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 Ebtisam Mostafa Saied
(5) External Evaluator: Prof. Dr Ahdab Elmourshedy was nominated by the faculty council on 8/12/2007
(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. In pursuit of this mission, the educational objectives of the Computer Systems Engineering program are:

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

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

2. Intended Learning Outcomes (ILOs)

a. Knowledge And Understanding:

Graduates will achieve an appropriate level of technical competence in demonstrates knowledge and understanding of:

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.
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 socio-economical impact of engineering solutions
a12. Contemporary engineering topics.
a13. 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. Quality assessment of computer systems.
a15. Related research and current advances in the field of computer software and hardware.
a16. Technologies of data, image and graphics representation and organization on computer storage media.
a17. 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. Proposing 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.

3. Academic Standards

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

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).

3.c. Comparison Of Provision To External References

The following table explains how the ILO's of the current program compare to the requirements of the NARS and the ABET criteria for program outcomes and assessment:

Attributes of program graduates as per ABET Criterion (3) for program outcomes and assessment	**Attributes of program graduates as per NARS Requirements for engineering programs, in general**	**Corresponding ILO's in Current Program**	Courses
(a) ability to apply knowledge of mathematics, science and engineering	(a) ability to apply knowledge of mathematics, science and engineering concepts to the solution of complex engineering problems		
(b) ability to design and conduct experiments, as well as to analyze and interpret data	(b) ability to design and conduct experiments and to analyze and interpret data		
(c) ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	(c) ability to design a system, component, or process to meet required needs		

(d) ability to function on multidisciplinary teams	(d) ability to function on multidisciplinary teams		
(e) ability to identify, formulate and solve engineering problems	(e) ability to identify, formulate and solve engineering problems		
(f) understanding of professional and ethical responsibility	(f) understanding of professional and ethical responsibilities		
(g) ability to communicate effectively	(g) ability to communicate effectively		
(h) having the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	(h) ability to consider and avoid the detrimental impact of engineering solutions within social or global measures.		
(i) recognition of the need for, and ability to engage in life-long learning			
(j) knowledge of contemporary issues			
(k) ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	(k) ability to use the techniques, skills, and modern engineering tools necessary for engineering practice		

4. Curriculum Structure and Contents

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

4.b. Program structure: Contact hours system

i. No. of Contact hours: **238 + 60** hr. for preparatory year
131 Lectures
107 Tutorial /Exercises
238 Total

ii. No. of Contact hours: **177.5+45.5** for preparatory year
162.5 Compulsory
15 Elective

iii. No. of Contact hours of basic science: **54.5** hours = **30.5** %

iv. No. of Contact hours of social science and humanities: **24** hours = **13.5** %

v. No. of Contact hours of specialized courses: **99** hours = **56** %

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.)	11	9-12 %
B	Mathematics and Basic Sciences	20.3	20-26 %
C	Basic Engineering Sciences (Faculty/Spec. Req.)	21	20-23 %
D	Applied Engineering and Design	21	20-22 %
E	Computer Applications and ICT*	10	9-11 %
F	Projects* and Practice	9	8-10 %
	Subtotal	93	92-94 %
G	Discretionary (Institution character-identifying) subjects	7	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	
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	
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	
EC111	Elec. Engineering fundamentals	4	2	-	6	
EC112	Electrical Circuits (1)	4	2	-	6	
EC113C	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	
EC121	Electronics (1)	4	3	-	7	
EC122	Electrical Circuits (2)	3	2	-	5	
EC123	Tests (1)	-	-	4	4	
EC124C	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	
EC211	Electrical and Electronics measurements	4	2	-	6	
EC212	Electromagnetic fundamentals	4	2	-	6	
EC213C	Computer Organization (1)	3	2	-	5	
EC214C	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					
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	
EC211	Signal Analysis	4	2	-	6	
EC222	Electronics (2)	4	3	-	7	
EC223	Tests (2)	-	-	4	4	
EC224C	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	
CSE311	Microprocessor	4	2	-	6	
CSE312	Automatic control (1)	3	2	-	5	
CSE313	Operating System	4	2	-	6	
CSE314	System Analysis (1)	4	2	-	6	
CSE315	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					
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	
CSE321	Electronic Circuits (A)	3	2	-	5	
CSE322	Computer Architecture	4	2	-	6	
CSE323	Database Design	3	-	2	5	
CSE324	Test(3)	-	-	4	4	
CSE34x	Elective Course(1) from list(1)	4	2	-	6	
EP381	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	
CSE34x	Elective Course(1) Computer Systems Engineering (List1)					
CSE341	System Analysis (2)	4	2	-	6	
CSE342	Programming Languages	4	2	-	6	
CSE343	Software Engineering	4	2	-	6	
CSE344	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	
CSE411	Computer Graphics	3	2	-	5	
CSE412	Artificial Intelligence	3	2	-	5	
CSE413	Computer Network (1)	3	2	-	5	
CSE414	Project	-	-	3	3	
CSE44x	Elective course(1) from list(2)	4	2	-	6	
CSE44x	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	
CSE44x	Elective Courses(1)(2) Computer Systems Engineering (List2)					
CSE441	Image Processing	4	2	-	6	
CSE442	Computer Terminals	4	2	-	6	
CSE443	Computer Security	4	2	-	6	
CSE444	Research in Operational Management	4	2	-	6	
CSE445	Distributed Systems	4	2	-	6	

CSE446	Advanced Control Systems	4	2	-	6	
CSE447	Neural Networks	4	2	-	6	
CSE448	Information Systems	4	2	-	6	
CSE449	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	
CSE421	Compilers	4	2	-	6	
CSE422	Test(4)	-	-	5	5	
CSE414	Project	-	-	5	5	
CSE45x	Elective course(3) from list(3)	4	2	-	6	
CSE45x	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	
CSE45x	Elective Courses(3)(4) Computer Systems Engineering (List3)					
CSE451	Robotics	4	2	-	6	
CSE452	Simulation	4	2	-	6	
CSE453	AI Programming	4	2	-	6	
CSE454	Expert Systems	4	2	-	6	
CSE455	Management Information Systems	4	2	-	6	
CSE456	Software Engineering	4	2	-	6	
CSE457	Systems Engineering	4	2	-	6	
CSE458	Computer Vision	4	2	-		
CSE459	Selected Topics In computer Engineering	4	2	-	6	
CSE450	Computer Network (2)	4	2	-	6	

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		