



Computer and Control Engineering

Program Specification

2019 - 2020

Computer and Control Engineering

Program Specification

According to 2013 Regulation

Administrative Information

Program title	Computer and Computer Engineering, CCE
Program type	Single
Award / degree	B.Sc. Degree
Dept. (s) responsible	Communication and Computer Engineering
Coordinator	Head of communication and computer engineering department Prof .Dr. Salah Alagooz.
Assistant Co-ordinator:	Dr. Mohamed Abdelhamed
External evaluator	Prof Dr: Abdelwahab Kamel Electronics and communication engineering Dept., Benha University
Date of most recent approval of program specification by the Department council	Department council's in 9/2019

1. General

1.1. Basic Information

- **Program Title:** Computer and Control Engineering Program
- **Program Type:** Single
- **Department:** Communication and Computer Engineering Department
- **Coordinator:** Prof. Salah Elagooz
- **Assistant Co-ordinator:** Dr. Mohamed Abdelhamed
- **Year of operation:** 2019-2020
- **Dates of program specifications approval:** 2013

1.2 Staff Members

The Computer and Control Engineering Program is taught by (25) highly qualified staff members,(9) of them are full time employed and (5) is part time staff member,in addition to (11) full time employed staff members for teaching the basic science courses.

(Appendix 1)

1.3 External Evaluators:

The program was evaluated by external evaluator Prof. Abdelwahab Kamel The evaluation showed that the program specification agrees with the National Academic Reference Standards However, the reviewer gave objective comments, which were taken into consideration in the final version of the program specifications. The reviewers' reports and response to their comments are printed in separate volume. (Appendix 2)

2. Professional Information

2.1. Preamble

Engineers solve real-life problems. They find the best solutions through the application of their knowledge, experience and skills. Engineers help to define and refine the way of life by providing innovative, higher-performance, safer, cleaner or more comfortable day-use facilities for human beings. They seek improvement through the processes of invention, design, manufacturing and construction.

2.2. Program Mission and Aims

2.2.1. Program Mission

The mission of the Communications and Computer Engineering Department is to provide education for those students who are able to compete internationally, able to produce creative solutions to the society's needs, conscious to the universal moral values, adherent to the professional ethical code, and to generate and disseminate knowledge and technologies essential to the local and global needs in the field of electronics and communication engineering.

2.2.2. Program Aims

The Computer and Control Engineering Program aims at providing future engineers with appropriate theoretical knowledge and technical skills to respond to professional market demands in the fields of Computer and Control Engineering.

The following are the aimed graduate attributes:

- a) Possess the basic skills and knowledge of the challenges in the areas of communications engineering, electronics, computers and contemporary control engineering.
- b) Apply modern methods in planning, design, implementation, management and construction in the communications engineering, electronics, computers and various modern control engineering systems.
- c) Acquire the communication skills to ensure that the spirit of cooperation and teamwork in multidisciplinary projects.
- d) Develop professional performance and creative thinking and action planning based on community values and ethics of the profession.
- e) Think logically and creatively and to gain the necessary skills in engineering analysis to determine the problem and modeling and then analyze and find the factors and parameters affecting the way to design.
- f) Maintain state of art of the latest developments in the fields of communications, electronics, computers and control engineering, through a re-evaluation study plans and curricula offered periodically.
- g) Create strong relationships with local and regional companies and international institutions to promote and support the process of educational activity in the department.

2.3 The Attributes of an Computer and Control engineer:

- a- a) Apply knowledge of mathematics, science and engineering concepts to the solution of engineering problems.
- b- Design a system; component and process to meet the required needs within realistic constraints.
- c- Design and conduct experiments as well as analyze and interpret data.
- d- Identify, formulate and solve fundamental engineering problems.
- e- Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management.
- f- Work effectively within multi-disciplinary teams.
- g- Communicate effectively.
- h- Consider the impacts of engineering solutions on society & environment.
- i- Demonstrate knowledge of contemporary engineering issues.
- j- Display professional and ethical responsibilities; and contextual understanding
- k- Engage in self- and life- long learning.
- l- Participate in and lead quality improvement projects.
- m- Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting with emphasis on electronic power devices.
- n- Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing.
- o- Deal with the computers hardware, software, operating systems and interfacing.
- p- Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.

2.4 Intended Learning Outcomes (ILO's)

2.4.1. Knowledge and Understanding:

On successful completion of the programmes graduates must be able to demonstrate knowledge and understanding

General	K1	Define concepts and theories of mathematics and sciences, appropriate to the discipline.
	K2	State basics of information and communication technology (ICT).
	K3	Describe characteristics of engineering materials related to the discipline.
	K4.	Define principles of design including elements design, process and/or a system related to specific disciplines.
	K5	List methodologies of solving engineering problems, data collection and interpretation.
	K6	Recognize quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues
	K7	List business and management principles relevant to engineering.
	K8	Label current engineering technologies as related to disciplines
	K9	Recognize topics related to humanitarian interests and moral issues.
	K10	Describe technical language and report writing.
	K11	Define the Professional ethics and impacts of engineering solutions on society and environment.
	K12	Name the Contemporary engineering topics.
Specified	K13	Recall mathematical methods, physical laws and the principles of electronic engineering as applied to information technology and control systems engineering.
	K14	State basics of design and analyzing electronic engineering systems, while considering the constraints of applying inappropriate technology and the needs of commercial risk evaluation.
	K15	Outline Managing and practicing business, including finance, law, marketing and quality control
	K16	Define The professional and ethical responsibilities of the engineer.
	K17	Label The HW/SW systems and interfacing.
	K18	Define The concepts of analog, digital, and industrial control systems
	K19	Recognize The concepts of signal analysis, communication systems, computer networks, digital signals, information processing, and AI applications
	K20	Describe principles in the fields of logic design, machine and programming languages, different data structures, computer organization and architectures, memory hierarchy, advanced computer architectures, embedded systems, operating systems, real-time systems and reliability analysis.
	K21	Reproduce electrical and electronic measurement techniques and measuring instrumentation.
	K22	Recognize technology of data, image and graphics representation and organization on computer storage media.
	K23	Outline quality assessment of computer and control systems.
	K24	Describe principles of design specific to computer and control systems engineering.
	K25	Name broad general education necessary to understand the impact of computer engineering solutions in a global and societal context.

2.4.2. Intellectual Skills:

On successful completion of this programme graduate must be able to:

General	I1	Select appropriate mathematical and computer-based methods for modeling and analyzing problems.
	I2	Select appropriate solutions for engineering problems based on analytical thinking.
	I3	Prepare creative thinking and innovative way in problem solving and design.
	I4	Combine, exchange, and assess different ideas, views, and knowledge from a range of sources.
	I5	Assess and evaluate the characteristics and performance of components, systems and processes.
	I6	Investigate the failure of components, systems, and processes.
	I7	Solve engineering problems, often on the basis of limited and possibly contradicting information.
	I8	Select and appraise appropriate ICT tools to a variety of engineering problems.
	I9	Judge engineering decisions considering balanced costs, benefits, safety, quality, reliability, and environmental impact.
	I10	Incorporate economic, societal, environmental dimensions and risk management in design.
	I11	Analyze results of numerical models and assess their limitations.
	I12	Create systematic and methodic approaches when dealing with new and advancing technology.
Specified	I13	Demonstrate a high level of competence in identifying, defining and solving computers and systems engineering problems.
	I14	Initiate creative thinking for resolving and developing innovative solutions for the practical industrial problems.
	I15	Maintain a sound theoretical approach in dealing with new and advancing technology
	I16	Select and apply appropriate IT tools to a variety of computers and control systems engineering problems.
	I17	Generate an innovative design to solve a problem containing a range of commercial and industrial constraint
	I18	Evaluate different techniques and strategies for solving computers and systems engineering problems.

2.4.3. Professional and Practical Skills:

On successful completion of the programmes, students must be able to:

General	P1	Apply knowledge of mathematics, science, information technology, design, business context and engineering practice integrally to solve engineering problems.
	P2	Use the professional merge of the engineering knowledge, understanding, and feedback to improve design, products and/or services.
	P3	Create and/or re-design a process, component or system, and carry out specialized engineering designs.
	P4	Practice the neatness and aesthetics in design and approach.
	P5	Use computational facilities and techniques, measuring instruments, workshops and laboratory equipment to design experiments, collect, analyze and interpret results
	P6	Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline and develop required computer programs.
	P7	Apply numerical modeling methods to engineering problems.
	P8	Apply safe systems at work and observe the appropriate steps to manage risks.
	P9	Demonstrate basic organizational and project management skills.
	P10	Apply quality assurance procedures and follow codes and standards
	P11	Exchange knowledge and skills with engineering community and industry.
	P12	Prepare and present technical reports.
Specified	P13	Practice computer programming for the design of analogue and digital communication systems, and coding, decoding techniques.
	P14	Use and troubleshoot, maintain and repair different types of electronic and communication systems using the standard tools.
	P15	Identify appropriate specifications for required devices and systems.
	P16	Use appropriate devices and tools to measure electronic and communication systems performance and parameters.
	P17	Prepare models and implement communications and electronic systems for certain specific function using the relevant laboratory equipment and analyze the results correctly.
	P18	Utilize project management methods

2.4.4. General and Transferable Skills:

On successful completion of the programmes, students must acquire the following:

General	T1	Demonstrate efficient IT capability.
	T2	Collaborate effectively within multidisciplinary team.
	T3	Communicate effectively.
	T4	Work in stressful environment and within constrains.
	T5	Lead and motivate individuals.
	T6	Effectively manage tasks, time, and resources.
	T7	Search for information and engage in life-long self-learning discipline.
	T8	Acquire entrepreneurial skills
	T9	Refer to relevant literatures.

2.5 Curriculum Structure and Contents

2.5.1 Program Content:

The following are the subjects taught during this program

Prep. Year / 1st Semester

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
PHM 011	Mathematics (1)	2	2	-	4	3	2	60	-	90	150		√					
PHM 031	Mechanics (1)	2	2	-	4	3	2	60	-	90	150		√					
PHM 021	Physics (1)	2	1	1	4	2	2	30	30	40	100		√					
ARC 011	Engineering drawing & Projection (1)	1	3	-	4	2	2	50	-	50	100			√				
HUM 021	Production Technology	1	1	2	4	2	2	30	30	40	100			√				
Hum 021	History of engineering and technology	2	-	-	2	2	2	30	-	70	100	√						
CHE 001	Chemistry (1)	2	1	1	4	2	2	30	30	40	100		√					
HUM 011	Technical English language (1)	-	2	2	4	1	1	15	15	20	50	√						
Total		12	12	6	30	17	15	305	105	440	850	3	10	4	-	-	-	-

Prep. Year/ 2nd Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
PHM 012	Mathematics (2)	2	2	-	4	3	2	60	-	90	150		√					
PHM 032	Mechanics (2)	2	2	-	4	3	2	60	-	90	150		√					
PHM 022	Physics (2)	2	1	1	4	2	2	30	30	40	100		√					
ARC 012	Engineering drawing & Projection (2)	1	3	4	8	3	2	45	45	60	150			√(2)		√(1)		
HUM 012	Technical English language (2)	-	2	2	4	1	1	15	15	20	50	√						
ECE 001	International Computer Driving License (ICDL)	-	-	4	4	1	2	15	15	20	50					√		
SCX 0P1	Selective Course (1)	2	1	1	4	2	2	30	30	40	100			√				
SCX 0P2	Selective Course (2)	2	1	-	3	2	2	40	-	60	100			√				
Total		11	12	12	35	17	15	295	135	420	850	1	8	6	-	2	-	-

First Year / 1st Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 141	Circuits (2)	2	2	-	4	3	2	30	40	80	150			√				
ECE 111	Electronics (2)	2	1	1	4	2	2	30	30	40	100			√				
ECE 121	Measurements and Laboratory (1)	2	-	2	4	2	2	20	40	40	100			√				
PHM 110	Mathematics (3)	2	2	-	4	3	2	60	-	90	150		√					
PHM 121	Physics (3)	2	1	1	4	2	2	20	20	60	100		√					
ECE 143	Mechanical Engineering (1)	2	-	2	4	2	2	30	30	40	100			√				
ECE 191	Information Technology	2	-	2	4	2	2	30	30	40	100					√		
Total		17	6	8	28	16	14	220	190	390	800	-	5	9	-	2	-	-

First Year / 2nd Semester

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 122	Measurements and Laboratory (2)	2	-	2	4	2	2	20	40	40	100			√				
PHM 111	Mathematics (4)	2	2	-	4	3	2	60	-	90	150		√					
PHM 122	Physics (4)	2	2	1	5	3	2	30	30	90	150		√					
ECE 144	Mechanical Engineering (2)	2	-	2	4	2	2	30	30	40	100			√				
ECE 181	Training Project (1)	-	2	-	2	1	-	-	50	-	50						√	
ECP1 03	Logic design	2	2	2	6	3	2	40	40	70	150					√		
HUM 101	Selective Course (Humanities (1))	2	1	-	3	2	2	30	-	70	100	√						
Total		12	9	7	28	16	12	210	190	400	800	2	6	4	-	3	1	-

First Year / 3rd Semester (summer)

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 13X	Practical field training (1)	-	-	3	3	1	-	25	25	-	50						√	
ECE 182	Training Project (2)	-	2	-	2	1	-	-	50	-	50						√	
Total		-	2	3	5	2	-	25	75	-	100	-	-	-	-	-	2	-

Second Year/ 1st Semester

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 261	Electrical and Magnetic Fields (1)	2	1	-	3	2	2	40	-	60	100				√			
ECE 223	Measurements and Laboratory (3)	1	-	2	3	1	2	15	15	20	50			√				
ECE 213	Electronics (3)	2	1	1	4	2	2	30	30	40	100			√				
PHM 211	Mathematics (5)	2	2	-	4	3	2	60	-	90	150		√					
ECE 283	Training Project (3)	-	2	-	2	1	-	-	50	-	50						√	
ECE 291	Microprocessors	2	2	2	6	3	2	40	60	50	150					√		
ECE 242	Circuits (3)	2	2	2	6	3	2	40	40	70	150			√				
HUM 203	Technical written reports	2	1	-	3	2	2	30	-	70	100	√						
Total		13	11	7	31	17	14	255	195	400	850	2	3	6	2	3	1	-

Second Year/ 2nd Semester

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 262	Electrical and Magnetic Fields (2)	2	1	-	3	2	2	40	-	60	100				√			
ECE 224	Measurements and Laboratory (4)	1	-	2	3	1	2	15	15	20	50			√				
ECE 214	Electronics (4)	2	1	1	4	2	2	30	20	50	100			√				
PHM 212	Mathematics (6)	2	1	-	3	2	2	40	-	60	100		√					
ECE 251	Electrical Signal Analysis	2	-	2	4	2	2	40	-	60	100				√			
ECE 231	Dynamics system and control	2	2	-	4	3	2	60	-	90	150			√				
ECE 292	Computer Engineering (1)	2	-	4	6	3	2	45	45	60	150					√		
Total		13	5	9	27	15	14	270	80	400	750	-	2	6	4	3	-	-

Second Year/ 3rd Semester (Summer Course)

Code	Course Name	Teaching Hours						Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours	Written Exam Duration	Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
ECE 23X	Practical Field training (2)	-	-	3	3	1	-	25	25	-	50						√	
ECE 284	Training Project (4)	-	2	-	2	1	-	-	50	-	50						√	
Total		-	2	3	5	2	-	25	75	-	100	-	-	-	-	-	2	-

Third Year/ 1st Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
CCE 351	Communications (1)	2	0	2	4	2	2	30	30	40	100				√			
CCE 371	Automatic Control	2	-	2	4	2	2	40	-	60	100				√			
CCE 391	Computer Architecture (1)	2	2	2	6	3	2	45	45	60	150					√		
CCE 392	Software Engineering	2	2	2	6	3	2	45	45	60	150					√		
CCE 393	Computer Eng. (2)	2	-	2	4	2	-	30	30	40	100					√		
CCE 317	Computer Aided Design (CAD)	1	-	2	3	1	2	15	15	20	50					√		
EPM 305	Power Eng. And Electrical Machines (1)	2	-	2	4	2	2	30	30	40	100				√			
HUM 3XX	Humanities Optional (2)	2	1	-	3	2	2	30	-	70	100	√						
Totals		15	5	14	34	17	14	265	195	390	850	2	-	-	6	9	-	-

Third Year/ 2nd Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
CCE 352	Communications (2)	2	-	2	4	2	2	30	30	40	100				√			
CCE 372	Digital Control	2	-	2	4	2	2	40	-	60	100				√			
CCE 394	Computer Architecture (2)	2	2	2	6	3	2	45	45	60	150					√		
CCE 395	Data Bases	2	-	2	4	2	2	30	30	40	100					√		
CCE 361	Electromagnetic Waves	2	-	2	4	2	2	30	30	40	100				√			
HUM 303	Legislation, Contracts, and Specifications	2	1	-	3	2	-	30	-	70	100	√						
EPM 306	Power Eng. And Electrical Machines (2)	2	-	2	4	2	2	30	30	40	100			√				
Total		14	3	12	29	15	12	235	165	350	750	2	-	2	6	5	-	-

Third Year/ 3rd Semester (Summer Course)

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
CCE 33X	Practical Field Project (3)	-	-	3	3	1	-	25	25	-	50							√
CCE 383	Training Project (5)	-	-	4	4	1	-	0	50	-	50							√
Totals		-	-	7	7	2		25	75		100	-	-	-	-	-	-	2

Fourth Year/ 1st Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
CCE 491	Computer Networks (1)	2	1	1	4	2	2	30	30	40	100							√
CCE 4XX ₁	Optional Course (1)	2	-	2	4	2	2	30	30	40	100							√
CCE 4XX ₂	Optional Course (2)	2	-	2	4	2	2	30	30	40	100							√
CCE 411	Data Structures	2	2	2	6	3	2	30	50	70	150					√		
BSM 492	Artificial Intelligence	2	2	-	4	3	2	60	-	90	150							√
HUM 4XX	Humanities Optional (3)	2	1	-	3	2	2	30	-	70	100	√						
CCE 481	Project	2	-	3	5	3	-	50	-	-	50						√	
Totals		14	6	10	30	17	12	260	140	350	750	2	-	-	-	3	3	9

Fourth Year/ 2nd Semester

Code	Course Name	Teaching Hours					Written Exam Duration	Marking				Subject Area						
		Lectures	Exercises	Practical	Total hours	Credit Hours		Year work	Practical Exam	Written Exam	Total	Hum. & Soc. Sc.	Math. & B. Sc.	B. Eng. Sc.	App. Eng. & Des.	Comp. App. & ICT	Proj. & Practice	Discretionary
CCE 493	Computer Networks (2)	2	1	1	4	2	2	30	30	40	100							√
CCE 494	Operating Systems	2	1	2	5	3	2	45	45	60	150							√
CCE 495	Computer Drawing Applications	2	2	2	6	3	2	45	45	60	150				√			
CCE 4XX ₃	Optional Course (3)	2	-	2	4	2	2	30	30	40	100							√
CCE 4XX ₄	Optional Course (4)	2	-	2	4	2	2	30	30	40	100							√
HUM 442	Project Management	2	1	-	3	2	2	30	-	70	100						√	
CCE 482	Project	2	-	3	5	3	-	70	180	-	250						√	
Totals		14	5	12	31	17	12	280	360	310	950	-	-	-	-	3	5	9