6	
EPE381	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	
ECE34xC	Elective Course(1) Computer Systems Engineering (List1)					Attached Table
ECE341C	System Analysis (2)	4	2	-	6	
ECE342C	Programming Languages	4	2	-	6	
ECE343C	Software Engineering	4	2	-	6	
ECE344C	Selective topics in computer Engineering	4	2	-	6	

Year of program 5 (Fourth Year Computer Systems Engineering) Semester 1

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE411C	Computer Graphics	3	2	-	5	Attached Table
ECE412C	Artificial Intelligence	3	2	-	5	
ECE413C	Computer Network (1)	3	2	-	5	
ECE414C	Project	-	-	3	3	
ECE44xC	Elective course(1) from list(2)	4	2	-	6	
ECE44xC	Elective course(2) from list(2)	4	2	-	6	

b- Elective

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE44xC	Elective Courses(1)(2) Computer Systems Engineering (List2)					Attached Table
ECE441C	Image Processing	4	2	-	6	
ECE442C	Peripheral Devices	4	2	-	6	
ECE443C	Computer Security	4	2	-	6	
ECE444C	Operations Research and Management Systems	4	2	-	6	
ECE445C	Distributed Systems	4	2	-	6	
ECE446C	Advanced Control Systems	4	2	-	6	
ECE447C	Neural Networks	4	2	-	6	
ECE448C	Information Systems	4	2	-	6	
ECE449C	Selected Topics in Computer Engineering	4	2	-	6	

Year of program 5 (Fourth Year Computer Systems Engineering) Semester 2

a- Compulsory

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE421C	Compilers	4	2	-	6	Attached Table
ECE422C	Test(4)	-	-	5	5	
ECE414C	Project	-	-	5	5	
ECE45xC	Elective course(3) from list(3)	4	2	-	6	
ECE45xC	Elective course(4) from list(3)	4	2	-	6	

b- Elective

Code	Course Title	No. of hours / week				Program ILOs Covered (By no.)
		Lect.	Tut.	Lab	Total	
ECE45xC	Elective Courses(3)(4) Computer Systems Engineering (List3)					Attached Table
ECE451C	Robotics Systems	4	2	-	6	
ECE452C	Engineering Systems Simulation	4	2	-	6	
ECE453C	Artificial Intelligence programming	4	2	-	6	
ECE454C	Expert Systems	4	2	-	6	
ECE455C	Management Information Systems	4	2	-	6	
ECE456C	Software Engineering	4	2	-	6	
ECE457C	Systems Engineering	4	2	-	6	
ECE458C	Computer Vision	4	2	-	6	
ECE459C	Selected Topics In computer Engineering	4	2	-	6	

ECE450C	Computer Networks (2)	4	2	-	6	
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7. 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.

8. 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.

9. 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		