Computer and Automatic Control Engineering

PROGRAM SPECTIFICATION

2022-2023

PRGRAM COORDINATOR:.DR. VIVIAN HANNA

1. Basic Information:

A. **Program Title:** Computer and Automatic Control Engineering
B. **Program type:** Single
C. **Departments responsible of the program:**
   a. Department of Electrical Engineering
D. **Date of approval of Program specification by the Institute Council:** Approved on 9/9/2004 .
E. **Coordinator:** Dr. Vivian Hanna, Head of Electrical Engineering Department.
F. **Year of operation:** 2022/2023
G. **Date of program regulation approval:**9/9/2004

1.1 External Evaluators:

The most recent program external evaluation has been conducted by: (**Appendix 1)** shows the external evaluators' reports:

External Evaluators	Date of review	Action
Prof. Dr.		All comments were covered

1.2-Professional Information:

1.2.1 Program Mission and Aims

1.2.1.1 Program mission

The mission of Computer and Automatic Control Engineering program is to provide education that is driven by a professional and technology-oriented focus and highly committed to sustainability. The department is devoted to educating and inspiring future generations of designers who are both technically skilled and ethically professional.

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1.2.1.2 Program Aims

The Computer and Automatic Control Engineering program aims at enriching the Egyptian computer engineering sector and Society with capable and skilled who are dedicated to the implementation and design of modern computer applications. In addition to introducing pioneers in community and cyberspace. The following are the aimed graduate attributes:

1. Apply knowledge and understanding of the interdisciplinary fundamentals of design, manufacture, operate, develop or maintain computer systems, computers networks or computer controlled systems.
2. Demonstrate the scientific principles relevant to the elements and components of computer systems and computer controlled systems.
3. Use analytical and practical skills appropriate for designing computer systems, computers networks and computer controlled systems.
4. Act professional topics related to current economic, social and ethical issues that promote life-long learning and ability for continuous self-improvement.
5. Improve team skills that enable them to work and communicate effectively while solving technical problems in a multidisciplinary environment.
6. Develop, innovate and adopt new directions in their advance education.

1.2.1.3 The attributes of Computer and Automatic Control Engineering program engineers

The graduates should be able to:

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. Engage in self- and life- long learning.
11. Act professionally in design and supervision of computer engineering disciplines.
12. Use current advanced techniques, skills, and tools necessary for computing practices to specify, design, and implement computer-based systems.
13. Demonstrate inductive reasoning abilities, figuring general rules and conclusions about seemingly unrelated events.
14. Recognize the information requirements of various business activities on both operational and decision making levels.
15. Implementing phases of the computer system and cyberspace development life cycle, procurement and installation of hardware, software design, data manipulation and system operations.
16. Tackling business problems using smart system analysis tools and computer-based techniques.
17. Managing projects related to computer systems in diverse fields of applications.
18. Lead and supervise a group of designers and information technology (IT) technicians.

2. Learning outcomes (LO's) for program

A .General Engineering

LO1.Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

LO2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.

LO3. 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.

LO4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

LO5. Practice research techniques and methods of investigation as an inherent part of learning.

LO6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

LO7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.

LO8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

LO9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.
LO10.Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

B-Computer Engineering
LO11. Select, model and analyze computer-programming systems applicable to the specific discipline by applying the concepts of: generation, transmission of digital systems.
LO12. Design model and analyze a digital system or component for a specific application; and identify the tools required to optimize this design.
LO13.Design and implement: elements, modules, sub-systems or systems in digital engineering using technological and professional tools.
LO14.Estimate and measure the performance of a digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.
LO15. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain digital equipment, systems and services

3-Academic Standards:

Academic References Standards of the construction engineering & technology program was referenced by the National Academic References Standards (NARS 2009). NARS 2009 was set by National Authority for Quality Assurance and Accreditation of Education in Egypt (http://naqaae.eg/wp-content/uploads/2014/PDF/21.pdf). It was enhanced and adopted as academic standards to be suitable for the program (Institute council No. 1) on 8/2003 , Program ILOs vs. NARS, Program ILOs vs. Program aims and Program ILOs vs. Program courses association matrices were constructed (Appendices 1and 2).

4- External Reference Standards and benchmarks:

Not present

5-Program Structure and components:

a. Program duration: **Five academic years**.
b. Curriculum structure:
    - Credit hours: 300 contact hours
    - Theoretical and practical hours distribution

Theoretical hours:	193	Tutorial / Lab/ Workshop hours:	107	Total	300

- Mandatory and elective credit hours distribution

Mandatory hours:	284	Elective hours:	16	Total	300
Institute	60	Department	240	Total	300

c. Program structure:

		Contact hours	%	NARS %
1	Humanities and Social Sciences	30	10	9-12
2	Basics Sciences	62	20.66	20-26
3	Basic Engineering Sciences (Institute/Spec. Req.)	66	22	20-23
4	Applied Engineering and Design	64	21.33	20-22
5	Computer Applications and ICT*	30	10	9-11
6	Projects* and Practice	30	10	8-10
7	Discretionary (Institution character-identifying) subjects	18	6	6-8

d. Program Levels:

Study level	Student level	Percentage of the earned credit hours	
		Elective	Mandatory
1	Freshman	0 %	20 %
2	Sophomore	0 %	20 %
3	Junior	0 %	20 %
4	Senior 1	0 %	20 %
5	Senior 2	5.34 %	14.66 %

e. Program courses

e.1 Institute Requirements (General Engineering)

First year – General Engineering — الفرقة الأولى – هندسة عامة

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex./ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 111	Mathematics (1)	4	2	100	50		3							150	رياضيات (1)
BAS 121	Physics (1)	3	2	90	30	30	3							150	فيزيقا (1)
BAS 151	Drawing & Projection Engineering		4	70	30		3							100	الرسم والإسقاط الهندسي
ELE 131	An Introduction to computers & Information	2	3	60	20	20	3							100	مقدمة الحاسبات ومعالجة المعلومات
MEO 141	Production Engineering & Manufacturing	4	2	90	30	30	3							150	هندسة الإنتاج والتصنيع
HUM 171	English Language (1)	2	2	30	20		3							50	لغة إنجليزية (1)
BAS 112	Mathematics (2)							4	2	100	50		3	150	رياضيات (2)
BAS 122	Physics (2)							3	2	90	30	30	3	150	فيزيقا (2)
BAS 131	Mechanics							3	2	100	50		3	150	ميكانيكا
BAS 141	Chemistry							2	2	60	20	20	3	100	كيمياء
BAS 152	Engineering Drawing								4	70	30		3	100	الرسم الهندسي
ELE 141	Computer Programming (1)							2	2		60	40	3	100	برمجة الحاسب
HUM 151	Technology & society							2		30	20		2	50	التكنولوجيا والمجتمع
	Total Hrs/week	15	15					16	14					Total Marks	1500
		30						30							

e.2 Program Requirements

Second year – Electrical Engineering — الفرقة الثانية – هندسة كهربية

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex./ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 211	Mathematics (3)	4	2	100	50		3							150	رياضيات (3)
BAS 221	Physics (3)	4	2	90	30	30	3							150	فيزيقا (3)
ELE 211	Electric Circuits	4	3	90	30	30	3							150	دوائر كهربية
ELE 212	Electrical Power Engineering	3	2	70	30		3							100	هندسة قوى كهربية
ELE 241	Computer Programming (2)	2	2		100	50	3							150	برمجة الحاسب (2)
HUM 211	English Language (2)	2		30	20		2							50	لغة انجليزية (2)
BAS 212	Mathematics (4)							4	2	100	50		3	150	رياضيات (4)
BAS 222	Physics (4)							4	2	100	50		3	150	فيزيقا (4)
ELE 221	Electronic Circuits							4	2	90	30	30	3	150	دوائر الكترونية
ELE 222	Computer-Aided Circuit Analysis & Sch							2	3		70	30	3	100	برمجيات رسم وتحليل الدوائر
ELE 231	Logical Design							3	2	90	30	30	3	150	تصميم منطقي
HUM 221	Industrial Psychology							2		30	20		2	50	علم النفس الصناعي
	Total Hrs/week	19	11					19	11						
		30						30							

Third year – Electrical Engineering- Computer and Automatic Control

الفرقة الثالثة– هندسة كهربية – هندسة وتكنولوجيا الحاسبات ونظم التحكم

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex./ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
BAS 311	Mathematics (5)	3	2	100	50		3							150	رياضيات (5)
ELE 311	Electrical Measurements	3	1	60	20	20	3							100	قياسات كهربية
ELE 326	Advanced Electronic Circuits	4	2	90	30	30	3							150	دوائر الكترونية متقدمة
ELE 331	Advanced Logical Design	2	2	60	20	20	3							100	تصميم منطقي متقدم
ELE 351	Communication (1)	3	2	90	30	30	3							150	اتصالات (1)
ELE 371	System Dynamics	3	1	70	30		3							100	ديناميكا النظم
HUM 341	English Language (3)	2		30	20		2						3	50	لغة انجليزية (3)
ELE 332	Microprocessor							4	2	100	50		3	150	المعالج الدقيق
ELE 341	Fundamentals of Programming							4	2	100	25	25	3	150	أسس البرمجة
ELE 352	Communication (2)							4	2	100	50		3	150	اتصالات (2)
ELE 362	Control Elements							3	1	60	20	20	3	100	مكونات التحكم
ELE 363	Control Engineering (1)							3	2	60	20	20	3	100	هندسة التحكم (1)
ELE 381	Energy Conversion Systems							3	2	60	20	20	3	100	نظم تحويل الطاقة
HUM 331	Industrial Organization							2		30	20		2	50	تنظيم صناعي
		20	10					21	9						
		30						30							

Fourth year – Electrical Engineering- Computer and Automatic Control

الفرقة الرابعة– هندسة كهربية – هندسة وتكنولوجيا الحاسبات ونظم التحكم

	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex./ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
ELE 435	Microprocessor Applications	3	1	60	20	20	3							150	تطبيقات المعالج الدقيق
ELE 461	Industrial Instrumentation Systems	2	2	60	20	20	3							100	نظم القياسات الصناعية
ELE 463	Control Engineering (2)	4	2	90	30	30	3							150	هندسة التحكم (2)
ELE 472	Signal Analysis	3	1	70	30		3							100	تحليل الإشارات
ELE 481	Power Electronic & Applications	3	1	60	20	20	3							100	الكترونيات القوي وتطبيقاتها
ELE 433	Computer Organization (1)	4	2	100	50		3							150	تنظيم الحاسب (1)
HUM 431	Projects Management	2		30	20									50	إدارة المشروعات
ELE 454	Computer Organization (2)							4	2	100	50		3	150	تنظيم الحاسب (2)
ELE 441	Operating Systems							3	1	60	20	20	3	100	نظم تشغيل
ELE 432	Algorithms & Data Structures							3	1	60	20	20	3	100	الخوارزميات وهياكل البيانات
ELE 462	Digital Control Systems							4	2	90	30	20	3	150	نظم التحكم الرقمية
ELE 478	Modeling & Simulation							3	2	70	30		3	100	النمذجة والمحاكاة
ELE 482	Electric Power Systems							3	1	60	20	20	3	100	نظم الطاقة الكهربية
HUM 441	Engineering Economics & Laws							2		30	20		2	50	اقتصاديات وتشريعات هندسية
		20	10					19	11						
		30						30							

الفرقة الخامسة – هندسة كهربية – هندسة وتكنولوجيا الحاسبات ونظم التحكم

Course Code	Course Name	First Semester						Second Semester						Total Marks	اسم المقرر
		Hrs/Week		Maximum Marks			Exam Period	Hrs/Week		Maximum Marks			Exam period		
		Lect	Ex./ Lab	Final Exam	Year work	Oral		Lect	Ex/ Lab	Final Exam	Year Work	Oral			
ELE 592	Project	2	4					2	4			300		300	المشروع
ELE 541	Database Systems	3	1	60	20	20	3							100	نظم قواعد البيانات
ELE 542	Software Engineering	3	1	70	30		3							100	هندسة البرمجيات
ELE 561	Process Control	3	1	60	20	20	3							100	التحكم الصناعي
HUM 531	Operations Research & Managements	3	1	70	30		3							100	بحوث العمليات ونظم الإدارة
ELE 5y1	Elective Course (1)	3	1	70	30		3							100	مقرر اختياري (1)
ELE 5y2	Elective Course (2)	3	1	70	30		3							100	مقرر اختياري (2)
ELE 531	Computer Networks							3	1	70	30		3	100	شبكات الحاسبات
ELE 543	Complier Theory							3	1	70	30		3	100	نظرية مترجمات البرامج
ELE 562	Advanced Control Systems							3	1	70	30		3	100	نظم التحكم المتقدمة
ELE 573	Artificial Intelligence							3	1	70	30		3	100	الذكاء الاصطناعي
ELE 5y3	Elective Course (3)							3	1	70	30		3	100	مقرر اختياري (3)
ELE 5y4	Elective Course (4)							2	2	70	30		3	100	مقرر اختياري (4)
		20	10					20	10						
		30						30							

e.3. Elective courses

1st Semester Elective Course المقررات الاختيارية للفصل الدراسي

ELE 533	Distributed Computer Systems	نظم الحاسبات الموزعة
ELE 544	Computer Security	امان الحاسبات
ELE 563	Robot Systems	نظم الروبوت
ELE 573	Pattern Recognition & Image Processing Systems	نظم تمييز الأنماط ومعالجة الصور
ELE 574	Biomedical Systems	النظم الحيوية الطبية
ELE 575	Real-Time Systems & Applications	نظم الزمن الحقيقي وتطبيقاتها
ELE 533	Distributed Computer Systems	نظم الحاسبات الموزعة

2nd Semester Elective Course المقررات الاختيارية للفصل

ELE 534	Selected Topics in Computers	موضوعات مختارة في الحاسبات
ELE 564	Selected Topics in Control	موضوعات مختارة في التحكم
ELE 576	Local Area Networks	الشبكات المحلية
ELE 577	Neural Networks	الشبكات العصبية
ELE 534	Selected Topics in Computers	موضوعات مختارة في الحاسبات
ELE 564	Selected Topics in Control	موضوعات مختارة في التحكم

Contact Hours

Total contact hours 300

f. Courses Contents:

As mentioned in courses specifications and bylaw.

6. Program Admission Requirements

a. Secondary Egyptian Schools Graduates.
b. Secondary School Certificate Graduates of other countries are eligible to join this program if they met the minimum grades set by Admission Office of the Ministry of Higher Education.
c. The study begins with a preparatory year for all students before specialization in Electrical Engineering. Students' departmental allocation is in accordance with the institute Council regulations.

7. Graduation requirements (Completion of program):

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- In addition to the two subjects mentioned in the previous item, the student who fails in two subjects in humanities and social sciences, whether from his class or from lower classes, is admitted to the transfer to the consecutive higher level. Passing successfully in all courses before obtaining the B.Sc. degree is a prerequisite.

d- 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

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

1. Distinction: from 85% of the total mark and upwards
2. Very good: from 75% to less than 85% of the total mark.
3. Good from: 65% to less than 75% of the total mark
4. Pass: from: 50% to less than 65% of the total mark

g-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.

h- 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 to their cumulative sum

i - The student is awarded an honor degree in 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- Graduation Minimum contact Hours Required

The minimum number of credit hours required for graduation as specified in the bylaw is 300 contact hours.

9- Academic degree Requirements

The curriculum of all academic programs in the institute includes the following group of courses:

(a) Institute requirements (Mandatory General Engineering): Is a group of 60 contact hours courses to develop the personality of students. They must be completed by all students as part of the graduation requirements for the chosen field of specialization.

(b) Program requirements (Mandatory Electrical Engineering): are 224 contact hours group courses to develop the specialty of students according to Electrical Engineering discipline

(b) Program requirements (Elective Electrical Engineering): are 16 contact hours group courses to develop the specialty of students according to Electrical Engineering discipline .

10-Student Assessment (Methods and rules for student assessment)

Intended Learning Outcomes	Assessment methods								
	Written exam	Online exam	Oral Exam	Mid Term Exam	Attendance	Project	Report and sheet	Laboratory exam	Quiz
A-Knowledge and Understanding	√	√	√	√		√	√	√	√
B- Intellectual Skills	√	√	√	√		√	√	√	√

C-Practical and Professional Skills	√	√	√	√		√	√	√	√
D-General and Transferable Skills			√		√	√	√		

11. Program Evaluation Methods:

	Evaluator	Method	Sample
1	Senior Students	Questionnaire and brain storming	40 %
2	Alumni	Questionnaire	20 -30
3	Stakeholders	Questionnaire, meetings and discussions	Representative sample
4	External evaluator	Provide reports after site visit and document examination	1
5	Internal evaluators for courses	Provide reports after document examination	1

Program Coordinator and **Institute Dean**

Assoc. Prof. Dr. Somaya Kayed **Prof. Dr. Esam Khalifa**

Signature: **Signature:**

Date: 1/ 9/2021

Prepared concerning NAQAAE form No. 13