قسم هندسة الاتصالات

والالكترونيات

➢ المرفقات:

- توصيف البرنامج.
- مصفوفة البرامج.
- مجالس تبني المعايير الأكاديمية:
  1. مجلس قسم هندسة الاتصالات والالكترونيات لتبني المعايير الأكاديمية NARS 2018 .
  2. اعتماد توصيف البرنامج والمقررات من مجلس القسم.
  3. مجلس الكلية لتبني المعايير الأكاديمية NARS 2018 لكل الأقسام العلمية.
  4. مجلس الجامعة لتبني المعايير لكل الأقسام.
- توصيف المقررات.

توصيف البرنامج

Program Specification
Port Said University
Faculty of Engineering, Port-Said

A- Basic Information

1	**Program title**	:	B. Sc. in Electrical Engineering (Specialisation: Electronics and Communications Engineering)
2	**Program type**	:	Single
3	**Department**	:	Electrical Engineering
4	**Program coordinator**	:	Dr. Rania Abdallah
5	**Internal Evaluator**	:	Prof. Dr. Rawya Yehia Rezk
6	**External Evaluator**	:	Prof. Dr. El-sayed El-Rabaie
7	**Last date of program specifications approval**	:	28-3-2021

B- Professional Information

1. Program Amis:

The Electronics and Communication Engineering program aims to provide prospective engineers with appropriate theoretical knowledge, basic science, humanities, and technical skills which allow the graduates to work efficiently in local and international markets and to display basic competency in each of the technical areas identified as essential to electronics and communications engineers. Demand core courses are offered in the field of integrated electronic circuits, electronic data storage, high-speed computing, communications, microwave, wave propagation and antenna, optoelectronics, automation, automatic control and monitoring systems, network analysis, digital signal processing, and microprocessors.

After completing the program, the Electronics and Communications Engineering graduate will be able to:

1) Apply knowledge of mathematics, basic sciences and engineering principles to solve, analysis, and interpret data related to a wide spectrum of electronics and communications engineering problems.
2) Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
3) Work in and lead a heterogeneous groups of engineers and technicians in different

specialties and display leadership qualities, business administration, and entrepreneurial skills.

4) Use contemporary engineering tools, techniques, and skills for engineering practice and project management.

5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to contribute to developing, promoting, and facing challenges in the contemporary engineering issues.

6) Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting.

7) Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing and deal with the computer hardware, software, operating systems and interfacing.

8) Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.

9) Model, analyze, design and build photonic, microwave components and systems

2. Graduate Attributes with Program Aims

Graduates Attributes		Program Aims
Attributes of Engineer	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.	1) Apply knowledge of mathematics, basic sciences and engineering principles to solve, analysis, and interpret data related to a wide spectrum of electronics and communications engineering problems.
	3. Behave professionally and adhere to engineering ethics and standards. 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	2) Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

	sustainability principles.	
	4. Work in and lead a heterogeneous team of professionals from different engineering specialties and assume responsibility for own and team performance. 10. Demonstrate leadership qualities, business administration and entrepreneurial skills.	3) Work in and lead a heterogeneous groups of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.
	7. Use techniques, skills and modern engineering tools necessary for engineering practice.	4) Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
	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.	5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to contribute to developing, promoting, and facing challenges in the contemporary engineering issues.
	11. Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting.	6) Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and design, to the troubleshooting.
	12. Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing. 13. Deal with the computer hardware, software, operating systems and interfacing.	7) Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing and deal with the computer hardware, software, operating systems and interfacing.
	14. Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.	8) Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.
	15. Model, analyze, design and build photonic, microwave components and systems	9) Model, analyze, design and build photonic, microwave components and systems

3. The Academic Reference (NARS 2018) for the Program

3.1 Competencies of Engineering Graduate (Level A)

The Engineering Graduate must be able to:

A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.

A2. 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.

A3. 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.

A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.

A5. Practice research techniques and methods of investigation as an inherent part of learning.

A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.

A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.

A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.

A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.

3.2 Competencies of Electrical Engineering Graduate (Level B)

In addition to the Competencies for All Engineering Programs the basic Electrical Engineering graduate must be able to:

B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems

B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.

B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.

B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.

3.3 Competencies of Electronics and Communications Program Graduate (Level C)

In addition to the competences for all Engineering Programs (A-Level) and the competencies for the Electrical Engineering Discipline (B-Level), the Electronics and Communications Program graduate must be able to (C-Level):

C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.

C2. Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance

C3. Design and compare between alternative components and systems in Electronics and Communications Engineering

C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.

C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.

C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.

C7. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering as listed below.

	Concentration	
1	Electronics	C7a. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.
2	Microwave and Photonics	C7b. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems
3	Communication Engineering	C7c. Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks

4. Benchmarks and Academic Reference Standards

The external references for standards considered in the development of this program were the National Academic Reference Standards for Engineering (NARS 2018).

5. The Academic Reference and Program Aims

The following table explains how the competencies of the current program achieve the program aims:

Academic Reference	Program Aims
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics. A2. 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. C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	1) Apply knowledge of mathematics, basic sciences and engineering principles to solve, analysis, and interpret data related to a wide spectrum of electronics and communications engineering problems.
A3. 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. A4. Utilize contemporary technologies, codes of	2) Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and

practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles. B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	sustainability.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams. A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools. A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	3) Work in and lead a heterogeneous groups of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	4) Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
A5. Practice research techniques and methods of investigation as an inherent part of learning. A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies. C5: Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	5) Master self-learning and life -long learning strategies to communicate effectively using different modes, tools, and languages to contribute to developing, promoting, and facing challenges in the contemporary engineering issues.
B2. Design, model and analyze an electrical/electronic/digital system or component fora specific application; and identify the tools required to optimize this design.	6) Manipulate with the electronic circuits, all the way from the discrete components level, circuits' analysis and

C3: Design and compare between alternative components and systems in Electronics and Communications Engineering. C7. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering.	design, to the troubleshooting.
B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems. C2. Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance. C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems. C7. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering.	7) Apply control theory and measurement principals for industrial variables, signal conversion, conditioning and processing and deal with the computer hardware, software, operating systems and interfacing.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools. C4: Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering. C7. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering.	8) Design, operate and maintain digital and analog communication, mobile communication, coding, and decoding systems.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and	9) Model, analyze, design and build photonic, microwave components and

Communications Engineering. C7. Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering.	systems

6. Program Structure

6. a- Program duration: 5 Years

6. b- Program structure: Table (a)

Table (a)
Courses Teaching Hours According to Academic Year

Year	No. hours/week				Average hours/week		Total 30/week
	First Term 15 weeks		Second Term 15 weeks				
	Lecture	Ex./ Lab.	Lecture	Ex./ Lab.	Lecture	Ex./ Lab.	
Preparatory	13	11	13	13	13	12	25
First	14	12	13	11	14	11	25
Second	١٣	12	14	11	13	12	25
Third	12	14	12	12	12	13	25
Fourth	12	14	10	14	11	14	25
Total	65	62	62	62	63	62	125

- **No. of hours per week (Third): Compulsory** 21 **Elective** 4

  (Fourth): Compulsory 17 **Elective** 8

7. Program Courses

- **Preparatory (1st Semester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI001	Mathematics (1)	٢	٢	-	٤	٣٠	-	٧٠	١٠٠	٣
SCI002	Mechanics (1)	٢	٢	-	٤	٣٠	-	٧٠	١٠٠	٣
SCI003	Physics (1)	٢	١	١	٤	٢٠	٢٠	٦٠	١٠٠	٣
SCI004	Chemical Engineering	٢	-	٢	٤	٢٠	٢٠	٦٠	١٠٠	٣
PRD002	Engineering Drawing and Geometric Projection (1)	١	٣	-	٤	٣٠	-	٧٠	١٠٠	٣
HUU001	Technical English Language	٢	-	-	٢	١٠	-	٤٠	٥٠	٢
HUF002	Engineering and technology History	٢	-	-	٢	١٠	-	٤٠	٥٠	٢
Total		١٣	8	3	24				600	

* Gathered as one course at the end of the year.

- **Preparatory (2ndSemester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI005	Mathematics (2)	٢	٢	-	٤	٣٠	-	٧٠	١٠٠	٣
SCI006	Mechanics (2)	٢	٢	-	٤	٣٠	-	٧٠	١٠٠	٣
SCI007	Physics (2)	٢	١	١	٤	٢٠	٢٠	٦٠	١٠٠	٣
PRD001	Production Technology	٢	-	٢	٤	٢٠	٢٠	٦٠	١٠٠	٣
PRD003	Engineering Drawing and Geometric Projection (1)	١	٣	-	٤	٣٠	-	٧٠	١٠٠	٣
CCE001	Computer and Programming	٢	-	٢	٤	٢٠	٢٠	٦٠	١٠٠	٣
HUU002	Human Rights	٢	-	-	٢	١٠	-	٤٠	٥٠	٢
Total		١٣	8	٥	٢٦				6٥0	

* Gathered as one course at the end of the year.

❖ **Classification of preparatory year courses contents according to NARS**

No.	Course Code	Course Name	Classification of Course Contents According to NARS						
			A	B	C	D	E	F	G
١	SCI001	Mathematics (1)		٤					
٢	SCI002	Mechanics (1)		٤					
٣	SCI003	Physics (1)		٤					
٤	SCI004	Chemical Engineering		٤					
٥	PRD002	Engineering Drawing and Geometric Projection			3		1		
٦	HUU001	Technical English Language	٢						
٧	HUF001	Engineering and technology History	٢						
٨	SCI005	Mathematics (2)		٤					
٩	SCI006	Mechanics (2)		٤					
١٠	SCI007	Physics (2)		٤					
١١	PRD001	Production Technology			٤				
12	PRD003	Engineering Drawing and Geometric Projection			3		1		
١٣	CCE001	Computer and Programming					٤		
١٤	HUU002	Human Rights	٢						

- **First Year (1st Semester)**

r s e C	Course Title	Weekly Hours	Grading (Marks)	E x

		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI108	Mathematics (3-A)	2	2	---	4	30	---	70	100	3
SCI114	Physics (3-A)	2	---	2	4	20	20	60	100	3
CCE102	Introduction to Programming	2	---	2	4	20	20	60	100	3
CCE103	Logic Circuits (1)	2	1	1	4	20	20	60	100	3
EPM101	Electrical Circuits (1)	2	1	1	4	20	20	60	100	3
MPE108	Fluid Mechanics and Thermodynamics	2	1	1	4	20	20	60	100	3
HUU103	Development of Thinking Skills	2	---	---	2	10	---	40	50	2
Total		**14**	**5**	**7**	**26**				**650**	

- **First Year (2nd Semester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI118	Mathematics (4-A)	2	2	---	4	30	---	70	100	3
ECE101	Measurements and Tests	---	---	2	2	---	25	25	50	2
ECE102	Electronic Materials and Devices	2	---	2	4	20	20	60	100	3
ECE103	Electromagnetic Field Theory	3	1	---	4	30	---	70	100	3
EPM102	Electrical Circuits (2)	2	1	1	4	20	20	60	100	3
CIV107	Civil Engineering	2	2	---	4	30	---	70	100	3
HUF102	Technical Reporting	2	---	---	2	10	---	40	50	2
Total		**13**	**6**	**5**	**24**				**600**	

❖ Classification of First year courses contents according to NARS

No.	Course Code	Course Name	Classification of Course Contents According to NARS						
			A	B	C	D	E	F	G
١٥	SCI108	Mathematics (3-A)		٤					
١٦	SCI114	Physics (3-A)		٤					
١٧	CCE102	Introduction to Programming			٤				
١٨	CCE103	Logic Circuits (1)			٤				
١٩	EPM101	Electrical Circuits (1)			٤				
٢٠	MEP108	Fluid Mechanics and Thermodynamics			٤				
٢١	HUU103	Development of Thinking Skills	٢						
٢٢	SCI118	Mathematics (4-A)		٤					
٢٣	ECE101	Measurements and Tests						٢	
٢٤	EPM102	Electronic Materials and Devices			٤				
٢٥	ECE103	Electromagnetic Field Theory			٤				
٢٦	ECE102	Electrical Circuits (2)			٤				
٢٧	CIV107	Civil Engineering			4				
٢٨	HUF102	Technical Reporting	٢						

- **Second Year (1st Semester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI226	Mathematics(5-A)	2	2	---	4	30	---	70	100	3
ECE204	Electronic Circuits	2	1	1	4	20	20	60	100	3
ECE205	Electromagnetic Waves	3	2	---	5	40	---	85	125	3
ECE206	Summer Training (1)**	---	--	2	2	---	50	---	50	---
EPM211	Electrical Power and Machines	2	2	---	4	30	---	70	100	3
CCE204	Logic Circuits (2)	2	1	1	4	20	20	60	100	3
HUU204	Administration and Marketing	2	--	---	2	10	---	40	50	2
Total		**13**	**8**	**4**	**25**				**625**	

- Second Year (2nd Semester)

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
SCI230	Engineering Statistics and Probability	2	2	---	4	30	---	70	100	3
ECE207	Signal and System Analysis	2	1	2	5	25	25	75	125	3
CCE207	Numerical Analysis and Programming	2	1	1	4	20	20	60	100	3
CCE208	Computer Architecture	2	---	2	4	20	20	60	100	3
CCE210	Introduction to Database	2	---	2	4	20	20	60	100	3
HUF203	Engineering Applications in Marine Environment	2	---	---	2	10	---	40	50	2
HUF204	Environmental Science and Occupational Safety	2	---	---	2	10	---	40	50	2
Total		**14**	**4**	**7**	**25**				**625**	

** Summer practical training after completion of First Year.

❖ Classification of Second year courses contents according to NARS

No.	Course Code	Course Name	Classification of Course Contents According to NARS						
			A	B	C	D	E	F	G
٢٩	SCI226	Mathematics(5-A)		٤					
٣٠	ECE204	Electronic Circuits			2	2			
٣١	ECE205	Electromagnetic Waves			5				
٣٢	ECE206	Summer Training (1)						2	
٣٣	EPM211	Electrical Power and Machines			4				
٣٤	CCE20٤	Logic Circuits (2)				4			
٣٥	HUU20٤	Administration and Marketing	٢						
٣٦	SCI230	Engineering Statistics and Probability		٤					
٣٧	ECE207	Signal and System Analysis		٥					
٣٨	CCE207	Numerical Analysis and Programming		3			1		
٣٩	CCE208	Computer Architecture					٤		
٤٠	CCE210	Introduction to Database					4		
٤١	HUF203	Engineering Applications in Marine Environment							٢
٤٢	HUF204	Environmental Science and Occupational Safety	٢						

- **Third Year (1st Semester)**

no rs e C od	Course Title	Weekly Hours	Grading (Marks)	xa

		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
ECE308	Design of Analog Filters	2	1	1	4	20	20	60	100	3
ECE309	Communications Theory	2	1	1	4	20	20	60	100	3
ECE310	Summer Training (2)***	---	---	2	2	---	50	---	50	---
ECE311	Electronics Laboratory	---	---	2	2	---	25	25	50	2
XXX3XX	Elective Course (1)	2	---	2	4	20	20	60	100	3
CCE311	Microprocessors and Their Applications	2	---	2	4	20	20	60	100	3
CCE313	Fundamentals of Computer Networks	2	1	1	4	20	20	60	100	3
HUU305	Leadership Skills	2	---	---	2	10	---	40	50	2
Total		**12**	**3**	**11**	**26**				**650**	

- **Third Year (2ndSemester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
ECE312	Digital Signal Processing	2	1	1	4	20	20	60	100	3
ECE313	Microwave Engineering	2	1	1	4	20	20	60	100	3
ECE314	Digital Communications	2	1	1	4	20	20	60	100	3
ECE3XX	Elective Course (2)	2	2	---	4	30	---	70	100	3
CCE315	Computer Network Laboratory	---	---	2	2	---	25	25	50	2
CCE318	Automatic Control	2	1	1	4	20	20	60	100	3
HUF305	Presentation Skills	2	---	---	2	10	---	40	50	2
Total		**12**	**6**	**6**	**24**				**600**	

- *****Summer practical training after completion of second year.**

❖ **Classification of Third year courses contents according to NARS**

No.	Course Code	Course Name	Classification of Course Contents According to NARS						
			A	B	C	D	E	F	G
43	ECE3٠٨	Design of Analog Filters				٣		١	
44	ECE309	Communications Theory			٢	2			
45	ECE310	Summer Training (2)						٢	
46	ECE311	Electronics Laboratory						٢	
٤٧	CCEXXX	Elective Course (1)							٤
48	CCE31١	Microprocessors and Their Applications				٢	١	١	
49	CCE3١٣	Fundamentals of Computer Networks					٤		
٥٠	HUU305	Leadership Skills	٢						
٥١	ECE312	Digital Signal Processing				٢	٢		
52	ECE313	Microwave Engineering				٣		١	
53	ECE314	Digital Communications				٣		١	
54	ECE3XX	Elective Course (2)				٤			
55	CCE315	Computer Network Laboratory						٢	
56	CCE31٨	Automatic Control			٤				
٥٧	HUF305	Presentation Skills	٢						

- **Fourth Year (1st Semester)**

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
ECE418	Antennas and Wave Propagation	2	1	1	4	20	20	60	100	3
ECE419	Digital Integrated Circuits	2	1	1	4	20	20	60	100	3
ECE420	Wireless Communications	2	2	---	4	30	---	70	100	3
ECE421	Communications and Signal Processing Laboratory	---	---	2	2	---	25	25	50	2
CCE4XX	Elective Course (3)	2	1	1	4	20	20	60	100	3
ECE4XX	Elective Course (4)	2	2	---	4	30	---	70	100	3
HUD405	Innovation and Entrepreneurship	2	--	---	2	10	---	40	50	2
ECE422	Project	---	--	2	2	---	---	---	Continuous	
Total		12	7	7	26				600	

- Fourth Year (2^{nd} Semester)

Course Code	Course Title	Weekly Hours				Grading (Marks)				Final Exam Time
		Lecture	Tutorial	Practical Application (Lab)	Total	Class Work	Oral or Practical Test	Final Exam	Total	
ECE423	Communications Electronics	2	2	---	4	30	---	70	100	3
ECE424	Communications Systems	2	2	---	4	30	---	70	100	3
ECE425	Analog Integrated Circuits	2	1	1	4	20	20	60	100	3
XXX4XX	Elective Course (5)	2	1	1	4	20	20	60	100	3
ECE4XX	Elective Course (6)	2	2	---	4	30	---	70	100	3
ECE422	Project	---	---	4	4	60	90	---	150	---
Total		10	8	6	24				650	

❖ Classification of Third year courses contents according to NARS

No.	Course Code	Course Name	Classification of Course Contents According to NARS						
			A	B	C	D	E	F	G
٥٨	ECE418	Antennas and Wave Propagation				٣		١	
50	ECE419	Digital Integrated Circuits				٣		١	
60	ECE420	Wireless Communications				٤			
61	ECE421	Communications and Signal Processing Laboratory						٢	
62	CCE4XX	Elective Course (3)							٤
63	ECE4XX	Elective Course (4)				٤			
64	HUD405	Innovation and Entrepreneurship	٢						
65	ECE423	Communications Electronics				٤			
٦٦	ECE424	Communications Systems				٤			
٦٧	ECE425	Analog Integrated Circuits				٣		١	
٦٨	XXX4XX	Elective Course (5)							٤
٦٩	ECE4XX	Elective Course (6)				٤			
٧٠	ECE422	Project						٦	

❖ Classification of courses contents according to NARS for all program

Classification of Course Contents According to NARS	A	B	C	D	E	F	G
% NARS	(9-12)%	(20-26)%	(20-23)%	(20-22)%	(9-11)%	(8-10)%	(6-8)%
Hours	20	56	55	54	26	25	14
Bylaw %	8	22.4	22	21.6	10.4	10	5.6
Matching	Accepted	Matched	Matched	Matched	Matched	Matched	Accepted

A. Humanities and Social Science, University Requirements.
B. Mathematics and Basic Sciences.
C. Basic Engineering Sciences.
D. Applied Engineering and Design.
E. Computer Applications and ICT.
F. Projects and Practice.
G. Discretionary Subjects.

- **Practical/Field Training:**

1. **Summer engineering drawing training in the first year.**

2. **Field training in the second year.**

Elective Courses' List

First Group – Non Major Elective Courses

***Student should elect one group.**

Group	Elective Course (1) 3rd Year Semester (1)	Elective Course (3) 4th Year Semester (1)	Elective Course (5) 4th Year Semester (2)
Group (A) Computer Networks	Advanced Programming Techniques CCE322	Advanced Computer Networks CCE433	Wireless Computer Networks CCE428
Group (B) Programming	Advanced Programming Techniques CCE322	Web Applications Design CCE423	Portable Computers Programming Applications CCE436
Group (C) Power and Machines (Control)	Power Electronics (1) EPM319	Control Systems CCE425	Industrial Process Control EPM435

Second Group – Major Elective Courses

***Student should elect one group.**

Group	Elective Course (2) 3rd Year Semester (2)	Elective Course (4) 4th Year Semester (1)	Elective Course (6) 4th Year Semester (2)
Group (A) Advanced Communications	Navigation and Satellite Communications ECE315	Mobile Communications ECE426	Selected Topics in Electronics ECE429
Group (B) Electro physics	Optical Electronics ECE316	Optical Communications ECE427	Acoustics ECE430
Group (C) Electronics	Nano Devices ECE317	Selected Topics in Electronics ECE428	VLSI Circuits ECE431

***Student can select subgroup (A) or (B) from the first group that differs from the second group.**

8. Program admission requirements

- **Admission to the preparatory year:** Having Egyptian Secondary education or equivalent certificate with major in Mathematics with the minimum grades determined by the National Admission Office. More details can be found in undergraduate bylaw 2014.
- **Admission to the Electronic and Communication program:** According to the regulations set by the Faculty Council which depending on student grades in the preparatory year.
- More details can be found in undergraduate bylaw (2014).

9. Regulations for progression and program completion

- **All Years (except the last year)**
  The student is considered successful if he passes the examinations in all courses of his class.
  - The student must get a minimum of 50% to pass each course and at least 30% from the mark of the final written exam.
  - To pass a level (Year) and promote to the next higher level the student should not fail in more than two courses of his class or from lower classes. 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
  - 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.

- **Last Year**
  - To be graduated, the student must pass all the courses.
  - If he fails in one or two courses, not including the project, he has the opportunity to be retested in September, and he must pass these courses to be graduated.
  - If the student fails in the project; he must repeat it during the next academic year.
- **The Grades of Success:**

  The student achieves one of the following grades in the examinations results and in the general grade according to the marks achieved:
  - 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% of the total mark to less than 50%
  - 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 to 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 not have failed in any examination he has sat in any class other than the preparatory year.
- More details can be found in undergraduate bylaw (2014).

10. Teaching and learning methods

Teaching and Learning Method
1- Lecture (online/in class)
2- Presentation and Movies
3- Discussion
4- Tutorial
5- Problem solving
6- Brain storming
7- Projects
8- Site visits
9- Self learning
10- Cooperative
11- Discovering
12- Computer Simulation
13- Laboratory
14- Other

10.1 Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

11. Teaching and learning method for low capacity and outstanding Student

For low capacity students	Assign a portion of the office hours for those students.
	Give them specific tasks.
	Repeat the explanation of some of the material and tutorials.
	Assign a teaching assistance to follow up the performance of these group of students.
For outstanding Students	Hand out project assignments to those students.
	Give them some research topics to be searched using the internet and conduct presentation.
	Encourage them to take parts in the running research projects.

12. Evaluation methods of students

No.	Method
1	Mid Term Examination (written/ online)
2	Practical Examination
3	Oral Examination
4	Formative (quizzes- online quizzes- presentation - …….)
5	Final Term Examination (written)
6	Graduation Project

13. Evaluation of program learning outcomes

Evaluator	Tool	Sample
1- Senior students	Meeting + questionnaire	
2- Alumni	questionnaire	
3- Stakeholders (Employers)	Site visits	
4-External Evaluator(s) (External Examiner (s)	Evaluation report	
5- Other	---------	------

Head of Department	**Program Coordinator**
Prof. Dr. Rawya Yehia Rizk	**Dr. Rania Mohamed Abdallah**

مصفوفة البرنامج

Electrical Engineering Department Electronics and Communication Program

NARS

2018 Matrix-- Bylaw 2014

Code	Course Name		A-level competencies (Engineering)										B-level competencies (Electrical Engineering)					C-level competencies (Electronics and Communications)						
			A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5	C6	C7
prarpatoray year																								
SCI001	Mathmatics (1)		x	x																				
SCI002	Mechanics (1)		x	x																				
SCI003	Physics (1)		x	x																				
SCI004	Chemical Engineering		x	x						x														
PRD002	Engineering Drawing and Geometric Projection (1)		x		x							x												
HUU001	Technical English Language								x	x														
HUF001	Engineering and technology History								x		x	x												
SCI005	Mathmatics (2)		x	x																				
SCI006	Mechanics (2)		x	x																				
SCI007	Physics (2)		x	x																				
PRD001	Production Technology		x	x		x																		
PRD003	Engineering Drawing and Geometric Projection (2)		x		x							x												
CCE001	Computer and Programming		x		x							x												
HUU002	Human Rights									x	x	x												
First Year																								
SCI108	Mathematics (3-A)		x									x		x										
SCI114	Physics (3-A)		x	x								x		x										
CCE102	Introduction to Programming		x											x	x									
CCE103	Logic Circuits (1)		x	x		x	x	x			x	x		x		x								
EPM101	Electric Circuits (1)		x	x			x	x	x			x		x		x								
MPE108	Fluid Mechanics and Thermodynamics		x	x						x														
HUU103	Development of Thinking Skills									x	x	x												
SCI118	Mathematics (4-A)		x	x								x		x										
ECE101	Measurements and Tests			x				x	x	x					x	x	x							
ECE102	Electronic Materials and Devices		x	x		x		x				x		x		x								
ECE103	Electromagnetic Field Theory		x				x					x		x		x								
EPM102	Electrical Circuits (2)		x	x			x					x	x	x		x								
CIV107	Civil Engineering		x	x								x												
HUF102	Technical Reporting									x		x												
Second Year																								
SCI226	Mathematics(5-A)		x	x								x		x										
ECE204	Electronic Circuits		x	x				x		x		x		x		x								
ECE205	Electromagnetic Waves		x									x		x				x				x		x
ECE206	Summer Training (1)**			x					x	x				x		x			x		x			
EPM211	Electrical Power and Machines		x										x	x	x	x								
CCE204	Logic Circuits (2)			x	x			x			x			x		x							x	
HUU204	Administration and Marketing								x		x	x												
SCI230	Engineering Probability and statistics		x									x		x										
ECE207	Signals and system analysis		x	x			x	x		x				x		x								
CCE207	Numerical analysis and programming		x	x			x				x	x		x									x	
CCE208	Computer architecture			x	x		x					x		x	x	x							x	
CCE210	Introduction to database			x	x									x	x									
HUF203	Engineering applications in Marine environment				x				x			x												
HUF204	Environmental Science and safety					x		x				x												
Third Year																								
ECE308	Design of Analog Filters		x					x				x		x		x			x	x				x
ECE309	Communications Theory		x	x	x		x			x					x	x							x	
ECE310	Summer Training (2)***			x		x			x	x						x	x		x		x			
ECE311	Electronics Laboratory			x		x		x	x			x				x	x						x	
CCE322	Elective Course (1)	Advancrd Programming Tecniques			x								x	x	x								x	
EPM319		Power Electronics			x								x	x	x								x	
CCE311	Microprocessors and Their Applications		x		x	x				x			x	x	x	x	x							
CCE313	Fundamentals of Computer Networks		x	x	x		x			x					x	x							x	
HUU305	Leadership Skills							x	x	x	x													
ECE312	Digital Signal Processing		x	x				x				x		x	x	x							x	
ECE313	Microwave Engineering		x					x				x		x		x				x				x
ECE314	Digital Communications		x	x				x				x		x	x	x							x	
ECE315	Elective Course (2)	Navigation and Satellite Communications	x		x									x				x						x
ECE316		Optical Electronics	x		x									x				x						x
ECE317		Nano Devices	x		x									x				x						x
CCE315	Computer Network Laboratory			x		x						x				x	x						x	
CCE318	Automatic Control		x	x		x								x		x							x	
HUF305	Presentation Skills								x	x	x	x												
Fourth Year																								
ECE418	Antennas and Wave Propagation				x		x	x							x	x		x			x			x
ECE419	Digital Integrated Circuits			x				x				x		x		x			x	x				x
ECE420	Wireless Communications		x			x	x							x	x			x				x		x
ECE421	Communications and Signal Processing Laboratory			x					x			x			x	x				x	x			x
CCE433	Elective course (3)	Advanced Computer Network		x	x							x			x	x							x	
CCE423		Web Applications Design		x	x							x			x	x							x	
CCE425		Control Systems		x	x							x			x	x							x	
ECE426	Elective course (4)	Mobile Communications			x							x		x	x	x		x				x		x
ECE427		Optical Communications			x							x		x	x	x		x				x		x
ECE428		Selected Topics in Electronics			x							x		x	x	x		x				x		x
HUD405	Entrepreneurship and innovation					x			x		x													
ECE423	Communications Electronics				x							x		x	x	x				x		x		x
ECE424	Communications Systems				x							x		x	x				x			x		x
ECE425	Analog Integrated Circuits						x			x				x	x	x				x	x			x
CCE428	Elective course (5)	Wireless Computer Networks		x		x						x		x	x	x							x	
CCE436		Portable Computers Programming Applications		x		x						x		x	x	x							x	
EPM435		Industrial Process Control		x		x						x		x	x	x							x	
ECE429	Elective course (6)	Selected Topics in Communications			x						x	x		x	x			x				x		x
ECE430		Acoustics			x						x	x		x	x			x				x		x
ECE431		VLSI Circuits			x						x	x		x	x			x				x		x
ECE422	Project					x		x	x	x	x	x		x	x	x	x	x	x	x	x	x		x
End of competencies Matrix																								

مجالس تبني المعايير الأكاديمية

سابعا: وحده الجودة والاعتماد

الموضوع الأول :

بشأن تبني (NARS-2018) لتوصيف البرامج والمقررات لمرحلة البكالوريوس لقسم الهندسة الكهربية للائحة 2014 بشعبه الثلاث (قوي وآلات كهربية – حاسبات وتحكم – إلكترونيات واتصالات).

القـــــــــرار: وافق المجلس.

الموضوع الثاني :

بشأن اقتراح المراجعين الداخلين والخارجين لتوصيف البرنامج والمقررات لعام 2021/2020 لمرحلة البكالوريوس لائحة 2014 – بحث يكون المراجع الخارجي.

أ.د. السيد الربيعي من شعبة الكترونيات واتصالات

أ.د. إبراهيم بدران عن شعبة حاسبات وتحكم وشعبة قوي وآلات كهربية

القـــــــــرار: وافق المجلس.

الموضوع الثالث :

بشأن تبني المعايير الأكاديمية القومية القياسية (NARS-2018)الصادرة عن الهيئة القومية لضمان الجودة والاعتماد كمعايير قياسية مرجعية لتوصيف مقررات وبرنامج الهندسة الكهربية بشعبة الثلاث – مرحلة البكالوريوس (لائحة 2014 بقسم الهندسة الكهربية .

القـــــــــرار: وافق المجلس.

الموضوع الرابع :

بخصوص تحديد الجدارات Sub-Specialty Level C الواجب توافرها في خريجي برنامج الهندسة الكهربية بشعبه الثلاث – مرحلة البكالوريوس (لائحة 2014) بقسم الهندسة الكهربية .

القـــــــــرار: وافق المجلس علي الجدارات التالية :

الموضوع الأول:

بشأن إحاطة اللجنة بملاحظات تقرير المراجعة الداخلية للشعب الثلاثة (شعبة الحاسبات والتحكم ، شعبة الكترونيات والاتصالات ، شعبة القوي والآلات كهربية بمعرفة الأستاذ الدكتور،/ راوية يحي رزق – رئيس قسم الهندسة الكهربية كلية الهندسة – جامعة بورسعيد والمراجعة الخارجية بمعرفة الأستاذ الدكتور/ إبراهيم بدران- (شعبة الحاسبات والتحكم وشعبة القوي والآلات الكهربية) الأستاذ الدكتور/ السيد الربيعي شعبة الالكترونيات والاتصالات

القرار: أحيط المجلس علما.

الموضوع الثاني :

بشأن اعتماد التوصيف للبرنامج والمصفوفة والمقررات لبرنامج :شعبة الحاسبات والتحكم طبقا لمعايير(لائحة 2014 – طبقا لـ NARS 2018)بعد الأخذ في الاعتبار رأي المراجع الداخلي والخارجي

القرار: وافق المجلس.

الموضوع الثالث :

بشأن اعتماد التوصيف للبرنامج والمصفوفة والمقررات لبرنامج :شعبة الالكترونيات والاتصالات طبقا لمعايير(لائحة 2014 – طبقا لـ NARS 2018)بعد الأخذ في الاعتبار رأي المراجع الداخلي والخارجي

القرار: وافق المجلس.

تمهيد:

- فى بداية الجلسة رحب السيد أ.د/**حسن محمد حسن**- عميد الكلية بالسادة أعضاء مجلس الكلية
- وتقدم بخالص الشكر لكلا من السادة الاتى اسماؤهم وذلك لعمل فيديو يوضح اهم المواد المتاحة للكلية طبقا لطلب هيئة ضمان الجودة والاعتماد لرفعه ضمن الوثائق المطلوب.
  - **السيدة الدكتوره/هبه عبد العاطى**- مدير وحدة الجودة لاخراج وكتابه التعليق الصوتي.
  - **المهندس/عبد الرحمن احمد صالح** - المعيد بقسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/مؤمن الهوارى**- طالب بالفرقة الثانية قسم الهندسة المدنية لكتابه التعليق الصوتي.
  - **الطالب/شادى عيسي**- طالب بالفرقة الثانية قسم الهندسة المدنية لقيامه بالتصوير والمونتاج.

اولا:المصادقة:-

- **التصديق علي مجلس الكلية الجلسة(٦) والذى عقد بتاريخ ١٤ /٢/٢٠٢١م**

القرار: صادق المجلس

ثانيا: إحاطة المجلس علما بشأن موضوعات اللجان المنبثقة عن مجلس الكلية

الموضوع الاول:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/٢٠٢١م**

القرار: احيط المجلس علماً

الموضوع الثانى:

بشان اقتراح لجنة المختبرات والمعامل المنعقدة بتاريخ ٧ /٣/٢٠٢١م **بالموافقة** على شراء اجهزة ومعدات لمعمل الطاقة الشمسية بقيمة تقديرية فى حدود مبلغ ٣٠٠,٠٠٠ (ثلاثمائة الف جنيها لا غير) وذلك لاهميتها العملية والعلمية لطلاب القسم والعملية التعليمية.

القرار: وافق المجلس

الموضوع الثالث:

بشأن احاطة مجلس الكلية علماً **بموضوعات لجنة المكتبات بتاريخ ٧ /٣/٢٠٢١م**

القرار: احيط المجلس علماً

ثالثا: وحدة توكيد الجودة والاعتماد:

الموضوع الاول :

بشأن عرض معايير NARS 2018 المتبناه للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨ . برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشيد

القرار: وافق المجلس

الموضوع الثانى :

بشأن **الموافقة** على قائمة المراجعين الخارجيين للبرامج الاكاديمية (مرحلة البكالوريوس)٢٠٢٠/٢٠٢١ المرشحين من الاقسام العلمية على النحو التالى:-

القسم	الاسم	الكليه/الجامعة
الهندسة المدنية	أ.د/ابراهيم هاشم	كليه الهندسة-جامعة المنوفيه
الهندسة الكهربية(شعبه قوى كهربيه)	أ.د/ابراهيم بدران	كليه الهندسة-جامعة المنصوره
الهندسة الكهربية(شعبه اتصالات)	أ.د/سيد ربيعي	كليه الهندسة-جامعة المنوفية
الهندسة الكهربية (شعبه حاسبات)	أ.د/ابراهيم بدران	كليه الهندسة- جامعة المنصوره
هندسة الانتاج التصميم الميكانيكي	أ.د/مصطفى شعبان	كليه الهندسة- جامعةعين شمس
الهندسة المعمارية والتخطيط العمراني	أ.د/محمد هشام السعودى	كليه الفنون الجميلة- جامعة الاسكندرية
الهندسة البحرية وعمارة السفن	أ.د/احمد الحيوي	كليه الهندسة-جامعة الاسكندرية
الهندسة الكيميائية	أ.د/فاطمة عاشور	كليه الهندسة-جامعة القاهرة
برنامج الغاز	أ.د/عطية محمد عطية	الجامعة البريطانية
برنامج التشيد	أ.د/ابراهيم هاشم	كليه الهندسة-جامعة منوف
الفيزيقا والرياضيات الهندسية	أ.د/ميرفت ابو الخير	كليه الهندسة – جامعة المنصوره

القرار: وافق المجلس

الموضوع الثالث :

بشأن **الموافقة** على قائمة المراجعين الداخلين للبرامج الاكاديمية (مرحلة البكالوريوس)٢٠٢٠/٢٠٢١ المرشحين من الاقسام العلمية على النحو التالى:-

القسم	الاسم
الهندسة المدنية	أ.د/محمد محمد الغندور
الهندسة الكهربية(شعبه قوى كهربيه)	أ.د/صبحي سرى
الهندسة الكهربية(شعبه اتصالات)	أ.د/راوية يحي رزق
الهندسة الكهربية (شعبه حاسبات)	أ.د/راوية يحى رزق
هندسة الانتاج التصميم الميكانيكي	أ.د/شعبان عبده ابراهيم
الهندسة المعمارية والتخطيط العمراني	أ.د/نجلاء على مجاهد
الهندسة البحرية وعمارة السفن	أ.د/عادل عبد الله توفيق
الهندسة الكيميائية	أ.د/طه ابراهيم فراج
برنامج الغاز	أ.د/ممدوح جاد الله
برنامج التشيد	أ.د/محمد محمد الغندور
الفيزيقا والرياضيات الهندسية	أ.د/يوسف هاشم زهران

القرار: وافق المجلس

رابعا: شئون أعضاء هيئة التدريس

الموضوع الاول:

بشأن اقتراح مجلس قسم هندسة الانتاج والتصميم الميكانيكي بجلسته المنعقدة في ٢٨/٢/٢٠٢١م **بالموافقة** على تعيين المهندسة / **الشيماء جمال عبد الناصر ابراهيم علي عثمان** ــ المدرس المساعد بذات القسم ــ بوظيفة مدرس بالقسم , حيث أنها حصلت على درجة دكتوراه الفلسفة في هندسة الانتاج والتصميم الميكانيكي طبقا لقرار أ .د/ رئيس الجامعة في ٢٥/٢/٢٠٢١م, علما بأنها على رأس العمل وملتزمة في عملها ومسلكها منذ تعيينها بالقسم .

القرار: وافق المجلس

جامعة بورسعيـــد
كلية الهندســــــة

Port Said University
Faculty of Engineering

مكتب عميد الكلية

Dean Office

السيد الأستاذ الدكتور / ايمن محمد ابراهيم

رئيس جامعة بورسعيد

تحية طيبة وبعد ،،،،

نحيط سيادتكم علما بموافقة مجلس الكليه بتاريخ ٢٠٢١/٣/١٣ على تبني معايير NARS 2018 للائحة ٢٠١٤ للاقسام الاتيه:-

١. قسم الهندسة البحرية وعمارة السفن
٢. قسم الهندسة الكهربية(شعبة قوى كهربيه)
٣. قسم الهندسة الكهربية(شعبة اتصالات)
٤. قسم الهندسة الكهربية(شعبة حاسبات)
٥. قسم الهندسة المعمارية والتخطيط العمراني
٦. قسم هندسة الانتاج والتصميم الميكانيكي
٧. قسم الهندسة المدنية
٨. برنامج الغاز
٩. قسم القوى الميكانيكية
١٠. قسم الهندسة الكيميائية
١١. برنامج التشييد

لذا برجاء التكرم بالموافقه على عرض الموضوع على مجلس الجامعة

وتفضلوا بقبول فائق الاحترام ،،

عميد الكلية

٢٩/١٢/٢٠٢١

أ.د / حسن محمد حسن

ت: ٣٤٠٣٤٥٩ -٣ ٤٤٦١٠١ (٠٦٦)
ف: ٣٤٠٠٩٣٦ (٠٦٦

Tel: (02-066) 3403459 -3446101
Fax: (02-066) 3400936
E-mail: dean_office@eng.psu.edu.eg

توصيف المقررات

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	**SCI001**		
Year/ Level	Preparatory- First semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	---

2. Course aims:

No.	Aim
1	Identify the essential knowledge about Calculus and some of its applications (Functions, Limits and continuity, Differentiation, Applications of Differentiation, and Partial Differentiation) and to have knowledge about Analytic Geometry and its applications (straight line, Ellipse, parabola, hyperbola, and circle equations).

3. Learning Outcomes (LOs):

A1.1	Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations.
A1.2	State acquaints with the continuity and different limits.
A1.3	Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola, and circle.
A1.4	Specify the problems to find its solutions.
A1.5	Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs.
A1.6	Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations.
A2.1	Acquire the experience to design differentiation problems and geometric problems and solve them.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Functions. - Limits and Continuity. - Differentiation. **Tutorials:** - Recognize many functions with their graphs and properties. - Evaluate the limits and the continuity of many functions - Solve a variety of differentiation problems.	1-4
2	**Lectures:** - Applications of Differentiation. - Partial Differentiation. **Tutorials:** - Use the textbooks to solve some application of differentiation. - Review solving problem of partial differentiation.	5-8
3	Midterm	9
4	**Lectures:** - Equations of Straight lines. - Circles and their applications. **Tutorials:** - Review examples of Circles and their applications	10-11
5	**Lectures:** - Equations of Ellipse. - Equations of parabola. **Tutorials:** - Solve problem Related to Equations of Ellipse and parabola.	12-14
6	Final Submission	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X					x								
	A1.2	X	x				x								
	A1.3	X		X			x	x							
	A1.4	X		X	x		x								
	A1.5	X	x				x								
	A1.6	X	x				x								
	A2.1	X	x			x	x	x							

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1,3, A1.4, A1.6, A2.1
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A1.3, A1.4, A1.6, A2.1
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.4, A1.5, A1.6, A2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	10
3	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	Reference List
1	Advanced Engineering Mathematics, Erwin Kreyszig, Wiley, 10th edition ,2011
2	William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc edition,2014

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Functions. • Limits and Continuity. • Differentiation. **Tutorial:** • Recognize many functions with their graphs and properties. • Evaluate the limits and the continuity of many functions • Solve a variety of differentiation problems.	1	A1.1, A1.2, A1.4
2	**Lectures:** • Applications of Differentiation. • Partial Differentiation. **Tutorial:** • Use the textbooks to solve some application of differentiation. • Review solving problem of partial differentiation.	1	A1.3, A1.4, A2.1
3	Midterm		A1.1, A1.2, A1.3, A1.4, A1.4, A2.1
4	**Lectures:** • Equations of Straight lines. • Circles and their applications. **Tutorial:** • Review examples of Circles and their applications	1	A1.3, A1.6, A2.1
5	**Lectures:** • Equations of Ellipse. • Equations of parabola. **Tutorial:** • Solve problem Related to Equations of Ellipse and parabola.	1	A1.3, A1.5, A1.6
6	Final Submission	1	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.1

Course: Mathematics (1)	
Program Los	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	A1.1 Recognize the functions (graphs and their properties), the differentiation and its applications, the partial differentiation and its applications and the geometric graphs and their equations. A1.2 State acquaint with the continuity and different limits. A1.3 Solve a variety of differentiation problems and the equations of straight line, Ellipse, parabola, hyperbola and circle. A1.4 Specify the problems to find its solutions. A1.5 Use the suitable methods for solving the different types of differentiation and the suitable equations for different types of graphs. A1.6 Distinguish the kinds of different types of differentiation and different types of geometric Graphs such as straight line, Ellipse, parabola, hyperbola, and circle equations.
A2. Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering	A2.1 Acquire the experience to design differentiation problems and geometric problems and solve them.

judgment to draw conclusions.	

Course Coordinator: Dr. Mohamed Yousef Farghaly

Dr. Mohamed Khalil EL Gayyar

Dr. Youssef Mohamed Baghdadi

Dr. Moanis Abdel Tawab Moaz

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	**SCI002**		
Year/ Level	Preparatory Year – First Semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	**Aim**
1	Recognize the principles of the mechanics and statics of particles, moments, Equilibrium's equations and solve any problem in a simple and logical manner

3. Learning Outcomes (LOs):

A1.1	Identify the mechanics and statics of particles.
A1.2	Recognize the laws of additions and multiplication of vectors.
A1.3	Define different methods to determine the resultant and moments of forces system
A1.4	Identify rectangular component of a force.
A2.1	Discuss the Reduction of a system of forces to one force and one couple.
A2.2	Evaluate Moment of force about a given Axis to the students
A2.3	Resolve the given force into a force at any point and a couple**.**
A2.4	Solve Equilibrium's equations of Rigid Bodies in two and three dimensions.
A2.5	Apply Distributed Forces: Centroids and Centers of Gravity.
A2.6	Solve some problems and collect some data.

4. Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** -Introduction -The meaning of mechanics, static's and Static's of particles. -Vectors, addition of vectors. -Resultant of several concurrent forces. -Rectangular component of a force. -Addition of forces by summing x& y components. -Force defined by its magnitude and two points on its line of action -Rigid Bodies & Equivalent Systems of Forces. **Tutorials:** • Solve the problems.	1-4
2	**Lectures: Chapter 2** External and Internal Forces -Vector product of two vectors and Applications. -Moment of force about a point. -Scalar product of two vectors and applications. -Mixed Triple product of Three vectors and Applications. -Moment of force about a given Axis. -Moment of a Couple and Addition of couple -Resolution of a given force into a force at any point and a couple -Reduction of a system of forces to one force and one couple. **Tutorials:** • Solve the problems.	5-8
3	**Midterm**	9
4	**Lectures: Chapter 3** Equilibrium of Rigid bodies -Reactions at Supports and Connections for a two Dim. Structure. -Equilibrium of Rigid Bodies in two Dimensions. -Equilibrium of a Two –Force and a Three –Force Body. **Tutorials:** • Solve the problems.	10-12
5	**Lectures: Chapter 4** Distributed Forces: Centroids and Centers of Gravity -Centers of Gravity Two-Dimensional body. -Centroids of Areas and Lines & Determination of centroids by Integration. -Distributed Forces: Centroids and Centers of Gravity. -Centroids of Areas and Lines & Determination of centroids by Integration **Tutorials:** • Solve the problems.	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture(online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x				x								
	A1.2	x	x	x		x									
	A1.3	x	x	x		x	x								
	A1.4	x	x												
	A2.1	x	x			x		x							
	A2.2	x	x												
	A2.3	x	x				x								
	A2.4	x	x				x								
	A2.5	x	x				x								
	A2.6	x	x				x								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
2	Formative (quizzes- online quizzes)	A2.4, A2.5,
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6.

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	**Reference List**
1	Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, 2011
2	Ferdinand P. Beer and E. Russell Johnston, Jr."Vector Mechanics for Engineers" – Statics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York, 2010.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Chapter 1** -Introduction -The meaning of mechanics, static's and Static's of particles. -Vectors, addition of vectors. -Resultant of several concurrent forces. -Rectangular component of a force. -Addition of forces by summing x& y components. -Force defined by its magnitude and two points on its line of action -Rigid Bodies & Equivalent Systems of Forces.	1	A1.1, A1.2, A1.3, A1.4
2	**Chapter 2** - External and Internal Forces -Vector product of two vectors and Applications. -Moment of force about a point. -Scalar product of two vectors and applications. -Mixed Triple product of Three vectors and Applications. -Moment of force about a given Axis. -Moment of a Couple and Addition of couple - Resolution of a given force into a force at any point and a couple -Reduction of a system of forces to one force and one couple.	1	A2.1, A2.2, A2.3
3	Midterm	1	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3

4	**Chapter 3** Equilibrium of Rigid bodies -Reactions at Supports and Connections for a two Dim. Structure. -Equilibrium of Rigid Bodies in two Dimensions. -Equilibrium of a Two –Force and a Three –Force Body.	1	A2.4
5	**Chapter 4** Distributed Forces: Centroids and Centers of Gravity -Centers of Gravity Two-Dimensional body. -Centroids of Areas and Lines & Determination of centroids by Integration. -Distributed Forces: Centroids and Centers of Gravity. -Centroids of Areas and Lines & Determination of centroids by Integration	1	A2.5, A2.6.

Course: Mechanics (1)	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1- Identify the mechanics and statics of particles. A1-2- Recognize the laws of additions and multiplication of vectors. A1-3- Define different methods to determine the resultant and moments of a System of forces system. A-1-4- Identify rectangular component of a force.
A2- 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.	A2-1 Discuss the Reduction of a system of forces to one force and one couple. A2-2 Evaluate Moment of force about a given Axis to the students. A2-3 Resolve the given force into a force at any point and a couple. A2-4 Solve Equilibrium's equations of Rigid Bodies in two and three dimensions. A2-5 Apply Distributed Forces: Centroids and Centers of Gravity. A2-6 Solve some problems and collect some data.

Course Coordinator: Prof. Dr. Abdalla Wassf Isaac.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Physics and Mathematical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">SCI004</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Preparatory Year</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>-</td><td>2</td></tr>
</table>

2. Course aims:

No.	**Aim**
1	Identify essential knowledge of basic principles, laws and theories of physical Chemistry, applied chemistry, which are necessary for engineering students. Quantitative and theoretical study of the properties and structure of matter and their relation to the interaction of matter with energy will be discussed.

3. Learning Outcomes (LOs):

A1.1	Recognize the ability to solve quantitative problems in matter changes
A1.2	Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure
A1.3	Recognize the equations of physical chemistry
A1.4	Define different topics and theories of physical chemistry
A1.5	State the difference between organic and inorganic samples
A2.1	Show the difference between the different types of polymers
A2.2	Investigate the behavior of gases
A2.3	Estimate the difference between the physical and chemical properties of different matters
A2.4	Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied
A2.5	Identify the Physical behavior of solid, liquid gas and mixed phase
A8.1	Communicate verbally with the colleagues in the lab

4. Course Contents:

No.	Topics	Week
1	**Chapter 1: physical chemistry** -Introduction to physical Chemistry -Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units -Properties of gases -The perfect gas - gas laws -Problems -The real gas -Molecular interactions – Van der Waals equation. -Kinetics theory of gases- Problems **Chapter 2: Organic Chemistry** -Introduction to organic chemistry: -Lewis symbols, chemical bonding - electronic distributions Nomenclature of organic compounds – hybridization of orbital -Physical properties of organic compounds, aliphatic compounds and their derivatives effect of structure on the chemical properties **Chemistry lab**: -Introduction to the quantitative & qualitative analysis -Standardization of sodium Carbonate solution -Standardization of Hydrochloric acid solution using sodium Hydroxide Solution	1-3
2	**Chapter 3: chemical thermodynamics and thermochemistry** -First and second law of thermodynamics – heats of reactions – laws of heat reactions - standard states – spontaneous of chemical reaction – entropy and free energy **Chapter 4: Electrochemistry:** -Electrolysis -Application of electrochemistry on the corrosion of metals **Chemistry lab**: -Titration of strong acid against strong base -Analysis of alkaline mixture	4-6
3	**Chapter 5: Chemical equilibrium**: -Law of mass action and reversible reactions -Ionic theory – ionization of water - titration process and titration curves – indicators – hydrolysis of salts. Solubility product & common ion effect **Chemistry lab**: -Analysis of acidic mixture	7-8
4	**Midterm**	9
5	**Chapter 6: Natural gas & Petroleum oil:** -Composition of natural gas – process of separation **Petroleum oil:** -Composition – Classification – Separations **Chemistry lab**: -Identification of metal cations	10-11
6	**Chapter 7: Polymer chemistry:** -Introduction – classification of polymers - Mechanism of	12-15

	polymerization – free radical mechanism competitive reactions -Anionic and cationic Mechanism of polymerization – copolymers -Mechanical properties of polymers - relation between mechanical properties & Temperature **Chemistry lab**: -Identification of metals cations	

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x			x									
	A1.2	x	x												
	A1.3	x	x			x									
	A1.4	x	x			x									
	A2.5	x	x												
	A2.1	x	x					x							x
	A2.2	x	x												x
	A2.3	x	x												x
	A2.4	x	x					x							
	A2.5	x	x				x								
	A8.1						x								x

6. Teaching and Learning Methods low capacity and outstanding Student:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-4, A2-5
2	Practical	A2-1, A2-2, A2-3, A8-1
3	Oral Examination	A1-1, A1-2, A1-3, A1-4, A1-5
4	Formative (quizzes- online quizzes- reports)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1,
5	Final Term Examination (written)	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5, A8-1,

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	1٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation -reports)	1٠
4	Final Term Examination (written)	60
Total		100%

8. List of References:

No.	Reference List
1	Atkins. Peter, Julio de Paula, James Keeler, "Physical chemistry ", 11th ed, Oxford University Press, 2019.
2	I.N. Levine, " Physical chemistry”, 6th ed, The McGraw-Hill Companies, 2009.
3	J. Brady and G. Humistom "General chemistry, Principles and structure", 5th ed. John Wiley and Sons Inc., 1990.
4	Francis A Carey, Robert M Giuliano, 11th ed, Mc Graw Hill Education, 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	laboratory Usage:
3	Library Usage
4	White Board
5	Data Show System
6	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Chapter 1: physical chemistry** -Introduction to physical Chemistry -Major consideration in physical chemistry: Matter – quantifying matter (SI & cgs units) and derived SI units -Properties of gases -The perfect gas - gas laws -Problems -The real gas -Molecular interactions – Van der Waals equation. Kinetics theory of gases- Problems **Chapter 2: Organic Chemistry** -Introduction to organic chemistry: -Lewis symbols, chemical bonding - electronic distributions Nomenclature of organic compounds – hybridization of orbital -Physical properties of organic compounds, aliphatic compounds, and their derivatives effect of structure on the chemical properties **Chemistry lab**: -Introduction to the quantitative & qualitative analysis -Standardization of sodium Carbonate solution -Standardization of Hydrochloric acid solution using sodium Hydroxide solution	1	A1-1 A1-2 A1-3 A1-4 A1-5 A2-1 A2-2 A2-3 A8-2
2	**Chapter 3: chemical thermodynamics and thermochemistry** -First and second law of thermodynamics – heats of reactions – laws of heat reactions - standard states – spontaneous of chemical reaction – entropy and free energy **Chapter 4: Electrochemistry:** -Electrolysis -Application of electrochemistry on the corrosion of metals **Chemistry lab**: -Titration of strong acid against strong base Analysis of alkaline mixture	1	A1-1 A1-2 A1-3 A1-4 A8-2
3	**Chapter 5: Chemical equilibrium**: -Law of mass action and reversible reactions Ionic theory – ionization of water - titration process and titration curves – indicators – hydrolysis of salts. Solubility product & common ion effect **Chemistry lab**: -Analysis of acidic mixture	1	A2-1 A2-2 A2-3 A2-4 A8-1
4	**Midterm**	1	A1-1, A1-2, A1-3, A1-4, A1-5, A2-1, A2-2, A2-3, A2-4, A2-5,
5	**Chapter 6: Natural gas & Petroleum oil:** -Composition of natural gas – process of separation	1	A1-1 A1-4

	Petroleum oil: -Composition – Classification – Separations **Chemistry lab**: -Identification of metal cations		A2-3 A2-4 A8-1
6	**Chapter 7: Polymer chemistry:** -Introduction – classification of polymers - Mechanism of polymerization – free radical mechanism competitive reactions -Anionic and cationic Mechanism of polymerization – copolymers -Mechanical properties of polymers - relation between mechanical properties & Temperature **Chemistry lab**: -Identification of metals cations	1	A1-4 A3-4 A2-5 A8-1

Course :Engineering Chemistry	
Program LOs	**Course Los**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1- Recognize the ability to solve quantitative problems in matter changes. A1-2 Outline the comprehension the physical effects on the chemical compounds and recognize its chemical structure. A1-3 Recognize the equations of physical chemistry. A1-4 Define different topics and theories of physical chemistry. A1-5 State the difference between organic and inorganic samples.
A2. 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.	A2-1 Show the difference between the different types of polymers. A2-2 Investigate the behavior of gases. A2-3 Estimate the difference between the physical and chemical properties of different matters. A2-4 Discuss how to apply mathematics in chemistry in such a way that the equations paint a clear picture of the physical phenomena being studied. A2.5 Identify the Physical behavior of solid, liquid gas and mixed phase

A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate verbally with the colleagues in the lab

Course Coordinator: Prof. Dr. Walid Fathallah
Dr. Sameh Mekawy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Production Engineering & Mechanical Design		
Course Code	**PRD002**		
Year/ Level	Preparing year – First semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	1	3	-

2. Course aims:

No.	Aim
1	Provide the basic knowledge and skills of the concepts and principles of engineering drawing and fundamental of drawing projections. The basic principles of drawing with several applications are also studied.

3. Learning Outcomes (LOs):

A1.1	Identify the materials related to the parts of machines.
A1.2	Analyze the engineering problems that are used in engineering drawing.
A3.1	Apply the computer software (AutoCAD) for different drawing exercises.
A3.2	Employ the image and samples of machines drawing applications.
A10.1	Solve the different types of drawing exercises.
A10.2	Recognize the characteristics and processes related to the different machines and symbol drawing.
A10.3	Use engineering drawing and mechanics drawing handbook.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Introduction of principles of engineering lines used in drawing. **Tutorials:** - Drawing of some exercise for different line weights.	1
2	**Lectures:** - Geometric construction theories of view derivation. **Tutorials:** - Drawing of some exercise on geometric construction.	2
3	**Lectures:** - Orthographic projection of engineering bodies. **Tutorials:** - Drawing of some exercise for projection.	3-4
4	**Lectures:** - Projection of point, lines, surfaces, and bodies. **Labs/Tutorials:** - Drawing of some exercise for projection of a very simple shapes.	5
5	**Lectures:** - How to divide of engineering drawing board and general engineering drawing. **Tutorials:** - Drawing of some exercise on how to divide an engineering drawing board.	6
6	**Lectures:** - Drawing engineering operations and some application on it. **Tutorials:** - Drawing of some exercise on engineering operations.	7-8
7	Midterm	9
8	**Lectures:** - Drawing of simple isometrics and its projections. **Tutorials:** - Drawing of some exercise for simple isometrics.	10-11
9	**Lectures:** - Drawing of complicated isometrics with inclined surfaces. **Tutorials:** - Drawing of some exercise for complicated isometrics.	12-13
10	**Lectures:** - Drawing of the third projection with the knowledge of the other projectors. **Tutorials:** - Some exercise on the drawing of the third projection with the knowledge of the other projectors.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x		x	x									
	A1.2	x	x		x		x			x					
	A3.1	x	x		x	x	x	x							
	A3.2	x	x		x										
	A8.1	x	x		x					x	x	x			
	A8.2	x	x		x	x	x	x							
	A8.3										x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.2, A8.1, A8.2
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2, A8.3
3	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every 3 weeks
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	Reference List
1	K. L. Narayana, P. Kannaiah, and K. Venkata Reddy ' Machine Drawing' New Age International (P) Ltd., 2006.
2	Fatehy El-shrif, ' Mechanical Drawing' Helwan Univ., 1975.
3	C. Simmons, D. Maguive, and N. Phelps, 'Manual of Engineering Drawing', Elsevier Ltd., 2009.
4	K. R. Hart 'Engineering Drawing with Problems and Solutions' ELBS, 1984.
5	Book," Engineering Drawing", prepared by staff of production engineering and Machine design department

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Introduction of principles of engineering lines used in drawing. **Labs/Tutorials:** • Drawing of some exercise for different line weights.	1	A1.1
2	**Lectures:** • Geometric construction theories of view derivation. **Labs/Tutorials:** • Drawing of some exercise on geometric construction.	1	A1.2
3	**Lectures:** • Orthographic projection of engineering bodies. **Labs/Tutorials:** • Drawing of some exercise for projection.	1	A1.2, A3.2, A10.1
4	**Lectures:** • Projection of point, lines, surfaces, and bodies. **Labs/Tutorials:** • Drawing of some exercise for projection of a very simple shapes.	1	A1.2, A3.2, A10.1, A10.2
5	**Lectures:** • How to divide of engineering drawing board and general engineering drawing. **Labs/Tutorials:** • Drawing of some exercise on how to divide an engineering drawing board.	1	A1.2, A3.2, A10.1, A10.2
6	**Lectures:** • Drawing engineering operations and some application on it. **Labs/Tutorials:** • Drawing of some exercise on engineering operations.	1	A1.2, A3.2, A10.1, A10.2, A10.3

7	Midterm	1	A1.1, A1.2, A3.2, A10.1, A10.2
8	**Lectures:** - Drawing of simple isometrics and its projections. **Labs/Tutorials:** - Drawing of some exercise for simple isometrics.	1	A1.2, A3.1, A3.2, A10.1, A10.2
9	**Lectures:** - Drawing of complicated isometrics with inclined surfaces. **Labs/Tutorials:** - Drawing of some exercise for complicated isometrics.	1	A1.2, A3.1, A3.2, A10.1, A10.2, A10.3
10	**Lectures:** - Drawing of the third projection with the knowledge of the other projectors. **Labs/Tutorials:** - Some exercise on the drawing of the third projection with the knowledge of the other projectors.	1	A1.2, A3.1, A3.2, A10.1, A10.2, A10.3

Course: Engineering Drawing and Geometric Projection (1)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the materials related to the parts of machines. A1.2 Analyze the engineering problems that are used in engineering drawing.
A3. 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.	A3.1 Apply the computer software (AutoCAD) for different drawing exercises. A3.2 Employ the image and samples of machines drawing applications.
A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	A10.1 Solve the different types of drawing exercises. A10.2 Recognize the characteristics and processes related to the different machines and symbol drawing. A10.3 Use engineering drawing and mechanics drawing handbook.

Course Coordinator: Prof. Dr. Gamal Abdel Nasser

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	**HUU001**		
Year/ Level	Preparatory year- First semester		
Teaching Hours	Lectures	Tutorial	Practical
	2	---	---

2. Course Aims:

No.	**Aim**
4	Use techniques, skills, and some English grammar and rules necessary for effectively writing numbers, equations, symbols, and some different types of technical documents such as reports, proposals, letters, and presentations.

3. Learning Outcomes (LOs):

A7-1	Work independently and within a team to prepare different types of technical reports and presentations.
A7-2	Choose the most adequate dictionaries to follow in writing the technical documents.
A8-1	Communicate effectively with colleges to identify the characteristics of a good technical report.
A8-2	Practice the rules and principles of technical writing.
A8-3	Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations.

4. Course Contents:

Week No.	Topic	Total Hours	Contact hrs		
			Lec.	Tut.	Lab.
Week 1-2	Review of English Grammar and Mechanics of Language (Capitalization –Punctuation)	4	4	--	--
Week-3	Some characteristics of Technical Language (Abbreviation)	2	2	--	--
Week 4-5	How to write numbers, units, equations, symbols, and units of measure	4	4	--	--
Week 6-8	Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies, Clichés, Nouns as adjectives, and Misused and troublesome words and phrases	6	6	--	--
Week 9	Midterm Exam	2	2	--	--
Week 10-11	Rules and Principals of technical writing	4	4	--	--
Weeks 12-13	Good technical writing	4	4		
Week 14-5	Applications of technical writing • Letters • reports • manuals • proposals • presentations	4	4	--	--

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method													
		Lecture (online-In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A7-1	X	X			X		X				X			
	A7-2	X	X			X		X			X	X			
	A8-1	X	X			X									
	A8-2	X				X	X								
	A8-3	X		X	X	X									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials.
2	Online lectures and documentation.

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written)	A7-1, A7-2, A8-1, A8-2, A8-3
2	Formative (quizzes - online quizzes - reports)	A7-1, A7-2, A8-1, A8-2, A8-3
3	Final Term Examination (written)	A7-1, A7-2, A8-1, A8-2, A8-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (online written)	Week 9
2	Formative (quizzes - online quizzes - reports)	Throughout the semester
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written)	١٠
2	Formative (quizzes - online quizzes - reports)	١٠
3	Final Term Examination (written)	٨٠
Total		100%

8. List of References:

No.	Reference List
1	D. J. Weatherford, “Technical Writing in Engineering Professions“, 2016.
2	Phillip A. Laplante, “Technical Writing: A Practical Guide for Engineers and Scientists”, CRC Press, 2nd edition, July 2018.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	Review of English Grammar and Mechanics of Language (Capitalization –Punctuation)	4	A7-1, A8-1, A8-2
2	Some characteristics of Technical Language (Abbreviation)	4	A7-1, A8-1, A8-2
3	How to write numbers, units, equations, symbols, and units of measure	4	A7-1, A8-2, A8-3
4	Technical words problems: such as jargons, Big words, Wordy phrases, Redundancies, Clichés, Nouns as adjectives, and Misused and troublesome words and phrases	4	A7-2, A8-2
5	Midterm Exam	4	A7-1, A7-2, A8-1, A8-2, A8-3
6	Rules and Principals of technical writing	4	A7-2, A8-2, A8-3
7	Good technical writing	4	A7-2, A8-2, A8-3
8	Applications of technical writing • letters • reports • manuals • proposals • presentations	4	A7-1, A8-2, A8-3,
9	Final written exam	4	A7-1, A7-2, A8-1, A8-2, A8-3,

<table>
<tr><th colspan="2">Course: Technical English Language</th></tr>
<tr><th>Program LOs</th><th>Course LOs</th></tr>
<tr><td rowspan="2">A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.</td><td>A7-1 Work independently and within a team to prepare different types of technical reports and presentations.</td></tr>
<tr><td>A7-2 Choose the most adequate dictionaries to follow in writing the technical documents.</td></tr>
<tr><td rowspan="3">A8- Communicate effectively graphically, verbally and in writing – with a range of audiences using contemporary tools.</td><td>A8-1 Communicate effectively with colleges to identify the characteristics of a good technical report.</td></tr>
<tr><td>A8-2 Practice the rules and principles of technical writing.</td></tr>
<tr><td>A8-3 Acquire the skills to differentiate between the different types of technical documents reports, proposals, manuals, and presentations.</td></tr>
</table>

Course Coordinator: Dr. Hosam Elashkar

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1 Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	**HUF001**		
Year/ Level	Preparatory year- First semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	**--**	**--**

2 Course aims:

No.	Aim
1	Apply a wide spectrum of knowledge for society driving engineering developments and engineering developments changing society with the main emphasis placed on developments and changes over the past three hundred years.

3 Learning Outcomes (LOs):

A7.1	Recognize the importance and the evolution of engineering education.
A9.1	Identify the responsibilities and job description of engineers in different positions.
A10.1	Demonstrate the skill of making good communication using internet or brief presentation.
A10.2	Use the internet to communicate and present summaries or opinions.

4 Course Contents:

No.	Topics	Week
1	**Lectures:** • Definitions: art, science, technology and engineering.	**1-2**
2	**Lectures:** • Relationship between civilizations and natural and social sciences.	**3-4**
3	**Lectures:** • Development of different engineering fields.	**5-6**
4	**Lectures:** • Historical relationship between sciences and technology.	**7-8**
5	**MID-TERM EXAM**	**9**
6	**Lectures:** • The impact of the engineering evolution on societal and economic development.	**10-12**

7	**Lectures:** • Various examples on the aspects of engineering activities.	**13-15**

5 Teaching and Learning Methods:

LO's		**Teaching and Learning Method**													
		Lecture (Online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A7.1**	x			x	x						x			
	A9.1	x		x	x	x	x	x				x			
	A10.1	x		x	x	x	x	x				x			
	A10.2	x			x	x			x						

6 Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Online lectures and assignments

7 Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A7.1, A9.1, A10.1
2	Exercises & Reports	A7.1, A9.1, A10.1, A10.2
3	Formative (quizzes- online quizzes-presentation)	A7.1, A9.1, A10.1, A10.2
4	Final Term Examination (written)	A7.1, A9.1, A10.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Exercises & Reports	Weekly
3	Formative (quizzes- online quizzes-presentation)	6th -11th
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Exercises & Reports	5
3	Formative (quizzes- online quizzes-presentation)	5
4	Final Term Examination (written)	8٠
Total		100%

8 List of References:

No.	Reference List
1	Course notes
2	Essential books (text books) ● مُلاحظات المنهج ● الكُتُب الضرورية (كتب دراسية) ● كتاب تأريخ الهندسة والتكنولوجيا + اسطوانة مدمجة، اعداد أ.د عاطف علم الدين ● تأريخ العلوم و التكنولوجيا الهندسية ● د. أحمد على العريان – عالم الكتب ١٩٩٦. ● تاريخ العلوم و التكنولوجيا في العصور القديمة و الوسطى ● د. مصطفى محمود سليمان – الهيئة المصرية العامة للكتاب ١٩٩٥. ● التنمية التكنولوجية مفهومها و متطلباتها ● د. يعقوب فهد العبيد – الدار الدولية للنشر و التوزيع ١٩٨٩. ● الطاقة لعالم الغد (الحقائق ، و الخيارات الواقعية ، و برنامج للإنجاز) ● لجنة مجلس الطاقة العالمي – الطبعة العربية ١٩٩٣. • Brain, M. The Engineering Book: From the Catapult to the Curiosity Rover, 250 Milestones in the History of Engineering (Sterling Milestones), 2015

9 Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Reports
3	White Board

4	Data Show System
5	Presenter

10 Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** Definitions: art, science, technology and engineering.	**1**	A7.1, A9.1, A10.1
2	**Lectures:** Relationship between civilizations and natural and social sciences.	**1**	A9.1, A10.2
3	**Lectures:** Development of different engineering fields.	**1**	A9.1, A10.1, A10.2
4	**Lectures:** Historical relationship between sciences and technology.	**1**	A9.1, A10.1, A10.2
5	**MID-TERM EXAM**	**1**	A7.1, A9.1, A10.1
6	**Lectures:** The impact of the engineering evolution on societal and economic development.	**1**	A9.1, A10.1, A10.2
7	**Lectures:** Various examples on the aspects of engineering activities.	**1**	A9.1, A10.1, A10.2

Course: Engineering and Technology History	
Program LOs	**Course LOs**
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	**A7.1** Recognize the importance and the evolution of engineering education.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	**A9.1** Identify the responsibilities and job description of engineers in different positions.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	**A10.1** Demonstrate the skill of making good communication using internet or brief presentation. **A10.2** Use the internet to communicate and present summaries or opinions.

Course Coordinator: Prof. Dr. Attef Alam Eldeen

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Physics and Mathematical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">SCI005</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Preparatory year- Second semester</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>2</td><td>-</td></tr>
</table>

2. Course aims:

No.	Aim
1	Apply and identify all techniques of integration, Numerical integration, and Fundamental Theorem of Calculus. As well as partial fraction-Mathematical, Complex Numbers-Determinates-Matrices-Theory of reminder and Synthetic Division-Theory of equations-set theory.

3. Learning Outcomes (LOs):

A1.1	Recognize integration by using: Substitution-Integration by parts- Numerical methods.
A1.2	Define the Complex Numbers-Determinates-Matrices.
A1.3	Recognize integration of exponential and logarithmic functions using Trigonometric substitutions.
A1.4	Solve the matrices problems.
A1.5	Estimate integral with finite sum and Integrating by using: Trapezoidal rule-Simpson's rule.
A1.6	Use the method of Gauss elimination.
A1.7	Analyze the fraction to its partial fractions.
A2.1	Solve a variety of Theory of reminder and Synthetic division problems.
A2.2	Apply the Theory of equations-set theory to solve different problems.
A2.3	Estimate to read and understand, write, and construct mathematical proofs.
A2.4	Use the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations.
A2.5	Evaluate the area between two curves.
A2.6	Relate derivatives and integrals (Fundamental Theorem of calculus).
A2.7	Apply integration methods to find areas.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Indefinite integrals. • Integration methods. • Partial fractions. • Mathematical induction. • Complex numbers. **Tutorials:** • Solve multiple Indefinite integrals.	1-4
2	**Lectures:** • Definite integral - improper integral. • Determinates - Matrices -Theory of reminder and Synthetic division. • Theory of equations. **Tutorials:** • Evaluate definite integral and improper integral.	5-8
3	Midterm	9
4	**Lectures:** • Applications (areas, arc length, volume) • Sequences and infinite series. **Tutorials:** • Solve the problems of sequences and infinite series.	10-11
5	**Lectures:** • Numerical integration (trapezoidal rule, Simpson's rule) • Set theory. **Tutorials:** • Solve the problems of numerical integration and Set theory.	12-14
6	Final submission	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	X	x				x								
	A1.3	X	x				x								
	A1.4	X	x				x								
	A1.5	X	x				x								
	A1.6	X	x				x								
	A1.7	X	x				x								
	A2.1	X					x								
	A2.2	X		X			x								
	A2.3	X		X			x								
	A2.4	X		X			x								
	A2.5	X		X			x								
	A2.6	X					x								
	A2.7	X				X	x	x				x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.7, A2.1, A2.3, A2.6
2	Formative (quizzes- online quizzes)	A1.1, A2.3, A1.3, A1.5, A1.7, A2.6
3	Final Term Examination (written)	A1.1, A1.2 A1.3, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes)	10
3	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	Reference List
1	Calculus 5e, James Stewart, McMaster university, Thomson, Australia, 2003.
2	Erwin Kreyszig :"Advanced Engineering Mathematics" John Wiley & Sons, N.Y 10th edition, 2011)
3	- William E. Boyce, Richard: "Elementary Differential Equations and Boundary Value Problems", John Wiley & Sons, Inc,4th edition,2014

9. Facilities Required for Teaching and Learning:

No.	**Facility**
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Integration methods. • Partial fractions. • Mathematical induction. • Complex numbers. **Tutorials:** • Solve multiple Indefinite integrals	1	A1.1, A1.2, A1.3, A1.7, A2.3, A2.6
2	**Lectures:** • Definite integral - improper integral. • Determinates - Matrices -Theory of reminder and Synthetic division. • Theory of equations. **Tutorials:** • Evaluate definite integral and improper integral.	1	A1.4, A1.5, A2.1
3	Midterm	1	
4	**Lectures:** • Applications (areas, arc length, volume) • Sequences and infinite series. **Tutorials** • Solve the problems of sequences and infinite series.	1	A1.4, A1.5, A1.6, A2.4, A2.5, A2.7
5	**Lectures:** • Numerical integration (trapezoidal rule, Simpson's rule). • Set theory. **Tutorials** • Solve the problems of numerical integration and Set theory**.**	1	A1.4, A2.2
6	Final submission of the project.	1	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6, A2.7

Course: Mathematics (2)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	A1.1 Recognize integration by using: Substitution-Integration by parts- Numerical methods. A1.2 Define the Complex Numbers-Determinates-Matrices. A1.3 Recognize integration of exponential and logarithmic functions using Trigonometric substitutions. A1.4 Solve the matrices problems. A1.5 Estimate integral with finite sum and Integrating by using: Trapezoidal rule-Simpson's rule. A1.6 Use the method of Gauss elimination. A1.7 Analyze the fraction to its partial fractions.
A2. 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.	A2.1 Solve a variety of Theory of reminder and Synthetic division problems. A2.2 Apply the Theory of equations-set theory to solve different problems. A2.3 Estimate to read and understand, write, and construct mathematical proofs. A2.4 Use the quadratic formula to find the roots of a second-degree polynomial and solve quadratic equations. A2.5 Evaluate the area between two curves. A2.6 Relate derivatives and integrals (Fundamental Theorem of calculus). A2.7 Apply integration methods to find areas.

Course Coordinator: Dr. Mohamed Yousef Farghaly

Dr. Mohamed Khalil EL Gayyar

Dr. Youssef Mohamed Baghdadi

Dr. Moanis Abd Eltawab

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	**SCI006**		
Year/ Level	Preparatory Year -Second semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	Aim
1	Apply and identify the principles of dynamics, Rectilinear and Curvilinear motion, the Linear momentum, Angular momentum of particles, and solve any problem in a simple and logical manner

3. Learning Outcomes (LOs):

A1.1	Identify the Rectilinear motion of particles (Position, Velocity, and acceleration).
A1.2	Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration).
A1.3	Define the Linear Momentum of particles, rate of change of Linear Momentum.
A1.4	Identify the equations of motion.
A2.1	Discuss the Angular momentum of particles.
A2.2	Evaluate the Trajectory of particles under a central force.
A2.3	Resolve the equations of motion in different coordinates**.**
A2.4	Solve the Projectiles problems.
A2.5	Apply to the Central Impact of two Spheres.
A2.6	Solve the Loss of Kinetic Energy during the Impact of two Spheres.

4. Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** - Kinematics of particles. - Rectilinear motion of particles (Position, Velocity and acceleration). - Curvilinear motion of a particles (Position vector, Velocity and Acceleration). **Tutorials:** • Solve the Position, Velocity and acceleration problems. • Review examples of the Curvilinear motion of a particle	1-4
2	**Lectures: Chapter 2** - Kinetics of particles. - Newton's Second law of motion. - Equations of motion in different coordinates. - Angular momentum of a particles. - Kepler's Laws of Planetary motion. - Trajectory of a particles under a central force. **Tutorials:** -Solve the problems.	5-8
3	**Midterm**	9
4	**Lectures: Chapter 3** - Projectiles **Tutorials:** - Solve the Projectiles problems.	10-11
5	**Lectures: Chapter 4** - Impact. - Equations of Impact of a Sphere on a Fixed Body. - Central Impact of two Spheres. - Oblique Central Impact of two Spheres. - Loss of Kinetic Energy. **Tutorials:** Solve the problems.	12-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture(online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x				x								
	A1.2	x	x			x									
	A1.3	x	x			x	x								
	A1.4	x	x												
	A2.1	x	x			x		x							
	A2.2	x	x												
	A2.3	x	x				x								
	A2.4	x	x				x								
	A2.5	x	x				x								
	A2.6	x	x				x								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
2	Formative (quizzes- online quizzes)	A2.4, A2.5,
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A2.6.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١5
2	Formative (quizzes- online quizzes)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	Reference List
1	Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, 2010.
2	Ferdinand P. Beer and E. Russell Johnston, Jr."Vector Mechanics for Engineers" Dynamics Metric Edition adapted by G. Wayne Brown, Sir Sandford Fleming College, New York 2014.

9. Facilities Required for Teaching and Learning:

No.	**Facility**
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	**Topic**	**Aim**	**LO's**
1	**Chapter 1** - Kinematics of particles. - Rectilinear motion of particles (Position, Velocity and acceleration). - Curvilinear motion of a particles (Position vector, Velocity and Acceleration).	1	A1.1, A1.2, A1.3, A1.4
2	**Chapter 2** - Kinetics of particles. - Newton's Second law of motion. - Equations of motion in different coordinates. - Angular momentum of a particles. - Kepler's Laws of Planetary motion. - Trajectory of a particles under a central force.	1	A2.1, A2.2, A2.3
3	Midterm	1	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
4	**Chapter 3** - Projectiles	1	A2.4
5	**Chapter 4** - Impact. - Equations of Impact of a Sphere on a Fixed Body. - Central Impact of two Spheres. - Oblique Central Impact of two Spheres. - Loss of Kinetic Energy.	1	A2.5, A2.6.

Course :Mechanics(2)	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the Rectilinear motion of particles (Position, Velocity, and acceleration). A1.2 Recognize the Curvilinear motion of particles (Position vector, Velocity and Acceleration). A1.3 Define the Linear Momentum of particles, rate of change of Linear Momentum. A1.4 Identify the equations of motion.
A2- 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.	A2-1 Discuss the Angular momentum of particles. A2-2 Evaluate the Trajectory of particles under a central force. A2-3 Resolve the equations of motion in different coordinates. A2-4 Solve the Projectiles problems. A2-5 Apply to the Central Impact of two Spheres. A2-6 Solve the Loss of Kinetic Energy during the Impact of two Spheres.

Course Coordinator: Dr. Amr Hassan Abdalla

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Physics and Mathematical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">SCI007</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Preparatory year – Second semester</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>1</td><td>1</td></tr>
</table>

2. Course aims:

No.	Aim
1	Describe the electricity and magnetism laws, properties of light as a wave and its laws, the applications of laser and types of optical lens.

3. Learning Outcomes (LOs):

A1.1	Identify the basics of electric field and its laws, the relation between the magnetic potential and the magnetic field intensity, the nature of light waves.
A1.2	Distinguish between the electric conductors and insulators, between different properties of light and between images formed by various lenses.
A1.3	Recognize the electric field by using Gauss's Law, the Capacitors, effect of an insulator inside a capacitor.
A1.4	Recognize the Magnetic fields, Magnetic forces, and the optical instruments and lenses.
A2.1	Investigate Snell's law of light refraction, ohm’s law experiment and Stefan Boltzmann's radiation law.
A2.2	Evaluate different parameters of optical lenses and the prism, the electrochemical equivalent of copper, magnetic dipole constant of magnetic by magnetometer.
A2.3	Show the different parameters through the lens maker's equation and the angular magnification for optical instruments.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Chapter 1: The Electric field** • The Electric field due to a continuous distribution of charge (charged wire-charged ring-charged plate). • The effect of the electric field on a charged point. • The effect of the electric field on the Electric Dipole examples. **Chapter 1: Nature of light** • Light as a corpuscle and as a wave. • Measurements of the speed of light (Fizeau method) -Wave front - Huygens's principle. • Reflection of Light: The Laws of reflection- rotation of reflected planes - Spherical Mirror and its type -The relation between focal Length and the radius of curvature. • The general law of spherical mirrors. • Concave mirror and its cases of formed images. • Convex Mirror and its cases of formed images. **Labs/Tutorials:** • Determination the power of convex lens.	1-3
2	**Lectures:** **Chapter2: Electric Flux** • Electric flux and Gauss's law • Applications of Gauss's law **Chapter2: Refraction of Light** • Refraction of light -The index of refraction -The laws of refraction -Deriving the Snell’s law of refraction using Huygens’s principle -Refraction by plane-parallel plate. Total internal reflection -The critical angle and its application. • Fiber optics -Types of fiber optics (single-mode, multi-mode). • The physical basic for transport of light through the fiber optics -The components of the fiber optics -The advantage of fiber optics -Practical application on using of the fiber optics. Images formed by refraction at spherical surfaces. **Labs/Tutorials:** • Determination of refractive index of water by liquid lens method.	4-5
3	**Lectures:** **Chapter 3: Electric Potential** • Electric Potential - Potential difference (in a uniform field-not a uniform field- a continuous distribution of charge). • The potential for (a charged wire- a charged sphere) –The electric potential energy –The relation between the electric field and the	6-8

	electric potential. **Chapter 3: Thin Lenses and Optical Instruments** - Thin lenses and optical instruments - Thin lens equation and lens-Makers' Equation -The lateral magnification-fundamental principles of light by lenses (converging lens- diverging lens) - Graphical method of forming images by converging lens and diverging lens - The Power of lens -Combination of thin lenses -Thin Lenses in Contac -The simple magnifier –The compound Microscope –The Astronomical Telescope. **Labs/Tutorials:** - Determination of apex angel and refractive index of prism by using spectrometer.	
4	**Midterm exam**	9
5	**Lectures:** **Chapter 4: Capacitors** - Capacitors – The parallel plate capacitor – Cylindrical capacitor – Spherical capacitor. - Electric volume energy density – Effect of a conductor inside a capacitor -Effect of an insulator inside a capacitor. **Chapter4: Interference Diffraction and Polarization of Light** - Diffraction and polarization of light - Interference of light waves and conditions for Interference -Young's Double Slit experiment Lloyd's mirror - Interference in thin films, find of constructive and destructive -Application on Interference in thin films - Newton's Rings -The Michelson interferometer. **Labs/Tutorials:** - Determination of the electrochemical equivalent of copper. - Determination of radius of curvature of convex lens by using Newton's rings.	10-11
6	**Lectures:** **Chapter 5: Electric current** - Electric current and Ohm's Law Solving electrical circuit by using Kirchhoff's Law. **Chapter 5: Diffraction** - Fraunhofer Diffraction -Fresnel Diffraction – Single slit diffraction -The diffraction grating - Resolving power of the diffraction grating -Polarization of light waves -Polarization by selective absorption polarization by reflection. - Polarization by Double Refraction. - Polarization by Scattering. **Labs/Tutorials:** - Investigate ohm's low experiment.	12-13

7	**Lectures:** **Chapter 6: Magnetic field** • Magnetic fields and Magnetic forces (magnetic field intensity - magnetic induction-magnetic flux - magnetic moment - magnetic voltage) - The relation between the magnetic potential and the magnetic field intensity. Magnetic effect for the electric current (Biot - Savart Law- Magnetic induction of a circular conductor - Magnetic induction of a straight conductor). **Chapter 6: Laser Emission** • Laser emission - Types of laser emission - Population inversion by optical pumping - Gaseous laser (Helium-Neon) -The holography (Pictures in three dimensions)-Fluorescence and phosphorescence-Laser application (Industrial, Medical, Military, and daily application). **Labs/Tutorials:** • Determination of magnetic dipole constant of magnetic by magnetometer**.**	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x					x								
	A1.2	x	x		x		x								
	A1.3	x	x				x								
	A1.4	x	x				x								
	A2.1	x					x								x
	A2.2	x					x								x
	A2.3	x					x								x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3,
2	Practical	A2.1, A2.2, A2.3
3	Oral Examination	A1.1, A1.2, A1.3, A1.4
4	Formative (quizzes- online quizzes- Reports.)	A1.1, A1.2, A1.3, A1.4
5	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References:

No.	Reference List
1	أساسيات الفيزياء – تأليف بوش – الطبعة الخامسة ٢٠١١ - ترجمة د. سعيد الجزيرى & د. محمد أمين سليمان.
2	أساسيات الفيزياء الكلاسيكية و المعاصره تأليف د/رأفت كامل واصف – الطبعة الاولى (٢٠١١)
3	فيزياء الجوامد – تأليف أ. د. محمد أمين سليمان و أ. د. أحمد فؤاد باشا و أ. د. شريف خيري (٢٠١٣)
4	Wahab. “Essentials of crystallography” second Edition, Narosa Publishing House, 2014
5	Kittel C.” Introduction to Solid State Physics” Wiley; 8th edition, 2018

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • The Electric field due to a continuous distribution of charge (charged wire-charged ring-charged plate). • The effect of the electric field on a charged point. • The effect of the electric field on the Electric Dipole examples. • Light as a corpuscle and as a wave. • Measurements of the speed of light (Fizeau method) -Wave front - Huygens's principle. • Reflection of Light: The Laws of reflection-rotation of reflected planes - Spherical Mirror and its type -The relation between focal Length and the radius of curvature. • The general law of spherical mirrors. • Concave mirror and its cases of formed images. • Convex Mirror and its cases of formed images. **Labs/Tutorials:** • Determination of refractive index of water by liquid lens method.	1	A1.1, A2.2
2	**Lectures:** • Electric flux and Gauss's law • Applications of Gauss's law • Refraction of light -The index of refraction -The laws of refraction -Deriving the Snell's law of refraction using Huygens's principle -Refraction by plane-parallel plate. Total internal reflection -The critical angle and its application. • Fiber optics -Types of fiber optics (single-mode, multi-mode). • The physical basic for transport of light through the fiber optics -The components of the fiber optics -The advantage of fiber optics -Practical application on using of the fiber optics. Images formed by refraction at spherical surfaces. **Labs/Tutorials:** • Determination of refractive index of water by liquid lens method.	1	A1.1, A1.2 , A1.3, A2.2
3	**Lectures:**	1	A2.2, A2.3, A1.1,

	- Electric Potential - Potential difference (in a uniform field-not a uniform field- a continuous distribution of charge). - The potential for (a charged wire- a charged sphere) –The electric potential energy –The relation between the electric field and the electric potential. - Thin lenses and optical instruments - Thin lens equation and lens-Makers' Equation -The lateral magnification-fundamental principles of light by lenses (converging lens- diverging lens) - Graphical method of forming images by converging lens and diverging lens -The Power of lens -Combination of thin lenses -Thin Lenses in Contac -The simple magnifier –The compound Microscope –The Astronomical Telescope. **Labs/Tutorials:** - Determination of apex angel and refractive index of prism by using spectrometer..		A1.2
4	Midterm	1	A1.1, A1.2, A1.3
5	**Lectures:** - Capacitors – The parallel plate capacitor – Cylindrical capacitor – Spherical capacitor. - Electric volume energy density – Effect of a conductor inside a capacitor -Effect of an insulator inside a capacitor. - Diffraction and polarization of light - Interference of light waves and conditions for Interference - Young's Double Slit experiment Lloyd's mirror - Interference in thin films, find of constructive and destructive -Application on Interference in thin films - Newton's Rings -The Michelson interferometer. **Labs/Tutorials:** - Determination of the electrochemical equivalent of copper. - Determination of radius of curvature of convex lens by using Newton's rings.	1	A1.1, A1.2, A1.3, A2.2
6	**Lectures:** - Electric current and Ohm's Law Solving electrical circuit by using Kirchhoff's Law. - Fraunhofer Diffraction -Fresnel Diffraction – Single slit diffraction -The diffraction grating - Resolving power of the diffraction grating - Polarization of light waves -Polarization by	1	A1.1, A1.2, A1.3, A2.2, A2.3

	selective absorption polarization by reflection. - Polarization by Double Refraction. - Polarization by Scattering. **Labs/Tutorials:** - Investigate ohm's low experiment.		
7	**Lectures:** - Services within neighborhoods Magnetic fields and Magnetic forces (magnetic field intensity - magnetic induction-magnetic flux - magnetic moment - magnetic voltage) - The relation between the magnetic potential and the magnetic field intensity. Magnetic effect for the electric current (Biot - Savart Law- Magnetic induction of a circular conductor - Magnetic induction of a straight conductor). - Laser emission - Types of laser emission - Population inversion by optical pumping - Gaseous laser (Helium-Neon) -The holography (Pictures in three dimensions)-Fluorescence and phosphorescence-Laser application (Industrial, Medical, Military, and daily application). **Labs/Tutorials:** - Determination of magnetic dipole constant of magnetic by magnetometer**.**	1	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3
8	Final Term Examination	1	A1.1, A1.2, A1.3, A1.4

Course: Physics (2)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics	A1.1 Identify the basics of electric field and its laws, the relation between the magnetic potential and the magnetic field intensity, the nature of light waves. A1.2 Distinguish between the electric conductors and insulators, between different properties of light and between images formed by various lenses. A1.3 Recognize the electric field by using Gauss's Law, the Capacitors, effect of an insulator inside a capacitor. A1.4 Recognize the Magnetic fields, Magnetic forces, and the optical instruments and lenses.
A2. 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.	A2.1 Investigate Snell's law of light refraction, ohm's law experiment and Stefan Boltzmann's radiation law. A2.2 Evaluate different parameters of optical lenses and the prism, the electrochemical equivalent of copper, magnetic dipole constant of magnetic by magnetometer. A2.3 Show the different parameters through the lens maker's equation and the angular magnification for optical instruments.

Course Coordinator: Ass. Prof. Dr. Abdel Naser Ahmed Mansour
Dr. Fatma Fathy El-Sanabary

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Production Engineering & Mechanical Design		
Course Code	**PRD001**		
Year/ Level	Preparatory year		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	0	2

2. Course aims:

No.	Aim
1	Identify the basic knowledge for both manufacturing and industrial engineering beside the information about engineering materials, workshop safety and bench work. Acquire knowledge and skills in the use of hand tools, layout tools, measuring tools and machine tools

3. Learning Outcomes (LOs):

A1.1	Identify the classification of engineering materials according to their crystal structures and their main properties.
A1.2	Recognize the tools and the methods that are used in designing and manufacturing of casting processes.
A1.3	Demonstrate the essential knowledge to understand and conduct forming and cutting processes.
A2.1	Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements.
A2.2	Select a proper material and a suitable process considering design requirements to obtain a certain product.
A2.3	Use measuring instruments and workshops to conduct the practical part of the course.
A4.1	Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and industrial safety requirements and environmental issues during conducting the workshops.
A4.2	Apply safe systems at work to observe the appropriate steps to manage risk during conducting the workshops.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to engineering materials. **Labs/Tutorials:** • Carpentry workshop.	1
2	**Lectures:** • Crystal structures of metals and alloys. **Labs/Tutorials:** • Models Workshop.	2-3
3	**Lectures:** • Metal alloys – Powder metallurgy. **Labs/Tutorials:** • Casting Processes Workshop.	4
4	**Lectures:** • Casting processes. **Labs/Tutorials:** • Welding Workshop.	5-6
5	**Lectures:** • Forming processes (forging, rolling, extrusion and drawing). **Labs/Tutorials:** • Workbench Processes Workshop.	7-8
6	Midterm	9
7	**Lectures:** • Cutting processes (turning, planning, milling, drilling and grinding). **Labs/Tutorials:** • Lathing Workshop.	10-11
8	**Lectures:** • Welding processes **Labs/Tutorials:** • Machine workshop.	12
9	**Lectures:** • Bench Work (Filling, Taping, Drilling and Sawing). **Labs/Tutorials:** • Electricity Workshop.	13
10	**Lectures:** • Measuring tools, quality and safely. **Labs/Tutorials:** • Laboratory measurements and measuring instrumentations.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A1.1**	x	x			x	x								
	A1.2	x	x			x	x								
	A1.3	x	x			x	x								
	A2.1	x				x				x					x
	A2.2	x				x	x								x
	A2.3	x		x		x				x					x
	A4.1	x		x		x	x								
	A4.2	x		x		x				x					

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A2.1, A2.2, A4.1
2	Practical	A2.1, A2.2, A2.3,
3	Formative (quizzes- online quizzes- presentation)	A1.1, A1.2, A1.3, A2.1, A2.2, A2.3, A4.1, A4.2
4	Final Term Examination (written)	A1.1, A1.2, A1.3, A2.1, A2.2, A4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical	15
3	Formative (quizzes- online quizzes- presentation)	Every 3 weeks
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical	10
3	Formative (quizzes- online quizzes- presentation)	20
4	Final Term Examination (written)	60
Total		100%

8. List of References:

No.	Reference List
1	Mittemeijer, E. J. Fundamentals of Materials Science: The Microstructure–Property Relationship Using Metals as Model Systems, 2010.
2	Fundamentals of Manufacturing for Engineers, Published by University College London (UCL), 1996.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Introduction to engineering materials. **Labs/Tutorials:** • Carpentry workshop.	1	A1.1, A1.2, A4.2
2	**Lectures:** • Crystal structures of metals and alloys. **Labs/Tutorials:** • Models Workshop.	1	A1.1, A1.2
3	**Lectures:** • Metal alloys – Powder metallurgy. **Labs/Tutorials:** • Casting Processes Workshop.	1	A1.1, A1.3, A2.2, A2.3, A4.1
4	**Lectures:** • Casting processes. **Labs/Tutorials:** • Welding Workshop.	1	A1.1, A1.2, A2.3, A4.2
5	**Lectures:** • Forming processes (forging, rolling, extrusion and drawing). **Labs/Tutorials:** • Workbench Processes Workshop.	1	A1.3, A2.2, A2.3, A4.1
6	Midterm	1	A.1, A1.2, A1.3, A2.1, A2.2, A4.1
7	**Lectures:** • Cutting processes (turning, planning, milling, drilling, and grinding). **Labs/Tutorials:** • Lathing Workshop.	1	A1.3, A2.2, A2.3, A4.1
8	**Lectures:** • Welding processes **Labs/Tutorials:** • Machine workshop.	1	A2.1, A2.2, A2.3, A4.1, A4.2
9	**Lectures:** • Bench Work (Filling, Taping, Drilling and Sawing). **Labs/Tutorials:** • Electricity Workshop.	1	A1.3, A2.2, A4.2

10	**Lectures:** • Measuring tools, quality and safely. **Labs/Tutorials:** • Laboratory measurements and measuring instrumentations.	1	A2.2, A2.3

Course: Production Technology	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Identify the classification of engineering materials according to their crystal structures and their main properties. A1.2 Recognize the tools and the methods that are used in designing and manufacturing of casting processes. A1.3 Demonstrate the essential knowledge to understand and conduct forming and cutting processes.
A2. 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.	A2.1 Develop a creative and innovative way to select appropriate method to conduct forming, cutting, welding, and casting processes, considering design requirements. A2.2 Select a proper material and a suitable process considering design requirements to obtain a certain product. A2.3 Use measuring instruments and workshops to conduct the practical part of the course.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Utilize the essential knowledge to apply quality assurance requirements, codes of practice and standards, health and Industrial safety requirements and environmental issues during conducting the workshops. A4.2 Apply safe systems at work to observe the appropriate steps to manage risk during conducting the workshops.

Course Coordinator: Prof. Dr. Ahmed Nassef

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Production Engineering & Mechanical Design</td></tr>
<tr><td>Course Code</td><td colspan="3">PRD003</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Preparing year – Second semester</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>1</td><td>3</td><td>-</td></tr>
</table>

2. Course aims:

No.	**Aim**
1	Provide the Student, the basic knowledge and skills of the concepts and principles of engineering drawing and fundamental of drawing projections. The basic principles of drawing with several applications are also studied.

3. Learning Outcomes (LOs):

A1.1	Identify the materials related to the parts of machines.
A1.2	Analyze the engineering problems that are used in engineering drawing.
A3.1	Apply the computer software (AutoCAD) for different drawing exercises.
A3.2	Use the image and samples of machines drawing applications.
A10.1	Identify the different type of drawing exercise.
A10.2	Study the characteristics and processes related to the different machines and symbol drawing.
A10.3	Use engineering drawing and mechanics drawing handbook.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Review on the drawing of the third projector with the knowledge of the other projections. **Tutorials:** • Drawing of some exercise for third projector.	1
2	**Lectures:** • How to make a section in the engineering drawing. **Tutorials:** • Drawing of some exercise on simple section geometrics.	2
3	**Lectures:** • Definition of the different Types in section bodies. **Tutorials:** • Drawing of some exercise for section bodies.	3-4
4	**Lectures:** • Intersections of bodies and surfaces and development of surfaces. **Tutorials:** • Exercise on the intersections of bodies.	5
5	**Lectures:** • How to draw the screw and nut in screwed joints. **Tutorials:** • Drawing of some exercise on screws and nuts.	6
6	**Lectures:** • Drawing of the sections for different types of screwed joints. **Tutorials:** • Drawing some exercise on the sections for different types of screwed joints.	7-8
7	Midterm	9
8	**Lectures:** • Identification for different of steel sections. **Tutorials:** • Steel construction, Symbols of electrical circuits, fasteners.	10-11
9	**Lectures:** • Drawing of the sections for different types of steel joints. **Tutorials:** • Some exercise on the sections for different types of steel joints.	12-13
10	**Lectures:** • Assembly of some mechanical components. **Labs:** • Computer aided drafting using solid work program.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x		x	x									
	A1.2	x	x		x		x								
	A3.1	x	x		x	x	x	x							
	A3.2	x	x		x										
	A8.1	x	x		x						x	x			
	A8.2	x	x	x	x	x	x	x							
	A8.3			x							x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.2, A8.1, A8.2
2	Formative (quizzes- online quizzes)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2, A8.3
3	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A8.1, A8.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes)	Every 3 weeks
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	Reference List
1	K. L. Narayana, P. Kannaiah, and K. Venkata Reddy ' Machine Drawing' New Age International (P) Ltd., 2006.
2	Fatehy El-shrif, ' Mechanical Drawing' Helwan Univ., 1975.
3	C. Simmons, D. Maguive, and N. Phelps, 'Manual of Engineering Drawing', Elsevier Ltd., 2012.
4	K. R. Hart 'Engineering Drawing with Problems and Solutions' ELBS, 1984.
5	Book," Engineering Drawing", prepared by staff of production engineering and Machine design department

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Review on the drawing of the third projector with the knowledge of the other projections. **Labs/Tutorials:** • Drawing of some exercise for third projector.	1	A1.1
2	**Lectures:** • How to make a section in the engineering drawing. **Labs/Tutorials:** • Drawing of some exercise on simple section geometrics.	1	A1.2
3	**Lectures:** • Definition of the different Types in section bodies. **Labs/Tutorials:** • Drawing of some exercise for section bodies.	1	A1.2, A3.2, A8.1
4	**Lectures:** • Intersections of bodies and surfaces and development of surfaces. **Labs/Tutorials:** • Exercise on the intersections of bodies.	1	A1.2, A3.2, A8.1, A8.2
5	**Lectures:** • How to draw the screw and nut in screwed joints. **Labs/Tutorials:** • Drawing of some exercise on screws and nuts.	1	A1.2, A3.2, A8.1, A8.2
6	**Lectures:** • Drawing of the sections for different types of screwed joints. **Labs/Tutorials:** • Drawing some exercise on the sections for different types of screwed joints.	1	A1.2, A3.2, A8.1, A8.2, A8.3
7	Midterm	1	A1.1, A1.2, A3.2, A8.1, A8.2
8	**Lectures:** • Identification for different of steel sections. **Labs/Tutorials:** • Steel construction, Symbols of electrical circuits, fasteners.	1	A1.2, A3.1, A3.2, A8.1, A8.2

9	**Lectures:** - Drawing of the sections for different types of steel joints. **Labs/Tutorials:** - Some exercise on the sections for different types of steel joints.	1	A1.2, A3.1, A3.2, A8.1, A8.2, A8.3
10	**Lectures:** - Assembly of some mechanical components. **Labs/Tutorials:** - Computer aided drafting using solid work program.	1	A1.2, A3.1, A3.2, A8.1, A8.2, A8.3

Course: Engineering Drawing and Geometric Projection (2)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the materials related to the parts of machines. A1.2 Analyze the engineering problems that are used in engineering drawing.
A3. 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.	A3.1 Apply the computer software (AutoCAD) for different drawing exercises. A3.2 Use the image and samples of machines drawing applications.
A10. Acquire and apply new knowledge, and practice self, lifelong and other learning strategies.	A10.1 Apply the different type of drawing exercise. A10.2 Study the characteristics and processes related to the different machines and symbol drawing. A10.3 Use engineering drawing and mechanics drawing handbook.

Course Coordinator: Prof. Dr. Gamal Abdel Nasser

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	**CCE001**		
Year/ Level	Preparatory year – 2nd Semester		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	0	2

2. Course aims:

No.	Aim
1	Describe an introduction to personal computer, operating systems, filling systems, and introduction to word processing; spread sheet theory, introduction to data base, multi-media and presentations, introduction to computer networks.

3. Learning Outcomes (LOs):

A1.1	Define the concept of personal computers.
A1.2	Describe and review of basic computer languages.
A3.1	Describe the different word processing tools.
A3.2	Develop spreadsheets exercises.
A3.3	Create different types and designs of presentations.
A10.1	Prepare different database panes.
A10.2	Apply different techniques to relate surfing the network.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Introduction to PC **Labs/Tutorials:** - Operating Systems (DOS – WINDOWS)	1-2
2	**Lectures:** - Filling Systems **Labs/Tutorials:** - Word Processing.	3-4
3	**Lectures:** - Introduction to Computer Network **Labs/Tutorials:** - Application of Network Surfing.	5-6
4	**Lectures:** - Introduction to Data Base. **Labs/Tutorials:** - Access Database.	7-8
5	Midterm	9
6	**Lectures:** - Multimedia & Presentation. **Labs/Tutorials:** - Spreadsheet Theory.	10-12
7	**Lectures:** - General Revision **Labs/Tutorials:** - General Revision	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x	x	x		x								
	A1.2	x	x		x	x		x	x				x		
	A3.1	x	x		x	x	x		x						
	A3.2	x	x		x			x							
	A3.3	x	x		x		x								x
	A10.1		x		x			x							x
	A10.2		x		x		x								x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A3.1, A3.2
2	Practical	A10.1
3	Formative (quizzes- online quizzes)	A1.1, A1.2, A3.1, A3.2,
4	Final Term Examination (written)	A1.1, A1.2, A3.1, A3.2, A10.1, A10.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical	15
3	Formative (quizzes- online quizzes)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical	20
3	Formative (quizzes- online quizzes)	٢٠
4	Final Term Examination (written)	٥٠
Total		100%

8. List of References

No.	Reference List
1	"Computers - Timeline of Computer History - Computer History Museum". Retrieved 9 January 2017.
2	Ackerman, Dan (22 August 2013). "Don't buy a new PC or Mac before you read this". CNET. CBS Interactive. Retrieved 5 October 2014.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Introduction to PC **Labs/Tutorials:** • Operating Systems (DOS – WINDOWS)	1	A1.1
2	**Lectures:** • Filling Systems **Labs/Tutorials:** • Word Processing.	1	A3.1
3	**Lectures:** • Introduction to Computer Network **Labs/Tutorials:** • Application of Network Surfing.	1	A1.1, A1.2, A10.2
4	**Lectures:** • Introduction to Data Base. **Labs/Tutorials:** • Access Database.	1	A1.1, A1.2, A3.3, A10.2
5	Midterm	1	A1.1, A1.2, A3.3, A10.2
6	**Lectures:** • Multimedia & Presentation. **Labs/Tutorials:** • Spreadsheet Theory.	1	A3.2
7	**Lectures:** • General Revision **Labs/Tutorials:** • General Revision	1	A1.1, A1.2, A3.1, A10.2

Course: Computer and programming	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the concept of personal computers. A1.2 Describe and review of basic computer languages.
A3. 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.	A3.1 Describe the different word processing tools. A3.2 Develop spreadsheets exercises. A3.3 Create different types and designs of presentations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Prepare different database panes. A10.2 Apply different techniques to relate surfing the network.

Course Coordinator: Dr. Walaa Elsayed Saber

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	**HUU002**		
Year/ Level	Preparatory year- Second semester		
Teaching Hours	Lectures	Tutorial	Practical
	2	---	---

2. Course Aims:

No.	**Aim**
1	Identify the basic knowledge and skills of political significance of human rights, the idea of "universal" human rights, its global politics for condemning these and other crimes against humanity.

3. Learning Outcomes (LOs):

A8-1	Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation.
A8-2	Work independently and within a team for class project and assignments.
A9-1	Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals.
A9-2	Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights
A10-1	Organize and manage time and resources effectively; for short-term and longer-term commitments.
A10-2	Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
A10-3	Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS

4. Course Contents:

Week No.	*Topic*	*Total Hours*	*Contact hrs*		
			Lec.	**Tut.**	**Lab.**
Week 1-2	What are human rights? (Or the problem of definitions).	4	4	--	--
Week-3	Foundations of rights: enlightenment history and theory.	2	2	--	--
Week 4	The united nations: structure and function.	2	2	--	--
Week 5	Genocide, international criminal law, and human rights courts.	2	2	--	--
Week 6	The interrelatedness of rights.	2	2	--	--
Week 7	Types of rights 1: civil and political rights.	2	2	--	--
Weeks 8	Types of rights: economic, social, and cultural rights.	2	2		
Week 9	Midterm Exam	2	2		
Week 10	Human rights in Egypt.	2	2		
Week 11	Social movements, social media, and representations of rights.	2	2	--	--
Week 12	Human rights narratives.	2	2		
Week 13	“Special rights”: women’s rights.	2	2		
Week 14-15	Group project discussion and presentation	4	4		

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method													
		Lecture (online-In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A8-1	X		X	X	X		X	X			X			
	A8-2	X			X			X	X		X				
	A9-1	X				X		X							
	A9-2	X		X		X		X							
	A10-1	X			X				X			X			
	A10-2	X				X		X							
	A10-3	X				X		X							

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and documentation.

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A8-1, A8-2, A9-1, A9-2, A10-2, A10-3
2	Formative (quizzes- online quizzes- presentation - reports)	A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3
3	Final Term Examination (written)	A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	Week 9
2	Formative (quizzes- online quizzes- presentation - reports)	Throughout the semester
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Formative (quizzes- online quizzes- presentation - reports)	١٠
3	Final Term Examination (written)	٨٠
Total		100%

8. List of References:

No.	Reference List
1	Surya P. Subedi, OBE, QC, The Effectiveness of the UN Human Rights System: Reform and the Judicialisation of Human Rights, 2019
2	Daniel Moeckli, Sangeeta Shah, Sandesh Sivakumaran, David Harris, International Human Rights Law 1st Edition, Oxford University Press; 2010.
3	Reis Monteiro, A., Ethics of Human Rights.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	What are human rights? (Or the problem of definitions).	1	A8-1, A8-2, A9-1
2	Foundations of rights: enlightenment history and theory.	1	A8-1, A8-2, A9-1, A9-2
3	The united nations: structure and function.	1	A8-1, A8-2, A9-1, A9-2
4	Genocide, international criminal law, and human rights courts.	1	A8-1, A8-2, A10-3
5	The interrelatedness of rights.	1	A8-1, A8-2, A10-2
6	Types of rights 1: civil and political rights.	1	A8-1, A8-2, A10-2
7	Types of rights: economic, social, and cultural rights.	1	A8-1, A8-2, A10-2
8	Midterm Exam	1	A8-1, A8-2, A9-1, A9-2, A10-2, A10-3
9	Human rights in Egypt.	1	A9-1, A9-2, A10-2
10	Social movements, social media, and representations of rights.	1	A9-1, A10-2
11	Human rights narratives.	1	A9-1, A10-2
12	“Special rights”: women’s rights.	1	A9-1, A10-2
13	Group project discussion and presentation	1	A8-1, A8-2, A9-1, A9-2, A10-1, A10-2, A10-3

Course: Human Rights	
Program LOs	**Course Los**
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate effectively with colleges to prepare and present HUMAN RIGHTS case studies as a technical report and presentation.
	A8-2 Work independently and within a team for class project and assignments.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Use Moral Elements in The HUMAN RIGHTS to Lead and motivate individuals.
	A9-2 Use FOUNDATIONS OF RIGHTS to anticipate and respond to new situations related to Human Rights.
A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Organize and manage time and resources effectively; for short-term and longer-term commitments.
	A10-2 Demonstrate an understanding of the effect of Symptoms Scientific Thought in Society.
	A10-3 Identify the difference between INTERNATIONAL CRIMINAL LAW, and HUMAN RIGHTS COURTS

Course Coordinator: Dr. Mona Hamouda

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

Course Specifications

First Year

For

B. Sc. in Electrical Engineering Program

(Specialization: Electronics and Communications Engineering)

Bylaw 2014

1. Basic Information:

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	SCI108		
Year/ Level	First year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	---

2. Course aims:

No.	**aim**
1	Apply knowledge to understand some basic of calculus: Multiple Integrals, The normal and tangent plane, Surface Integration, Differential equations of the first order (basic definitions, separable, homogeneous, exact equations) , Partial derivatives applications, Maxima of Multivariate functions, Higher order differential equations: (homogeneous and non-homogeneous), Simultaneous, Curvature and Special curves.

3. Learning Outcomes (LOs):

A1.1	Define the different classification of equations.
A1.2	Recognize the different between the different types of differential equations.
A1.3	Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters.
A1.4	Identify the different between the double Integral and the triple Integral.
A1.5	Recognize the different between the Maximum and minimum of function of two Variables
A1.6	Recognize the concepts and theories of Fourier series.
A10.1	Apply the different methods to solve the second order differential equations to determine the particular solutions.
A10.2	Solve multiple integrals in any other area.
A10.3	Show functions of several variables in various fields.
A10.4	Apply Fourier series methodology to solve different problems related to electrical engineering field.
B2.1	Distinguish between the different kinds of the differential equations of the first order (or second order).
B2.2	Acquire the operator method and variation of parameters to find the general solution for the second order differential equations.
B2.3	Evaluate double integrals, changing the order of integration, using polar coordinates.
B2.4	Evaluate triple integral, using cylindrical and spherical coordinates.
B2.5	Apply the limits and discussing continuity and studying differentiability, of functions of several variable.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: First Order Differential Equations: • Introduction about Classification of the Differential Equations • Separation of Variables, • Homogeneous Equations • Exact Equations • Integrating Factors • Linear Equations • Bernoulli's Equation **Tutorials:** • Apply the classification of differential equations. • Practice of solving differential equations.	1-4
2	**Lectures:** Chapter 2: Higher Order Linear Differential Equation. • Homogeneous equations with constant coefficients. • Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters. **Tutorials:** • Apply the different methods to solve the second order differential equations and determine the particular solutions.	5-7
3	**Lectures:** Chapter 3: Multiple Integrals • Double integral • Triple integral • Surface integration **Tutorials:** • Evaluate the double Integral, the triple Integral and the area between two curves. • Solve multiple integrals in any other area.	8
4	**Midterm**	9
5	**Lectures:** Chapter 4: Functions of Several Variables • Partial derivatives • Euler's Theorem for homogeneous Functions • Exact differentials • Taylor series of a function of two variables • Maximum and minimum of a function of two variables **Tutorials:** • Apply the limits , discuss continuity , and solve differentiability, of functions of several variable. • Use of text- books to solve some problems and collect some data.	10-12

6	**Lectures:** Chapter 5: Fourier series (Periodic functions - triangular series - Fourier series of functions of the **2-pi** cycle - Fourier series of even and odd functions - Fourier series of functions with different cycles). **Tutorials:** • Use of text- books to solve some problems and collect some data.	13-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture(on line / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial(on line / in class)**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x													
	A1.2	x	x				x									
	A1.3	x	x	x			x									
	A1.4	x	x				x									
	A1.5	x	x	x			x	x								
	A1.6	x	x				x	x								
	A10.1	x	x				x									
	A10.2	x	x				x	x								
	A10.3	x	x	x			x									
	A10.4	x					x	x	x							
B-Level	**B1.1**	x	x	x			x	x								
	B1.2	x	x	x			x									
	B1.3	x	x				x	x								
	B1.4	x	x				x	x								
	B1.5	x	x	x			x									

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments
3	Lecture (online / in class)

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A10.1, A10.2, B2.1 B2.2
2	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A10.1, A10.2 , A10.3, A10.4, B2.1 B2.2, B2.3, B2.4, B2.5
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A10.1, A10.2, A10.3, A10.4, B2.1 B2.2, B2.3, B2.4, B2.5

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Sheply L. Ross, John Wiley and Sons, “Differential equations 3rd Edition”, copy right 1984, by john Wiley & Sons, Inc., published simultaneously in Canada 2017.
2	Dennis G. Zill and Michael R. Cullen, “Differential Equations with Boundary Problem”, seven edition, PWS Publishers; published simultaneously in Canada, 2009
3	William E. Boyce, Richard:" Elementary Differential Equations and Boundary Value Problems", 8th Edition Wiley, Publisher John Wiley & Sons, Inc., 2014.
4	K. A. Stroud and Dexter J. Booth, “Advanced Engineering Mathematics” publisher Palgrave Macmillan, 2011.
5	Erwin Kreyszig, Kreyszig Textbook: “Advanced Engineering Mathematics, 10th Edition- slader, 2011

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** Chapter 1: First Order Differential Equations: • Introduction about Classification of the Differential Equations • Separation of Variables, • Homogeneous Equations • Exact Equations • Integrating Factors • Linear Equations • Bernoulli’s Equation **Tutorials:** • Apply the classification of differential equations. • Practice of solving differential equations	1	A1.1, A1.2, A10.1, B2.1
2	**Lectures:** Chapter 2: Higher Order Linear Differential Equation. • Homogeneous equations with constant coefficients.	1	A1.3, A10.2, B2.2

	- Non homogeneous equations; Method of Undetermined coefficients – Variation of parameters. **Tutorials:** - Apply the different methods to solve the second order differential equations and determine the particular solutions.		
3	**Lectures:** Chapter 3: Multiple Integrals - Double integral - Triple integral - Surface integration **Tutorials:** - Evaluate the double Integral, the triple Integral and the area between two curves. - Solve multiple integrals in any other area.	1	A1.4, A10.3, B2.3
4	**Lectures:** Chapter 4: Functions of Several Variables - Partial derivatives - Euler's Theorem for homogeneous Functions - Exact differentials - Taylor series of a function of two variables - Maximum and minimum of a function of two variables **Tutorials:** - Apply the limits, discuss continuity, and solve differentiability, of functions of several variable. - Use of text- books to solve some problems and collect some data.	1	A1.5, A10.2 , B2.4, B2.5
5	**Lectures:** Chapter 5: Fourier series (Periodic functions - triangular series - Fourier series of functions of the **2-pi** cycle - Fourier series of even and odd functions - Fourier series of functions with different cycles). **Tutorials:** - Use of text- books to solve some problems and collect some data.	1	A10.4, A1.6

Course: Mathematics (3-A)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the different classification of equations. A1.2 Recognize the different between the different types of differential equations. A1.3 Categorize the Non homogeneous equations; Method of Undetermined coefficients and Variation of parameters. A1.4 Identify the different between the double Integral and the triple Integral. A1.5 Recognize the different between the maximum and minimum of function of two variables. A1.6 Recognize the concepts and theories of Fourier series.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply the different methods to solve the second order differential equations and determine the particular solutions. A10.2 Solve multiple integrals in any other area. A10.3 Show functions of several variables in various fields. A10.4 Apply Fourier series methodology to solve different problems related to electrical engineering field.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Distinguish between the different kinds of the differential equations of the first order (or second order). B2.2 Acquire the operator method and variation of parameters to find the

	general solution for the second order differential equations. B3.3 Evaluate double integrals, changing the order of integration, using polar coordinates. B4.4 Evaluate triple integral, using cylindrical and spherical coordinates. B5.5 Apply the limits and discussing continuity, and studying differentiability, of functions of several variable.

Course Coordinator: Dr. Sally Eleissawy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical engineering		
Course Code	SCI114		
Year/ Level	First year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab
	2	-	2

2. Course aims:

No.	**aim**
1	Apply knowledge of electrical physics including Electron in a matter, free electron theory, Energy distribution functions, Semiconductors, Superconductors and Nanotechnology.

3. Learning Outcomes (LOs):

A1.1	Identify basics of modern physics, quantum physics and their application in electrical physics
A1.2	Outline the differences between solid state materials and their thermal, electrical and crystal structure properties.
A1.3	State the basics of semiconductor science and its electronic applications.
A1.4	Recognize Free electron theory and motion of electrons in electromagnetic fields.
A2.1	Collect characteristics of photodiode experimentally.
A2.2	Conduct appropriate experimentation to study diffraction.
A10.1	Apply new knowledge in Superconductivity and Nanotechnology by using self-learning.
B2.1	Analyze the I-V characteristic curve of classic Diode and LED.
B2.2	Determine the breakdown voltage of Zener diode graphically and applying it in voltage regulator circuit.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Plank's Quantum Theory - Photoelectric effect, Einstein equation Applications of the Photoelectric Effect - Compton Effect. - De- Broglie Equation - Davisson and Germer experiment. Uncertainty principals. **Labs:** - Analyze the I-V characteristic curve of classic Diode and LED.	1-2
2	**Lectures:** - Free electron theory - Motion of electron in electromagnetic fields. **Labs:** - Determine the breakdown voltage of Zener diode graphically and apply it in voltage regulator circuit.	3-4
3	**Lectures:** - Basic Atomic Structure - Bohr’s Postulates - Bohr atomic model - Classical electron - orbital angular momentum - Quantization - Electronic Structure of elements and Pauli Exclusion Principle **Labs:** - Collect characteristics of photodiode experimentally.	5-6
4	**Lectures:** - Introduction to Semiconductor science - Diodes, LEDs and Zener Diodes - Design of solar cells and photovoltaics	7-8
5	- Midterm	9
6	**Lectures:** - Crystal structure - Thermal, optical and electrical properties. - Interference and Diffraction **Labs:** Determine the wavelength of laser beam by using diffraction grating.	10-12
7	**Lectures:** - Introduction to superconductivity. - Low and high temperature Superconductors and their applications **Labs:** Determine absorption coefficient of materials by using Beer’s law	13-14
8	**Lectures:** - Introduction to Nanotechnology. **Labs:** - Final practical examination.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	x	x			x										
	A1.2	x	x			x										
	A1.3	x	x			x										
	A1.4	x	x			x										
	A2.1		x													x
	A2.2		x													x
	A10.1				x	x			x			x				
B-Level	B2.1		x													x
	B2.2		x													x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.3, A1.4, B2.1, B2.2
2	Practical Examination	A2.1, A2.2, B2.1, B2.2
3	Oral Examination	A1.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.2, A10.1
5	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A10.1, A2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	R.A. Serway and J.W. Jewett, "Physics for Scientists and Engineers", 6th Edition, Thomson Brooks/Cole 2014.
2	Edward M. Purcell and David J. Morin, “Electricity and Magnetism”, 3rd Edition, Cambridge University, 2013.
3	Larsen and Keller Education, “Solid State Physics”, June 27, 2019

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No	Topic	aim	LO's
1	**Lectures:** • Plank's Quantum Theory - Photoelectric effect, Einstein equation Applications of the Photoelectric Effect - Compton Effect. • De- Broglie Equation - Davisson and Germer experiment. Uncertainty principals. **Labs:** • Analyze the I-V characteristic curve of classic Diode and LED.	1	A1.1, A2.1, B2.1
2	**Lectures:** • Free electron theory • Motion of electron in electromagnetic fields. **Labs:** • Determine the breakdown voltage of Zener diode graphically and apply it in voltage regulator circuit.	1	A1.4, B2.2
3	**Lectures:** • Basic Atomic Structure - Bohr's Atom- Bohr's Postulates - Bohr atomic model • Classical electron - orbital angular momentum • Quantization - Electronic Structure of elements • Pauli Exclusion Principle **Labs:** • Collect characteristics of photodiode experimentally.	1	A1.1
4	**Lectures:** • Introduction to Semiconductor science • Diodes, LEDs and Zener Diodes • Design of solar cells and photovoltaics	1	A1.3
5	Midterm	1	A1.1, A1.3, A1.4, B2.1, B2.2

6	**Lectures:** - Crystal structure, thermal, optical and electrical properties. - Interference and Diffraction **Labs:** - Determine the wavelength of laser beam by using diffraction grating.	1	A1.2, A2.2
7	**Lectures:** - Types of superconductors **Labs:** Determine absorption coefficient of materials by using Beer's law	1	A10.1, A1.2
8	**Lectures:** - Introduction to Nanotechnology. **Labs:** - Final practical examination.	1	A10.1, A1.2

Course: Physics (3-A)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify basics of modern physics, quantum physics and their application in electrical physics A1.2 Outline the differences between solid state materials and their thermal, electrical and crystal structure properties. A1.3 State the basics of semiconductor science and its electronic applications. A1.4 Recognize Free electron theory and motion of electrons in electromagnetic fields.
A2. 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.	A2.1 Collect characteristics of photodiode experimentally. A2.2 Conduct appropriate experimentation to study diffraction.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply new knowledge in Superconductivity and Nanotechnology by using self-learning.
B2. Design model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Analyze the I-V characteristic curve of classic Diode and LED. B2.2 Determine the breakdown voltage of Zener diode graphically and apply it in voltage regulator circuit.

Course Coordinator. Assistant Prof. Dr. Abdel Nasser Mansour

Dr. Fatma El-Sanabary.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE102		
Year/ Level	First year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	2

2. Course aims:

No.	aim
4	Use contemporary engineering tools, covers the fundamental of C-programming, problem solving, and software engineering and learn how to write programs that allow numeric, character and work with single and multi-dimensional arrays.

3. Learning Outcomes (LOs):

A1.1	Identify the method used for input data and output results.
A1.2	Identify the method used for creating the computer mathematical model.
A1.3	Select the suitable model for different computer problems based on the analysis.
B2.1	Select the suitable programming language.
B2.2	Design and writing a C program based on mathematical model.
B3.1	Define the method used for designing the math model that representing the system into numerical suitable For computer application.
B3.2	Design and writing a C program based on numerical modeling methods

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction and Developer Environment Setup **Labs/Tutorials:** • Review the previously mentioned object.	1
2	**Lectures:** • Intro to the C++ language **Labs/Tutorials:** • Discuss problems facing the built environment in Egypt and the possible solutions.	٢
3	**Lectures:** • The basic structure of a C++ program **Labs/Tutorials:** • Review examples of the previously mentioned object.	3
4	**Lectures:** • Declaring variables in C++ • The use and misuse of variables **Labs/Tutorials:** • Review examples of the previously mentioned object.	4-5
5	**Lectures:** • Basic syntax for if • Expressions • Else statements • While loops & Do-while loops • For loops • Choosing the right kind of loop **Labs/Tutorials:** • Review examples of the previously mentioned object.	6-8
6	**Midterm**	9
7	**Lectures:** • Functions • Breaking down a program into functions. **Labs/Tutorials:** • Review examples of the previously mentioned object.	10-12
8	**Lectures:** • Arrays **Labs/Tutorials:** • Review examples of the previously mentioned object.	13-14

9	**Lectures**: • General Revision **Labs/Tutorials:** • General Revision	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x	x			x	x								
	A1.2	x	x			x			x	x				x		
	A1.3	x	x			x	x	x		x						
C-Level	**B2.1**						x			x				x	x	
	B2.2		x			x			x		x					
	B3.1		x		x					x				x	x	
	B3.2		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, B2.1
2	Practical Examination	A1.1, A1.2, A1.3, B2.1, B3.1
3	Oral Examination	A1.1, A1.2
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2
5	Final Term Examination (written)	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	٢٠
4	Final Term Examination (written)	٥٠
Total		100%

8. List of References

No.	Reference List
1	A. Allain, Jumping into C++, 2013
2	Kernighan, B, and D. Ritchie, The C Programming Language (2nd ed.) Englewood Cliffs, NJ:Prentice-Hall, 2003.
3	Ledgard, H., with J. Tauer, C with Excellence. IN: Hayden books, 2007

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Introduction and Developer Environment Setup **Labs/Tutorials:** • Review the previously mentioned object.	4	A1.1, A1.2
2	**Lectures:** • Intro to the C++ language **Labs/Tutorials:** • Discuss problems facing the built environment in Egypt and the possible solutions.	4	A1.1, A1.2
3	**Lectures:** • The basic structure of a C++ program **Labs/Tutorials:** • Review examples of the previously mentioned object.	4	A1.1, A1.2, A1.3, B2.1,
4	**Lectures:** • Declaring variables in C++ • The use and misuse of variables **Labs/Tutorials:** • Review examples of the previously mentioned object.	4	A1.1, A1.2, A1.3, B2.1,
5	**Lectures:** • Basic syntax for if • Expressions • Else statements • While loops & Do-while loops • For loops • Choosing the right kind of loop **Labs/Tutorials:** • Review examples of the previously mentioned object.	4	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2
6	Midterm	4	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2
7	**Lectures:** • Functions • Breaking down a program into functions. **Labs/Tutorials:** • Review examples of the previously mentioned object.	4	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2

8	**Lectures:** - Arrays **Labs/Tutorials:** - Review examples of the previously mentioned object.	4	A1.1, A1.2, A1.3, B2.1, B2.2, B3.2
9	**Lectures**: - General Revision **Labs/Tutorials:** - General Revision	4	A1.1, A1.2, A1.3, B2.1, B3.1, B3.2

Course: Introduction to programming	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the method used for input data and output results. A1.2 Identify the method used for creating the computer mathematical model. A1.3 Select the suitable model for different computer problems based on the analysis.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Select the suitable programming language. B2.2 Design and writing a C program based on mathematical model.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Define the method used for designing the math model that representing the system into numerical suitable For computer application. B3.2 Design and writing a C program based on numerical modeling methods

Course Coordinator: Dr. Walaa Elsayed Saber

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE103		
Year/ Level	First-year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
1	Apply knowledge about the basics of Boolean algebra rules, logic gates, and logic circuits families to design arithmetic circuits, logical combinational circuits, and sequential circuits and get acquainted with the applications of counters, registers, shifters, control units, and memories.

3. Learning Outcomes (LOs):

A1.1	Identify the number systems and the different mathematical operations on them.
A2.1	Analyze different types of logic gates and their expression simplification methods.
A4.1	Utilize excitation equations and tables of different types of logic gates to design various types of Combinational logic circuits.
A4.2	Utilize excitation equations and tables of different types of logic gates to design various types of Sequential logic circuits.
A4.3	Utilize excitation equations and tables of different types of logic gates to design various types of Flip-flop circuits.
A5.1	Apply appropriate mathematical and computer-based methods to model and analyze logic circuits.
A6.1	Apply knowledge of mathematics, engineering knowledge, and practice integrally to solve realistic engineering problems related to logic circuits.
A9.1	Produce designs for logic circuits to perform different logic operations.
A10.1	Create innovative solutions for designing the most economical logic circuits.
B2.1	Use measuring instruments and laboratory equipment to design experiments, collect, analyze and interpret collected data.
B4.1	Use a wide range of analytical tools, techniques, and software packages to analyze logic circuits.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Number Systems and Boolean algebra rules. **Tutorial:** Solving problems related to the lecture contents.	1-2
2	**Lecture:** Logical gates: Introduction – Simplification techniques of logic expressions such as karnough maps. **Tutorial:** Solving problems related to the lecture contents. **Lab:** • Introducing the digital lab device and how to use it. • Introducing different ICs and learning their function from Data Sheets. • Identifying ICs pin's number and how to put them on the board of the device. • Connecting 1-AND gate as a simple experiment to begin with.	3-4
3	**Lectures:** Design of Combinational circuits with AND, OR, and INVERTER gates. **Tutorial /Lab:** Proving the De-Morgan's Laws theoretically using Boolean algebra of the well-known functions: NAND and NOR gates and how to use them to prove De-Morgan's Laws experimentally.	5-6
4	**Lecture:** Arithmetic circuits (Part 1): Half adder and full adder, Binary parallel adder, Binary adders and subtractors, Comparators. **Tutorial /Lab:** Solving problems related to the above arithmetic logic circuits analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.	7-8
5	**Midterm**	9
6	**Lecture:** Arithmetic circuits (Part 2): Decoders, Encoders, Multiplexers, Demultiplexers, PLA, ROM. **Tutorial /Lab:** Solving problems related to the above arithmetic logic circuits analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.	10-12
7	**Lecture:** The basics of Flip-Flops as a storage element. **Lab:** Experimentally test the Flip-Flop function operation.	13
8	**Lecture:** Introduction to the design of sequential circuits – Types of counters. **Tutorial /Lab:** Solving problems related to the above subjects analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brainstorming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x	x			x									
	A2.1	x	x	x			x									
	A4.1	x	x				x	x								
	A4.2	x	x					x							x	
	A4.3	x	x				x	x							x	
	A5.1	x	x				x								x	
	A6.1	x					x					x			x	
	A9.1	x					x					x			x	
	A10.1	x	x				x					x				
B-Level	B2.1		x		x		x			x		x			x	
	B4.1				x		x			x		x			x	

6. Teaching and Learning Methods of Disabled Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2.1, A4.1, A4.2
2	Practical Examination	A1.1, A2.1, A4.1, A4.2, A4.3, A5.1,

3	Oral Examination	A1.1, A6.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A2.1, A4.1, A4.2, A4.3, A5.1, A6.1, A9.1, B2.2, B4.1
5	Final Term Examination (written)	A1.1, A2.1, A4.1, A4.2, A4.3, A5.1, A6.1, A9.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	A. B. Marcovitz, Introduction to Logic Design, Boston, MA McGraw-Hill, 2010.
2	A. P. Malvino, Digital Computer Electronics: An Introduction to Microcomputers, 5th Edition, 2003.
3	M. M. Mano, Digital Logic and Computer Design, 2nd Edition, Pearson, 2016.
4	T. C. Bartee, Digital Computer Fundamentals, 6th Edition, McGraw-Hill, 2011.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** Number Systems and Boolean algebra rules. - **Tutorial:** Solving problems related to the lecture contents.	1	A1.1
2	**Lecture:** Logical gates: Introduction – Simplification techniques of logic expressions such as karnough maps. **Tutorial:** Solving problems related to the lecture contents. **Lab:** - Introducing the digital lab device and how to use it. - Introducing different ICs and learning their function from Data Sheets. - Identifying ICs pin's number and how to put them on the board of the device. - Connecting 1-AND gate as a simple experiment to begin with.	1	A2.1
3	**Lectures:** Design of Combinational circuits with AND, OR, and INVERTER gates. - **Tutorial /Lab:** Proving the De-Morgan's Laws theoretically using Boolean algebra of the well-known functions: NAND and NOR gates and how to use them to prove De-Morgan's Laws experimentally.	1	A2.1, A4.1, B2.1, B4.1
4	Midterm	1	A1.1, A2.1, A4.1, A4.2
5	**Lecture:** Arithmetic circuits (Part 1): Half adder and full adder, Binary parallel adder, Binary adders and subtractors, Comparators. - **Tutorial /Lab:** Solving problems related to the above arithmetic logic circuits analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.	1	A2.1, A4.1, B2.1, B4.1
6	**Lecture:** Arithmetic circuits (Part 2): Decoders, Encoders, Multiplexers, Demultiplexers, PLA, ROM. - **Tutorial /Lab:** Solving problems related to the above arithmetic logic circuits analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.	1	A2.1, A4.1, B2.1, B4.1
7	**Lecture:** The basics of Flip-Flops as a storage element. **Lab:** Experimentally test the Flip-Flop function operation.	1	A4.2, B2.1, B4.1
8	**Lecture:** Introduction to the design of sequential circuits – Types of counters. - **Tutorial /Lab:** Solving problems related to the above	1	A4.3, B2.1, B4.1

		subjects analytically and using circuit simulator – Verification of some of the above results by experimentally realization using laboratory components and equipment.		

Course: Logic Circuits (1)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	A1.1 Identify the number systems and the different mathematical operations on them.
A2. 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.	A2.1 Analyze different types of logic gates and their expression simplification methods.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4.1 Utilize excitation equations and tables of different types of logic gates to design various types of Combinational logic circuits. A4.2 Utilize excitation equations and tables of different logic gates to design various types of Sequential logic circuits. A4.3 Utilize excitation equations and tables of different logic gates to design various types of Flip-flop circuits.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Apply appropriate mathematical and computer-based methods to model and analyze logic circuits.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Apply knowledge of mathematics, engineering knowledge, and practice integrally to solve realistic engineering problems related to logic circuits.
A9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Produce designs for logic circuits to perform different mathematical/logic operations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Create innovative solutions for designing the most economical logic circuits
B2. Design, model and analyze an electrical/electronic/digital system or component fora specific application; and identify the tools required to optimize this design.	B2.1 Use measuring instruments and laboratory equipment to design experiments, collect, analyze and interpret collected data.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Use a wide range of analytical tools, techniques, and software packages to analyze logic circuits.

Course Coordinator: Prof. Dr. Rawya Rizk,

Dr. Mona Nashaat

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	EPM101		
Year/ Level	First year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
1	Apply basic knowledge of electrical circuits’ components and analysis to explain different sources of electrical waves, direct current circuits, electrical analysis theories, Alternating current theory and Resonance in electrical circuits and locus representation.

3. Learning Outcomes (LOs):

A1.1	Electrical circuits fundamentals, linear and complex algebra, mathematical operators, trigonometrics, waveforms, and differential equations
A2.1	Network reduction, Kirchoff's laws, superposition, Thevenin's theorem, maximum power transfer, Norton's theorem, Nodal and Loop analysis.
A5.1	Apply linear and complex algebra to solve the electric circuit and convert the oral problem into analytical one.
A6.1	Use circuit simulator (such as Workbench), instruments and laboratory equipment to design experiments, collect, analyze and interpret results concerning electrical and electronic circuits.
A7.1	Collaborate with physics and mathematics department to apply their theory in electrical circuits' solution.
A10.1	Searching the internet for solution methodologies and electric network analysis.
B2.1	Solve electric circuits finding voltage, current and power using the appropriate theory of solution.
B4.1	Find the right solution according to data given and match the results within specific frame.

4. Course Contents:

No.	Topics	Week
1	Introduction - Definitions (work, energy, current, voltages…) - Definitions of electrical circuit elements (resistance, capacitance, inductance...) - Drawing of different waveforms of current, voltage, charge…) **Lab /Tutorial:** - Recognition of different electric circuit components - Verification of series and parallel connections. Illustrative examples	**Week-1**
2	- Fundamental of Electrical Circuits (resistive network) - Ohm's laws, , Kirchoff's current and voltage laws **Lab /Tutorial:** - Verify the ohm's law for the given electrical circuit Illustrative examples	**Week-2**
3	- N odal analysis **Lab /Tutorial:** - Verification of kirchoff's current law - Illustrative examples	**Week 3**
4	- loop analysis **Lab /Tutorial:** Illustrative examples	**Week- 4**
5	- superposition, **Lab /Tutorial:** Training on Workbench Simulator	**Week- 5**
6	- Thevenin and Norton equivalents Theories **Lab /Tutorial:** - Verification of Thevenin theorem Illustrative examples using workbench simulator n	**Week- 6**
7	- Delta to Y conversion and vice versa **Lab /Tutorial:** - Recognition of delta and Y connections - Illustrative examples	**Week- 7**

8	- AC Circuits - Different AC current and voltage waves - Studying part of the aforementioned theories in case of AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	**Week- 8**
9	Midterm written examination	**Week- 9**
10	- Apply the remaining aforementioned theories in AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	**Week-10**
11	- Complete and apply the remaining aforementioned theories in AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	**Week- 11**
12	- Sinusoidal Steady-State Circuit Analysis (introduction,..) **Lab /Tutorial:** Verification of aforementioned experiments in three phase connection.	**Week- 12**
13	- Balanced three phase system delta and star **Lab /Tutorial:** - Measurement of voltage and current in three phase connection. Illustrative examples	**Week- 13**
14	- Unbalanced three phase system delta and star **Lab /Tutorial:** - Illustrative examples	**Week- 14**
15	Review	**Week- 15**

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (Online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem solving	Brain storming	Projects	Site visits	Self - learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A1-1**	x	x				x	x								
	A2-1	x	x	x			x	x								
	A5-1	x	x				x	x								
	A6-1														x	x
	A7-1		x				x	x								
	A10-1					x						x	x			
B-Leve	**B2-1**	x	x				x	x								
	B4-1	x	x													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2.1, A5.1, B4.1, B2.1
2	Practical Examination	A2.1, B4.1
3	Oral Examination	A1.1, A2.1, A5.1
4	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A5.1, B4.1, B2.1, A7.1, A10.1
5	Final Term Examination (written)	A1.1, A2.1, A5.1, B4.1, B2.1, B4.2, A6.1

7.2 Assessment Schedule:

No.	Assessment Method	week
1	Mid Term Examination (written/ online)	9th
2	Tutorial, report, discussions and presentation assessment	Every week
3	Quizzes	Through whole semester
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Tutorial, report, discussions and presentation assessment	10
3	Quizzes	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Charles K. Alexander, Mathew N.O. Sadiku, "Fundamentals of Electric Circuits", McGraw Hill Higher Education, 6th edition, 2016.
2	Nilsson & Riedel "Electric Circuits" 11th edition, 2019.
3	Raymond A. De Carlo, Pen-Men Lin, "Linear Circuit Analysis", Oxford, 5th edition, 2015.
4	Elgerd, "Basic Electric Engineering", Adisson – Wesley Publishing Company, 2007.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LO's
1	Introduction - Definitions (work, energy, current, voltages,….) - Definitions of electrical circuit elements (resistance, capacitance, inductance,..) - Drawing of different waveforms of current, voltage, charge,……..) **Lab /Tutorial:** - Recognition of different electric circuit components - Verification of series and parallel connections. Illustrative examples	1	A 1-1, A 6-1
2	- Fundamental of Electrical Circuits (resistive network) - Ohm's laws, , Kirchoff's current and voltage laws **Lab /Tutorial:** - verify the ohm's law for the given electrical circuit Illustrative examples	1	A 1-1, A 6-1
3	- N odal analysis **Lab /Tutorial:** - Verification of kirchoff's current law Illustrative examples	1	A 1-1, A 6-1, B2-1, B4-1.
4	- loop analysis **Lab /Tutorial:** Illustrative examples	1	A2-1, B4-1, A1-1, A10-1
5	- superposition, **Lab /Tutorial:** Training on Workbench Simulator	1	A2-1, B2-1, B4-1, A1-1, A10-1, A6-1

6	- Thevenin and Norton equivalents Theories **Lab /Tutorial:** - Verification of Thevenin theorem Illustrative examples using workbench simulator n	1	A2-1, B2-1, B4-1, A1-1, A10-1, A6-1,
7	- Delta to Y conversion and vice versa **Lab /Tutorial:** - Recognition of delta and Y connections - Illustrative examples	1	A5-1, B4-1 A6-1, A7-1
8	- AC Circuits - Different AC current and voltage waves - Studying part of the aforementioned theories in case of AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	1	A 1-1, A5-1, A6-1
9	Midterm written examination	1	A1.1,A2.1, A5.1,B4.1, B2.1
10	- Apply the remaining aforementioned theories in AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	1	A5-1, B4-1, A 1-1, A6-1, A7-1
11	- Complete and apply the remaining aforementioned theories in AC circuit **Lab /Tutorial:** - Verification of aforementioned experiments in three phase connection. Illustrative examples	1	A5-1, B4-1 A6-1, , A7-1.
12	- Sinusoidal Steady-State Circuit Analysis (introduction,..)	1	A5-1, B4-1 A6-1, , A7-1.

	Lab /Tutorial: Verification of aforementioned experiments in three phase connection.		
13	- Balanced three phase system delta and star **Lab /Tutorial:** - Measurement of voltage and current in three phase connection. Illustrative examples	1	A1-1, A6-1
14	- Unbalanced three phase system delta and star **Lab /Tutorial:** - Illustrative examples		A1-1, A6-1.
15	Review	1	A6-1, A7-1. A1-1, B4-1

Course: Electrical circuits (1)	
Program Los	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	A1.1 Electrical circuits fundamentals, linear and complex algebra, mathematical operators, trigonometric, waveforms, and differential equationsA1.2 state acquaint with the continuity and different limits.
A2. 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.	A2.1 Network reduction, Kirchhoff's laws, superposition, Thevenin's theorem, maximum power transfer, Norton's theorem, Nodal and Loop analysis.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Apply linear and complex algebra to solve the electric circuit and convert the oral problem into analytical one.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Use circuit simulator (such as Workbench), instruments and laboratory equipment to design experiments, collect, analyze and interpret results concerning electrical and electronic circuits.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1 Collaborate with physics and mathematics department to apply their theory in electrical circuits' solution.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Searching the internet for solution methodologies and electric network analysis.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Solve electric circuits finding voltage, current and power using the appropriate theory of solution.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Find the right solution according to data given and match the results within specific frame.

Course Coordinator: Dr. Ramadan Aly Abd EL Aal

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Mechanical Power Engineering		
Course Code	MPE108		
Year/ Level	First year- first semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical
	2	1	1

2. Course aims:

No.	**aim**
4	Use contemporary engineering tools related to fluid mechanics and thermodynamics to solve most of engineering problems related to fluid mechanics and thermodynamics,

3. Learning Outcomes (LOs):

A1-1	Identify the different process and cycles used in thermodynamics and solve the concepts of physical meaning and phenomena of fluids and systems and units of measurement.
A1-2	Solve the concepts of physical meaning and phenomena of fluids and systems and units of measurement.
A1-3	Demonstrste the knownledge and understanding of ideal gas, reversible and irreversible processes, Carnot cycle, and pure substances.
A2-1	conduct appropriate experimentation used in thermodynamics and fluid mechanics
A2-2	Identify the concepts of the fluid flows to be able to classify them.
A8-1	Use text- books and steam tables to solve some problems and collect some data.

4. Course Contents:

No.	**Topics**	**Week**
1	**Lecture:** • Basic concepts of fluids and systems and units of measurement. **Tutorial/Lab:** • Tour within the Thermodynamics and Fluid Mechanics Laboratory, identification of the type and using of each measuring instrument, and	1

	write a report about that.	
2	**Lecture:** - Fluid statics - Newton's law of viscosity and its applications. **Tutorial/Lab:** - Problems Solving. - Using of U-tube manometers.	2
3	**Lecture:** - Description of fluid flow- classification of fluid flows. **Tutorial/Lab:** - Problems Solving. - Pressure difference measurements.	3-4
4	**Lecture:** - Bernoulli's Equation and its applications – Momentum equation and its applications. **Tutorial/Lab:** - Problems Solving. - Flow measurement by using of orifice. - Determination of Reynold's number of liquid flow.	5-6
5	**Lecture:** - Flow through pipes and pipe systems. **Tutorial/Lab:** - Problems Solving. - Flow velocity measurements.	7-8
6	**Midterm written examination**	9
7	**Lecture:** - Introduction to thermodynamics **Tutorial/Lab:** - Problems Solving. - Calibration of Bourden Tube Pressure Gauge.	10
8	**Lecture:**	11

	- First law of thermodynamics **Tutorial/Lab:** - Problems Solving. - Investigate the first law of thermodynamic using heat Engine .	
9	**Lecture:** - Second law of thermodynamics **Tutorial/Lab:** - Problems Solving. - Investigate the Second law of thermodynamic using heat Engine .	12
10	**Lecture:** Entropy – Heat engine – Reversed heat engine **Tutorial/Lab:** - Problems Solving. Engine power measurements by using tachometer and torque meter	13
11	**Lecture:** - Ideal gas - Reversible and irreversible processes – Carnot cycle. **Tutorial/Lab:** - Problems Solving. - Verification of Ideal Gas Law.	14
12	**Lecture:** - Pure substances. **Tutorial/Lab:** - During lab session, classify matter as either a pure substance or a mixture	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x	x			x	x		x							x
	A1-2	x	x			x	x		x			x				x
	A1-3	x	x			x	x		x			x				x
	A2-1	x	x			x	x		x			x				x
	A2-2	x	x		x	x	x		x			x				x
	A8-1	x			x	x	x		x			x				

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2-1,A3-1, A2-2
2	Practical Examination	A1.1,A1-2, A2-1, A3-1, A2-2
3	Oral Examination	A1.1,A1-2
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1-2, A2-1, A3-1, A8-1
5	Final Term Examination (written)	A1.1,A1-2, A2-1, A3-1,A2-2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights (%)
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Frank M. White, "Fluid Mechanics", 8th ed., McGraw-Hill, INC. 2015.
2	Irving H. Shames, "Mechanics of Fluids", 4th ed. McGraw-Hill, INC. 2003 .
3	R. K. Bansal, "Fluid Mechanics and Hydraulic Machines", Laxmi Publications LTD, New Delhi, 2005
4	Y. A. Çengel and M. A. Boles, "Engineering Thermodynamics An Engineering Approach"5th edition, 2010.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Basic concepts of fluids and systems and units of measurement	4	A1-2, A3-1,A2-2
2	Fluid statics - Newton's law of viscosity and its applications	4	A2-1, A2-2, A3-1, A8-1
3	Description of fluid flow- classification of fluid flows	4	A1-2, A3-1, A2-1, A2-2, A8-1
4	Bernoulli's Equation and its applications – Momentum equation and its applications - Flow through pipes and pipe systems	4	A1-2, A3-1, A2-1, A2-2
5	Introduction to thermodynamics - First law of thermodynamics	4	A1-1, A2-1,A8-1
6	Second law of thermodynamics - Entropy – Heat engine – Reversed heat engine.	4	A1-1, A2-1,A8-1
7	Ideal gas - Reversible and irreversible processes – Carnot cycle - Pure substances.	4	A1-1, A2-1,A8-1

Course: Fluid Mechanics and Thermodynamics	
Program LOs	**Program LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1 Identify the different process and cycles used in thermodynamics. A1-2 Solve the concepts of physical meaning and phenomena of fluids and systems and units of measurement. A1-3 Demonstrate the knowledge and understanding of ideal gas, reversible and irreversible processes, carnot cycle, and pure substances.
A2- 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.	A2-1Conduct appropriate experimentation used in thermodynamics and fluid mechanics. A2-2 Identify the concepts of the fluid flows to be able to classify them.
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Use text- books and steam tables to solve some problems and collect some data.

Course Coordinator: Prof .Dr. Abdelhady Elabady
Assoc. Prof. Dr. Ibrahim Abdelrahman Ibrahim

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">HUU103</td></tr>
<tr><td>Year/ Level</td><td colspan="3">First year- First Semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>2</td><td>-</td><td>-</td></tr>
</table>

2. Course aims:

No.	Aim
2	Behave professionally to necessary thinking skills for engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, and sustainability.

3. Learning Outcomes (LOs):

A8.1	Communicate effectively with colleagues to recognize the basic types of Thinking.
A9.1	Use the different types of thinking to give innovative improvements of daily problems.
A10.1	Apply the different types of thinking to give modifications of a case study as the Sustainable development goals.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • The concept of thinking, creativity, memory, Improving thinking skills, the difference between thinking and Improving thinking skills, the most important characteristics of Improving thinking skills	1-2
2	**Lectures:** • The components of Improving thinking skills, the importance of thinking in our life, the role of each of the axes of the educational process in Improving thinking skills, the difference between thinking, creativity and innovation	3
3	**Lectures:** • Types of thinking, basic thinking, basic thinking skills, creative thinking, creative thinking skills, critical thinking - stages of the creative process. • A case study on Sustainable development goals.	4-6
4	**Lectures:** • The meaning of scientific thinking, complex thinking, - a map of basic thinking skills - examples of each type of thinking skills from the field of specialization.	7
5	**Lectures:** • The difference between a good thinker and a bad thinker - traits and characteristics of a critical thinker	8
6	**Midterm**	9
7	**Lectures:** • Planning - the method of solving problems in a scientific way, steps for feeling a problem and how to solve it - training in the method of problem solving through problems in the field of specialization. • A case study on the future required jobs 2030-2050.	10
8	**Lectures:** Thinking strategies (brainstorming - the theory of the six hats) and how to apply this strategy in the field of specialization.	11-12
9	**Lectures:** Various exercises in the field of specialization to develop thinking skills	13-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A8-1**	x			x		x	x		x						
	A9-1	x			x		x	x		x						
	A10-1	x			x		x	x		x						

6. Teaching and Learning Methods 0f Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A8-1, A9-1, A10-1
2	Formative (quizzes- online quizzes- presentation - reports)	A8-1, A9-1, A10-1
3	Final Term Examination (written)	A8-1, A9-1, A10-1

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20%
2	Formative (quizzes- online quizzes- presentation - reports)	-
4	Final Term Examination (written)	80%
Total		100%

8. List of References

No.	Reference List
1	Butterworth, J., & Thwaites, G. "Thinking Skills: Critical Thinking and Problem Solving", Cambridge University Press, (2nd ed.), 2013.
2	محمد ماهر الجمال، التفكير العلمى ودور المؤسسات التربوية فى تنميته، دار الوفاء للطباعة والنشر، القاهرة ١٩٩٧
3	حسن حسين زيتون ،رؤية معاصرة في تنمية العقول المفكرة ، عالم الكتب القاهرة ٢٠٠٣.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Online facilities.
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures :** The concept of thinking, creativity, memory, improving thinking skills, the difference between thinking and Improving thinking skills, the most important characteristics of Improving thinking skills	2	A8-1, A9-1, A10-1
2	**Lectures:** The components of Improving thinking skills, the importance of thinking in our life, the role of each of the axes of the educational process in Improving thinking skills, the difference between thinking, creativity and innovation	2	A8-1, A9-1, A10-1

3	**Lectures:** Types of thinking, basic thinking, basic thinking skills, creative thinking, creative thinking skills, critical thinking - stages of the creative process. A case study on Sustainable development goals.	2	A8-1, A9-1, A10-1
4	**Lectures:** The meaning of scientific thinking, complex thinking, - a map of basic thinking skills - examples of each type of thinking skills from the field of specialization.	2	A8-1, A9-1, A10-1
5	**Midterm**	2	A8-1, A9-1, A10-1
6	**Lectures:** The difference between a good thinker and a bad thinker - traits and characteristics of a critical thinker	2	A8-1, A9-1, A10-1
7	**Lectures:** Planning - the method of solving problems in a scientific way, steps for feeling a problem and how to solve it - training in the method of problem solving through problems in the field of specialization. A case study on the future required jobs 2030-2050.	2	A8-1, A9-1, A10-1
8	**Lectures:** Thinking strategies (brainstorming - the theory of the six hats) and how to apply this strategy in the field of specialization.	2	A8-1, A9-1, A10-1
9	**Lectures:** Various exercises in the field of specialization to develop thinking skills	2	A8-1, A9-1, A10-1

Course: Development of Thinking Skills	
Program LOs	**Course LOs**
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate effectively with colleagues to recognize the basic types of Thinking.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Use the different types of thinking to give innovative improvements of daily problems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Apply the different types of thinking to give modifications of a case study as the Sustainable development goals.

Course Coordinator: Dr. Heba Youssef Soliman.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information:

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	SCI118		
Year/ Level	First year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	---

2. Course aims:

No.	**aim**
1	Apply theoretical knowledge and practical that will be required for dealing with systems of linear equations and their solutions, vector spaces, linear independence of vectors, linear transformations; and eigenvalues and eigenvectors, Laplace transforms, inverse Laplace transform, solving differential equations. The potential of using Laplace transforms and inverse Laplace transform in solving differential equations.

3. Learning Outcomes (LOs):

A1.1	Determine the Laplace transform of functions from first principles.
A1.2	Apply basic properties of the Laplace transform such as linearity and convolution.
A1.3	Use the Laplace transforms to solve ordinary differential equations with given initial conditions.
A1.4	Categorize of the basic concepts of linear algebra.
A1.5	Recognize System of Linear equations using matrices.
A1.6	Know and understand concept of vector space.
A1.7	Recognize the Eigenvalues and Eigenvector.
A2.1	Evaluate the unit step functions to determine the Laplace transform of piecewise continuous functions.
A2.2	Apply shifting, differentiation and integration properties of the Laplace transform.
A2.3	Distinguish different cases of linear systems solutions.
A2.4	Know fundamental concepts and properties of matrices.
A2.5	Identify fundamental concepts of probability.
A10.1	Use of text- books to solve some problems and collect some data.
B2.1	Evaluate the Delta functions to model impulses and solve such models by applying the Laplace transform.
B2.2	Distinguish most moderate method to solve a system of linear equations.
B2.3	Show different applications of Eigenvalues and Eigenvector.
B2.4	Use mathematical thinking for students to be self-independent in problem solving.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Chapter 1: Laplace transforms. • Definition of the Laplace transform • Properties of the Laplace transform • Inverse Laplace transform • Solving Initial Value Problems • Convolution theory • Impulses and the Dirac Delta Function **Tutorials:** • Practice of solving Laplace transform • Practice of solving inverse Laplace transform	1-5
2	**Lectures:** Chapter2: Linear Equations • Introduction to Linear Equations • Solving Linear Equations • The Gauss-Jordan algorithm • Systematic solution of Linear systems • Homogeneous systems **Tutorials:** • Apply the different methods to solve linear equations	6-7
3	**Lectures:** Chapter 3: Matrices • Matrix arithmetic • Linear transformations • Recurrence relations • Non-singular matrices • Least square solution of equation **Tutorials:** • Evaluate matrix arithmetic and linear transformations. • Solve problems on least square solution of equation**.**	8
4	**Midterm**	9
5	**Lectures:** Chapter 4: Vector Space and Subspaces • Subspaces of R^n • Linear Dependence • Basis of a Subspace • Rank and Nullity of a Matrix **Tutorials:** • Solve the problems on the basis of any vector space and the subspaces of R^n .	10-12
6	**Lectures:**	13

	Chapter 5: -Eigenvalues and Eigenvectors • Motivation • Definitions and examples **Tutorials:** • Calculate the Eigenvalues and Eigenvectors.	
7	**Lectures:** Chapter 6: Probability Theory • Sample Space • Probability Axioms • Distribution Function **Tutorials:** • Solve the role of probability in engineering. • Use of text- books to solve some problems and collect some data.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(on line / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial(on line / in class)	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x													
	A1.2	x	x				x									
	A1.3	x	x	x			x									
	A1.4	x	x				x									
	A1.5	x	x	x			x	x								
	A1.6	x	x	x			x	x								
	A1.7	x	x	x			x	x								
	A2.1	x	x				x	x								
	A2.2	x	x				x									
	A2.3	x	x				x	x								
	A2.4	x	x	x			x									
	A2.5	x	x				x	x								
	A10.1					x	x	x	x							
B-Level	B2.1	x	x	x			x	x								
	B2.2	x	x	x			x									
	B2.3	x	x				x	x								
	B2.4	x	x				x	x								

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments
3	Lecture (online / in class)

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, B2.1, B2.2
2	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2 , A2.3 , A2.4, A2.5, A10.1, B2.1, B2.2, B2.3, B2.4
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A1.7, A2.1, A2.2 , A2.3, A2.4, A2.5, A10.1, B2.1, B2.2, B2.3, B2.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	70
Total		100%

8. List of References:

No.	**Reference List**
1	Howard Anton and Chris Rorres, “Elementary Linear Algebra”, Application Version 11th, publisher John Wiley & Sons, 2013.
2	K.A., Booth D.J.: "Engineering Mathematics Stroud ”8ed., 2014
3	K. A. Stroud and Dexter J. Booth, “Advanced Engineering Mathematics” publisher Palgrave Macmillan, 2011.
4	Erwin Kreyszig, Kreyszig Textbook: “Advanced Engineering Mathematics, 10th edition- slader, 2011

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	**Topic**	**aim**	**LO's**
1	**Lectures:** Chapter 1: Laplace transforms. • Definition of the Laplace transform • Properties of the Laplace transform • Inverse Laplace transform • Solving Initial Value Problems • Convolution theory • Impulses and the Dirac Delta Function **Tutorials:** • Practice of solving Laplace transform • Practice of solving inverse Laplace transform	1	A1.1, A1.2, A1.3, A2.1,A2.2, B2.1
2	**Lectures:** Chapter2: Linear Equations • Introduction to Linear Equations • Solving Linear Equations • The Gauss-Jordan algorithm • Systematic solution of Linear systems • Homogeneous systems **Tutorials:** • Apply the different methods to solve linear equations	1	A1.4 ,A2.3, B2.2
3	**Lectures:** Chapter 3: Matrices	1	A1.5, A2.4, A10.1

	- Matrix arithmetic - Linear transformations - Recurrence relations - Non-singular matrices - Least square solution of equation **Tutorials:** - Evaluate matrix arithmetic and linear transformations. - Solve problems on least square solution of equation**.**		
4	**Lectures:** Chapter 4: Vector Space and Subspaces - Subspaces of R^n - Linear Dependence - Basis of a Subspace - Rank and Nullity of a Matrix **Tutorials:** - Solve the problems on the basis of any vector space and the subspaces of R^n .	1	A1.6, A10.1, B2.4
5	**Lectures:** Chapter 5: -Eigenvalues and Eigenvectors - Motivation - Definitions and examples **Tutorials:** Calculate the Eigenvalues and Eigenvectors.	1	A1.7, A10.1 , B2.3
6	**Lectures:** Chapter 6: Probability Theory - Sample Space - Probability Axioms - Distribution Function **Tutorials:** - Solve the role of probability in engineering. Use of text- books to solve some problems and collect some data.	1	A2.5 , B2.4

Course: Mathematics (4-A)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Determine the Laplace transform of functions from first principles. A1.2 Apply basic properties of the Laplace transform such as linearity and convolution. A1.3 Use the Laplace transforms to solve ordinary differential equations with given initial conditions. A1.4 Categorize of the basic concepts of linear algebra. A1.5 Recognize System of Linear equations using matrices. A1.6 Know and understand concept of vector space. A1.7 Recognize the Eigenvalues and Eigenvector.
A2. 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.	A2.1 Evaluate the unit step functions to determine the Laplace transform of piecewise continuous functions. A2.2 Apply shifting, differentiation and integration properties of the Laplace transform. A2.3 Distinguish different cases of linear systems solutions. A2.4 Know fundamental concepts and properties of matrices. A2.5 Identify fundamental concepts of probability.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Use of text- books to solve some problems and collect some data.
B2. Design, model and analyze an electrical/electronic/digital system or component	B2.1 Evaluate the Delta functions to model impulses and solve such models

for a specific application; and identify the tools required to optimize this design.	by applying the Laplace transform. B2.2 Distinguish most moderate method to solve a system of linear equations B2.3 Show different applications of Eigenvalues and Eigenvector. B2.4 Use mathematical thinking for students to be self-independent in problem solving.

Course Coordinator: Dr. Sally Eleissawy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE101		
Year/ Level	First year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	-	-	2

2. Course aims:

No.	**aim**
1	Apply knowledge and skills of how to apply the measurements and testing concerning the measurements of errors, accuracy and precision, statistical analysis of errors, Moving coil & Moving iron galvanometer, basics of analog electronic instruments, DC and AC bridges, Function of relay, basic of digital instruments, storage and sampling oscilloscopes, and Data acquisition applications, Frequency and Period Counters, Digital Displays: Theory of LED, LCD display devices and applications, Analog and Digital Multi-meter, Cathode Ray Oscilloscope.

3. Learning Outcomes (LOs):

A2.1	Conduct experimentation and simulation to measure voltage, current, frequency and power.
A2.2	Analyze the behavior of R, L and C in DC and AC circuits.
A6.1	Use software package and hardware implementation to submit a course project.
A7.1	Performs the lab experiments and project in groups.
A8.1	Write report of course project and lab experiments.
B3.1	Design a circuit to investigate the function the function of relay.
B4.1	Evaluate the performance of DC and AC bridges.
B4.2	Assess the characteristics and performance of Voltage-dependent resistor.
B5.1	Investigate the failure of components in electronic circuits.

4. Course Contents:

No.	Topics	Week
1	**Labs/Tutorials:** • **Introduction:** – Safety requirements. – Laboratory equipment's ▪ Sources ▪ Measuring devices. ▪ Components.	1
2	**Labs/Tutorials:** • **Galvanometer** - Moving coil galvanometer - Moving iron galvanometer - Use software packages such as Multisim and Matlab to test these circuits.	2
3	**Labs/Tutorials:** • **Measuring current.** • **Measuring voltage.** • **Measuring power.** • **Measuring frequency.** • **Use software packages such as Multisim and Matlab to test these circuits.**	3-5
4	**Labs/Tutorials:** • **RLC Measurements** - RLC Measurements Using Bridge Circuits - RLC Measurements Using impedance methods - Use software packages such as Multisim and Matlab to test these circuits.	6-8
5	Midterm	9
6	**Labs/Tutorials:** • **Voltage-dependent resistor VDR** • **Use software packages such as Multisim and Matlab to test these circuits.**	10
7	**Labs/Tutorials:** • **Capacitors** - Capacitor in a DC circuit - Capacitor in a AC circuit - Use software packages such as Multisim and Matlab to test these circuits.	11
8	**Labs/Tutorials:** • **Function of relay** • **Use software packages such as Multisim and Matlab to test these circuits.**	12-13
9	**Labs/Tutorials:** • Project	14
10	**Labs/Tutorials:** • Revision	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A2.1					**X**	**X**						**X**		**X**	**X**
	A2.2					**X**	**X**						**X**		**X**	**X**
	A6.1									**X**		**X**	**X**			**X**
	A7.1									**X**		**X**			**X**	**X**
	A8.1									**X**		**X**			**X**	**X**
B-Level	B4.1					**X**	**X**								**X**	**X**
	B4.2					**X**	**X**								**X**	**X**
	B5.1					**X**				**X**		**X**			**X**	**X**

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A2.1, A2.2, A6.1
2	Practical Examination	A2.1, A2.2, A6.1, A7.1, A8.1, B3.1, B4.1, B4.2, B5.1, C6.1
3	Oral Examination	A6.1, A7.1, A8.1
4	Formative (Project- quizzes- online quizzes- reports)	A6.1, A7.1, A8.1, B5.1
5	Final Term Examination (written)	A2.1, A2.2, B3.1, B4.1, B4.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (Project- quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical/ Oral Examination	20
3	Formative (Project- quizzes- online quizzes- reports)	10
4	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	Labs original Manuals
2	Labs Manuals that provide by the course coordinators
3	Helfrick, “Modern Electronic Instrumentation and Measurment”, Prentice Hall, 2009
4	J.G. Joshi , “Electronics Measurement & Instrumentation”, KHANNA, 2019

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lab Facilities
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Labs/Tutorials:** • **Introduction:** – Safety requirements. – Laboratory equipment's ▪ Sources ▪ Measuring devices. ▪ Components.	1	A2.1
2	**Labs/Tutorials:** • **Galvanometer** - Moving coil galvanometer - Moving iron galvanometer - Use software packages such as Multisim and Matlab to test these circuits.	1	A2.1, A6.1, A7.1, A8.1, B5.1
3	**Labs/Tutorials:** • **Measuring current.** • **Measuring voltage.** • **Measuring power.** • **Measuring frequency.** • **Use software packages such as Multisim and Matlab to test these circuits.**	1	A2.1, A6.1, A7.1, A8.1, B4.1
4	**Labs/Tutorials:** • **RLC Measurements** - RLC Measurements Using Bridge Circuits - RLC Measurements Using impedance methods - Use software packages such as Multisim and Matlab to test these circuits.	1	A2.1, A2.2, A6.1, A7.1, A8.1, B4.1
5	Midterm	1	A2.2 , A6.1, A7.1, A8.1, B4.1
6	**Labs/Tutorials:** • **Voltage-dependent resistor VDR** • **Use software packages such as Multisim and Matlab to test these circuits.**	1	A2.1, A6.1, A7.1, B4.2
7	**Labs/Tutorials:** • **Capacitors** - Capacitor in a DC circuit - Capacitor in a AC circuit - Use software packages such as Multisim and Matlab to test these circuits.	1	A2.1, A2.2, A6.1, A7.1, A8.1, B5.1
8	**Labs/Tutorials:** • **Function of relay**	1	A2.1, A2.2, A6.1, A7.1, A8.1, B3.1

	- **Use software packages such as Multisim and Matlab to test these circuits.**		
	Labs/Tutorials: - Project		A2.1, A6.1, A7.1, A8.1, B5.1
	Labs/Tutorials: - Revision		A2.1, A2.2, A6.1, A7.1, A8.1, B5.1

Course: Measurements and Testing	
Program LOs	**Course LOs**
A2. 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.	A2.1 Conduct experimentation and simulation to measure voltage, current, frequency and power. A2.2 Analyze the behavior of R,L and C in DC and AC circuits.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Use software package and hardware implementation to submit a course project.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1 Performs the lab experiments and project in groups.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Write report of course project and lab experiments.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Design a circuit to investigate the function the function of relay.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate the performance of DC and AC bridges. B4.2 Assess the characteristics and performance of Voltage-dependent resistor.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 Investigate the failure of components in electronic circuits.

Course Coordinator: Dr. Islam E. Shaalan

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">ECE102</td></tr>
<tr><td>Year/ Level</td><td colspan="3">First year- 2nd semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>0</td><td>2</td></tr>
</table>

2. Course aims:

No.	**aim**
1	Apply knowledge of mathematics, basic sciences and engineering principles to solve, analysis, and interpret data related to semiconductor materials and electronic devices.

3. Learning Outcomes (LOs):

A1.1	Identify the basic electrical and optical characteristics of materials.
A1.2	Solve problems related to the energy-band diagram and the physics of the semiconductor devices.
A2.1	Assess the performance of a typical semiconductor device.
A2.2	Describe the physical operation of the optoelectronic, negative-resistance, and power devices.
A4.1	Describe the importance of the semiconductor devices in real-life applications.
A6.1	State the current-voltage relationships of the optoelectronic, negative-resistance, and power devices along with their regions of operation.
A10.1	Apply knowledge of electronic devices to solve real-life problems.
B2.1	Analyze a typical device comprising different semiconductor regions with different doping levels.
B4.1	Interpret the limitations of the semiconductor devices.

4. Course Contents:

No.	**Topics**	**Week**
1	**Lectures:** **1. The basic concepts of materials science**: Materials categories – Energy band diagrams for different materials categories – Basics of semiconductor material physics - Current in semiconductors - optical properties of materials. **Labs:** • Dealing with the Workbench software capabilities.	**1 - 2**
2	**Lectures:** **2. PN-Junction**: Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and small-signal models. **Labs/Tutorials:** • Use the electronic laboratory equipment to draw the I-V characteristics of PN Diode. • Use software packages such as workbench to draw the I-V characteristics of PN Diode. • Identify appropriate specifications for required devices to be used to draw the I-V characteristics of PN Diode. • Demonstrate problem solving ability in the completion of their homework assignments related to basics of semiconductors (sheet 1) and PN Diode (Sheet 2).	**3- 5**
3	**Lectures:** **3. Bipolar junction transistor (BJT):** Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and small-signal models. **Labs/Tutorials:** • Use the electronic laboratory equipment to draw the I-V characteristics of bipolar transistor. • Use software packages such as workbench to draw the I-V	**6 - 8**

	characteristics of bipolar transistor. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of bipolar transistor. - Demonstrate problem solving ability in the completion of their homework assignments related to PN Diode (Sheet 3).	
	Mid-Term Exam	**9**
4	**Lectures:** **4. Depletion MOSFET:** Metal Oxide Semiconductor (MOS) Capacitor Electronics - MOSFET Types. Depletion MOSFET: Structure; Qualitative physical operation; Quantitative; physical operation analysis - Static and dynamic characteristics; DC and Small Signal models. **Labs/Tutorials:** - Use the electronic laboratory equipment to draw the I-V characteristics of depletion MOSFET. - Use software packages such as workbench to draw the I-V characteristics of depletion MOSFET. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of depletion MOSFET. - Demonstrate problem solving ability in the completion of their homework assignments related to depletion MOSFET (Sheet 4).	**10 - 11**
5	**Lectures:** **5. Enhancement MOSFET:** Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and Small Signal models. **Labs/Tutorials:** - Use the electronic laboratory equipment to draw the I-V characteristics of enhancement MOSFET. - Use software packages such as workbench to draw the I-V characteristics of enhancement MOSFET. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of enhancement MOSFET.	**12 - 13**

	Demonstrate problem solving ability in the completion of their homework assignments related to enhancement MOSFET (Sheet 5).	
6	**Lectures:** **6. Basics of photonic devices:** Radiative transition and optical absorption - Light emitted diode - Semiconductor Leaser – Photodetector - Solar Cell.	**14**
	7. Review, the project assessment and lab test	**15**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (class/online)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x	x			x	x								
	A1.2	x	x			x			x	x				x		
	A2.1		x				x		x		x					
	A2.2					x			x					x	x	
	A4.1					x				x		x				
	A6.1				x			x				x				
	A10.1	x	x			x	x	x		x						
B-Level	**B2.1**		x					x				x		x		
	B4.1			x			x							x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A2.1, A4.1, B2.1, B4.1
2	Practical Examination	A2.1, A2.2, A10.1, B2.1, B4.1
3	Oral Examination	A6.1, A8.1
4	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A2.2, A6.1, A8.1, B4.1
5	Final Term Examination (written)	A2.2, A10.1, B2.1, B4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	S. M. Sze and Kwok K. Ng, " Physics of Semiconductor Devices ", 3rd ed. John Wiley and Sons.2007.
2	R. C. Jaeger, " Microelectronic Circuit Design", 5th Ed. McGraw-Hill Education., 2015.
3	S. O. Kasap, “Optoelectronics and Photonics: Principles and Practices,” 2nd Edition, Pearson, NJ, USA, 2013.
4	Slawomir Sujecki, "Photonics Modelling and Design", CRC Press, 2014

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LOs
1	**Lectures:** **8. The basic concepts of materials science**: Materials categories – Energy band diagrams for different materials categories – Basics of semiconductor material physics - Current in semiconductors - optical properties of materials. **Labs:** • Dealing with the Workbench software capabilities.	**1**	A1.1, A1.2, A2.1, A4.1, B2.1, B4.1
2	**Lectures:** **9. PN-Junction**: Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and small-signal models. **Labs/Tutorials:** • Use the electronic laboratory equipment to draw the I-V	**1**	A4.1, B2.1, B4.1

	characteristics of PN Diode. - Use software packages such as workbench to draw the I-V characteristics of PN Diode. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of PN Diode. - Demonstrate problem solving ability in the completion of their homework assignments related to basics of semiconductors (sheet 1) and PN Diode (Sheet 2).		
3	**Lectures:** **10. Bipolar junction transistor (BJT):** Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and small-signal models. **Labs/Tutorials:** - Use the electronic laboratory equipment to draw the I-V characteristics of bipolar transistor. - Use software packages such as workbench to draw the I-V characteristics of bipolar transistor. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of bipolar transistor. - Demonstrate problem solving ability in the completion of their homework assignments related to PN Diode (Sheet 3).	**1**	A6.1 and A10.1
	Mid-Term Exam		A1.1, A1.2, A2.1, A2.2, A6.1, A10.1, B2.1, and B4.1
4	**Lectures:** **11. Depletion MOSFET:** Metal Oxide Semiconductor (MOS) Capacitor Electronics - MOSFET Types. Depletion MOSFET: Structure; Qualitative physical operation; Quantitative; physical operation analysis - Static and dynamic characteristics; DC and Small Signal models. **Labs/Tutorials:** - Use the electronic laboratory equipment to draw the I-V characteristics of depletion MOSFET.	**1**	A1.1, A1.2, A2.1, A2.2

	- Use software packages such as workbench to draw the I-V characteristics of depletion MOSFET. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of depletion MOSFET. - Demonstrate problem solving ability in the completion of their homework assignments related to depletion MOSFET (Sheet 4).		
5	**Lectures:** **12. Enhancement MOSFET:** Structure - Qualitative physical operation - Quantitative physical operation analysis - Static and dynamic characteristics - DC and Small Signal models. **Labs/Tutorials:** - Use the electronic laboratory equipment to draw the I-V characteristics of enhancement MOSFET. - Use software packages such as workbench to draw the I-V characteristics of enhancement MOSFET. - Identify appropriate specifications for required devices to be used to draw the I-V characteristics of enhancement MOSFET. Demonstrate problem solving ability in the completion of their homework assignments related to enhancement MOSFET (Sheet 5).	**1**	A6.1, A10.1, B2.1,
6	**Lectures:** **13. Basics of photonic devices:** Radiative transition and optical absorption - Light emitted diode - Semiconductor Leaser – Photodetector - Solar Cell.	**1**	B2.1 and B4.1

Course: Electronic Materials and Devices	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the basic electrical and optical characteristics of materials. A1.2 Solve problems related to the energy-band diagram and the physics of the semiconductor devices.
A2. 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	A2.1 Assess the performance of a typical semiconductor device. A2.2 Describe the physical operation of the optoelectronic, negative-resistance, and power devices.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Describe the importance of the semiconductor devices in real-life applications.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 State the current-voltage relationships of the optoelectronic, negative-resistance, and power devices along with their regions of operation.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply knowledge of electronic devices to solve real-life problems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design**.**	B2.1 Analyze a typical device comprising different semiconductor regions with different doping levels.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Interpret the limitations of the semiconductor devices.

Course Coordinator: Dr. Osama Refaat

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td rowspan="1">Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">ECE103</td></tr>
<tr><td>Year/ Level</td><td colspan="3">First year- Second Semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>3</td><td>1</td><td>-</td></tr>
</table>

2. Course aims:

No.	Aim
9	Model, analyze and recognize the characteristics of static electric and magnetic fields and the time dependent electromagnetic fields.

3. Learning Outcomes (LOs):

A1.1	Recognize the mathematical concepts necessary for understanding electromagnetic fields theory.
A1.2	Describe the characteristics of electric field and magnetic field and their basic laws.
A1.3	Recognize the capacitance, resistance and inductance as a types of circuit elements in electronic systems.
A5-1	Prepare researches about electromagnetic fields applications.
A10.1	Apply knowledge of electromagnetic fields on communications and other applications.
B2.1	B2-1 Analyze the fields phenomena using the suitable mathematical and computer-based methods to solve fields problems.
B2-2	Identify the suitable tools required to optimize the circuit elements in electronic systems.
B4-1	Estimate the performance of electromagnetic fields and circuit elements for a specific application.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Vector analysis:** - Vector algebra – Vector calculus (differentiation and integration of vectors)- Coordinate systems and transformation between them - Vector integral theorems (Gauss' divergence theorem, Stokes' theorem) **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to vector algebra and vector calculus (sheet 1)	1-2
2	**Lectures:** **Electrostatic fields in vacuum and in materials:** - Coulomb's law – Electrostatic field – Gauss's law – Potential – Poisson's and Laplace's equations - Boundary conditions on conductors – Electric dipole – Method of images- Material polarization – Displacement vector –Boundary conditions-Capacitance – Electrostatic energy and force **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to Coulomb's law, Gauss's law, Poisson's and Laplace's equations (sheet 2) - Demonstrate problem solving ability in the completion of their homework assignments related to Dipole, method of images, polarization, boundary conditions capacitance and electrostatic energy (sheet 3)	3-6
3	**Lectures:** **Stationary current field:** - Current flow – Kirchhoff's current law – Ohm's law – Electrical resistance – Boundary conditions – Joule's law **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to Kirchhoff's current law, Ohm's law, resistance, Joule's law (sheet 4)	7-8
4	**Midterm**	9
5	**Lectures:** **Steady magnetic fields in vacuum and in different materials:** - Ampere's Law of Force – Magnetic Induction Field – Biot-Savart Law – Magnetic Vector Potential- Gauss' Law for Magnetic Field – Ampere's Circuital Law – Vector Poison's Equation – Magnetic Dipole- Material magnetization – Magnetic field intensity – Boundary conditions – Bar magnet – Magnetic	10-11

	circuits **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Biot-Savart Law, Ampere's Circuital Law, boundary conditions (sheet 5)	
6	**Lectures:** **Quasi-stationary Electromagnetic fields:** • Faraday's law of induction – Induced electric field due to motion – Inductance – Magnetic energy – Magnetic force. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to inductance, magnetic energy, magnetic force (sheet 6)	12-13
7	**Lectures:** **Time dependent electromagnetic fields** • Time dependent fields – Maxwell's equations in different forms – Wave equation and its solution in free space, speed of electromagnetic waves. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to Maxwell's equations in different forms (sheet 7)	14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	A1-2	x			x		x	x								
	A1-3	x			x		x	x								
	A5-1	x		x	x	x	x	x			x	x	x			
	A10-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
	B4-1	x			x		x	x								

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, A1-2, A1-3, B2-1, B2-2
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A1-2, A1-3, A5-1, A10-1, B2-1, B2-2, B4-1
3	Final Term Examination (written)	A1-1, A1-2, A1-3, A5-1, A10-1, B2-1, B2-2, B4-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
4	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	F. T. Ulaby, U. Ravaioli "Fundamentals of Applied Electromagnetics," Pearsone, 7th Ed, 2015.
2	William Hayt and John Buck, "Engineering Electromagnetics" 8th edition, McGraw-Hill Education; 2018.
3	David K. Cheng, "Fundamentals of Engineering Electromagnetics," Addison-Wesley, 1993.
4	Raymond A. Serway and John W. Jewett, Jr., "Physics for Scientists and Engineers with Modern Physics," 8 edition, 2010.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** **Vector analysis:** • Vector algebra – Vector calculus (differentiation and integration of vectors)- Coordinate systems and transformation between them - Vector integral theorems (Gauss' divergence theorem, Stokes' theorem) **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to vector algebra and vector calculus (sheet 1)	9	A1-1
2	**Lectures:** **Electrostatic fields in vacuum and in materials:** • Coulomb's law – Electrostatic field – Gauss's law – Potential – Poisson's and Laplace's equations - Boundary conditions on conductors – Electric dipole – Method of images- Material polarization – Displacement vector –Boundary conditions- Capacitance – Electrostatic energy and force	9	A1-1, A1-2, A1-3

	Tutorials: • Demonstrate problem solving ability in the completion of their homework assignments related to Coulomb's law, Gauss's law, Poisson's and Laplace's equations (sheet 2) • Demonstrate problem solving ability in the completion of their homework assignments related to Dipole, method of images, polarization, boundary conditions capacitance and electrostatic energy (sheet 3)		
3	**Lectures:** **Stationary current field:** • Current flow – Kirchhoff's current law – Ohm's law – Electrical resistance – Boundary conditions – Joule's law **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to Kirchhoff's current law, Ohm's law, resistance, Joule's law (sheet 4)	9	A1-1, A1-2, A1-3, B2-1, B2-2
4	**Midterm**	9	A1-1, A1-2, A1-3, B2-1, B2-2
5	**Lectures:** **Steady magnetic fields in vacuum and in different materials:** • Ampere's Law of Force – Magnetic Induction Field – Biot-Savart Law – Magnetic Vector Potential- Gauss' Law for Magnetic Field – Ampere's Circuital Law – Vector Poison's Equation – Magnetic Dipole- Material magnetization – Magnetic field intensity – Boundary conditions – Bar magnet – Magnetic circuits **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Biot-Savart Law, Ampere's Circuital Law, boundary conditions (sheet 5)	9	A1-2, A1-3, A5-1, A10-1, B2-1, B2-2,
6	**Lectures:** **Quasi-stationary Electromagnetic fields:** • Faraday's law of induction – Induced electric field due to motion – Inductance – Magnetic energy – Magnetic force. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to inductance, magnetic energy, magnetic	9	A1-2, A1-3, A5-1, A10-1, B2-1, B2-2,

	force (sheet 6)		
7	**Lectures:** **Time dependent electromagnetic fields** - Time dependent fields – Maxwell's equations in different forms – Wave equation and its solution in free space, speed of electromagnetic waves. **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to Maxwell's equations in different forms (sheet 7)	9	A1-1, A5-1, A10-1, B2-1, B2-2,

Course: Electromagnetic Field Theory	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1 Recognize the mathematical concepts necessary for understanding electromagnetic fields theory. A1-2 Describe the characteristics of electric field and magnetic field and their basic laws. A1-3 Recognize the capacitance, resistance and inductance as a types of circuit elements in electronic systems.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5-1 Prepare researches about electromagnetic fields applications.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Apply knowledge of electromagnetic fields on communications and other applications.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze the fields phenomena using the suitable mathematical and computer-based methods to solve fields problems. B2-2 Identify the suitable tools required to optimize the circuit elements in electronic systems.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4-1 Estimate the performance of electromagnetic fields and circuit elements for a specific application.

Course Coordinator: Dr. Rania Abdallah

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	EPM102		
Year/ Level	First year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	Aim
1	Apply knowledge of electrical circuit theories and systematic methods to analyze circuit, frequency responses circuit, resonant circuits and filter network.

3. Learning Outcomes (LOs):

A1.1	Recognize the different basic circuit laws such as energy storage element inductor and capacitor , operational amplifier and initial conditions .to solve electrical circuit problems .
A1.2	Describe the systematic methods including first order differential equation and second order differential equation .
A2.1	Use circuit simulator (such as Workbench and Matlab) to solve and analyze computer circuits .
A5.1	Describe the suitable solutions for analyzing state vriable and two port network .
A10.1	Solve Laplace circuit transform to circuit analysis , frequency responses circuit , resonant circuits and filter network
B1.1	Assess linear and complex algebra to solve the electric circuit and convert the oral problem into analytical one.
B2.1	Solve Two port electrical networks, Filters circuits.
B4.1	Solve the right solution according to data given and match the results within specific frame.

4. Course Contents:

No.	Topics	Week
1	Important circuit concepts - Energy storage elements (inductor , capacitor) - The operational amplifier - Ramp and step functions - The impulse function - Integral relationships - Initial conditions	**Week-1**
2	The zero input response (RC circuits , RL circuits , additional first order circuits) The zero state response (response to impulse functions) Some other forcing functions (response to other forcing functions) Transient circuit analysis using spice	**Week-2**
3	Zero input circuits (series RLC circuits , Parallel RLC circuits) Non zero input circuits (series RLC , parallel RLC circuits , classifications of response of RLC circuits) Other second order circuits Spice analysis of RLC circuits	**Week 3**
4	Numerical analysis of zero input circuits Non zero input circuits Numerical analysis Rules for writing circuit equations	**Week-4**
5	Admittance parameters Impedance parameters Hybrid parameters Parameter conversion	**Week-5**
6	Interconnections of two ports (series interconnections, parallel interconnections) Illustrative examples	**Week-6**
7	Applications of Laplace transform to circuit Illustrative examples	**Week-7**
8	- Applications of Laplace transform to circuit Circuit element model Illustrative examples	**Week-8**
9	Midterm written examination	**Week-9**
10	Resonance in Electrical circuits Series resonance Illustrative examples	**Week-10**
11	Frequency Resonance in Electric circuits Illustrative examples	**Week-11**
12	Resonant circuits - Definition of resonant	**Week-12**

	- Type of resonant - Illustrative examples	
13	Filter networks Illustrative examples	**Week-13**
14	Overview Illustrative examples	**Week-14**
15	Review	**Week-15**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (Online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem solving**	**Brain storming**	**Projects**	**Site visits**	**Self - learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x	**x**				x	x								
	A1-2	x	**x**				x	x								
	A2-1		**x**	**x**		x										
	A5-1	x					x	x								
	A10-1	x	**x**				x	x								
B-Level	**B1-1**	x					x	x								
	B2-1	x	**x**				x	x								
	B4-1	x	**x**													

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A5.1, B4.1, B2.1
2	Practical Examination	A2.1, B4.1.
3	Oral Examination	A1.1, A5.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A2.1, A5.1, B4.1, B2.1, A10.1.
5	Final Term Examination (written)	A2.1, A1.2, A5.1, B4.1, B2.1.

7.2 Assessment Schedule:

No.	Assessment Method	Week
1	Mid Term Examination (written/ online)	9th
2	Tutorial, report, discussions and presentation assessment	Every week
3	Quizzes	Through whole semester
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Tutorial, report, discussions and presentation assessment	10
3	Quizzes	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Irwin, J. David, and R. Mark Nelms. Basic engineering circuit analysis. Wiley, 2020.
2	Nilsson & Riedel "Electric Circuits" 11th edition, 2019.
3	Roadstrum, William Henry, and Dan H. Wolaver. "Electrcial Enginnering For All Engineers" , john wiley & Sons , 2010
4	Raymond A.DeCarki,Pen-Men Lin, "Linear Circuit Analysis", Oxford, 5th edition, 2015.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LO's
1	Important circuit concepts - Energy storage elements (inductor , capacitor) - The operational amplifier - Ramp and step functions - The impulse function - Integral relationships - Initial conditions	1	A1-1&A5-1 B1-1&A10-1
2	The zero input response (RC circuits , RL circuits , additional first order circuits) The zero state response (response to impulse functions) Some other forcing functions (response to other forcing functions) Transient circuit analysis using spice	1	A1-1&A1-2 B4-1&A10-1 ,A2-1
3	Zero input circuits (series RLC circuits , Parallel RLC circuits) Non zero input circuits (series RLC , parallel RLC circuits , classifications of response of RLC circuits) Other second order circuits Spice analysis of RLC circuits	1	A1-1&A1-2 B4-1&A10-1 ,A2-1
4	Numerical analysis of zero input circuits Non zero input circuits Numerical analysis Rules for writing circuit equations	1	A1-1&A1-2 B4-1&A10-1 ,A2-1.
5	Admittance parameters Impedance parameters Hybrid parameters Parameter conversion	1	A5-1& B2-1&A10-1
6	Interconnections of two ports (series interconnections, parallel interconnections) Illustrative examples	1	A5-1& B2-1&A10-1
7	Applications of Laplace transform to circuit Illustrative examples	1	A1-1& B1-1&A10-1
8	- Applications of Laplace transform to circuit Circuit element model Illustrative examples	1	A1-1, B1-1.

9	Midterm written examination	1	A1.1, A5.1, B4.1, B2.1
10	Resonance in Electrical circuits Series resonance Illustrative examples	1	A1-1, B4-1, A10-1
11	Frequency Resonance in Electric circuits Illustrative examples	1	A1-1& B2-1&A10-1
12	Resonant circuits - Definition of resonant - Type of resonant - Illustrative examples	1	A1-1& B2-1& A10-1
13	Filter networks Illustrative examples	1	A1-1& B2-1& A10-1
14	Overview Illustrative examples		A1-1& B2-1& A10-1
15	Review	1	A1-1, A10-1 B2-1& A5.1

Course: Electrical circuits (2)	
Program Los	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics	A1.1 Recognize the different basic circuit laws such as energy storage element inductor and capacitor, operational amplifier and initial conditions .to solve electrical circuit problems. A1.2 Describe the systematic methods including first order differential equation and second order differential equation.
A2. 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.	A2.1 Use circuit simulator (such as Workbench and Matlab) to solve and analyze computer circuits.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Describe the suitable solutions for analyzing state variable and two port network.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Solve Laplace circuit transform to circuit analysis, frequency responses circuit , resonant circuits and filter network
B1 Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems..	B1.1 Assess linear and complex algebra to solve the electric circuit and convert the oral problem into analytical one.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Solve Two port electrical networks, Filters circuits.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Solve the right solution according to data given and match the results within specific frame.

Course Coordinator: Dr. Ramadan Aly Abd EL Aal

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1 Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Civil Engineering		
Course Code	CIV107		
Year / Level / Semester	First year - Second semester		
Specialization	Minor		
Teaching Hours	**Lectures**	**Tutorial**	**Practical**
	2	2	0

2 Course aims

No.	aim
1	Apply knowledge of fundamental principles of civil engineering and the necessary civil engineering applications to solve several civil engineering problems and will be acquainted with the applied civil engineering.

3 Learning Outcomes (LOs)

A1.1	Define the basic needs for surveying in civil engineering projects.
A1.2	Describe the fundamentals of surveying and topographic mapping.
A1.3	Identify the structure loads, supports, and reactions.
A1.4	Calculate the structure reaction.
A1.5	Analyze the structures to external and internal forces.
A1.6	Classify the different engineering materials and its properties.
A2.1	Sketch the straining action diagram using data obtained from structure reaction and applied loads
A10.1	Determine the structure reactions and internal forces.
A10.2	Recognize the inspection and laboratory tests.
A10.3	Classify different types of buildings
A10.4	Recognize the excavation works, foundations, and floors.

4 Course Contents

No.	Topic	Weeks
1	**Lectures:** • Introduction to major fields of Civil Engineering. • Distance measuring methods and electronic instruments. **Labs/Tutorials:** • Disscussion and Applications on Distance measuring methods	1-2
2	**Lectures:** • Leveling and method of level calculation **Labs/Tutorials:** • Applications to Leveling and method of level calculation	3
3	**Lectures:** • Review of plane static's • Types of loads, supports, and static stability of beams and frames. **Labs/Tutorials:** • Applications to plane static's • Applications to structures stability.	4-5
4	**Lectures:** • Determination of reactions in Beams, Frames, and Trusses **Labs/Tutorials:** • Applications to Determination of reactions in Beams, Frames, and Trusses	6
5	**Lectures:** • Structural Analysis of beams and frames **Labs/Tutorials:** • Applications to Structural Analysis of beams and frames	7-8
6	**Midterm**	9
7	**Lectures:** • Analytical determination of internal forces in trusses. • Graphical determination of internal forces in trusses. **Labs/Tutorials:** • Applications to trusses internal forces determination.	10-11
8	**Lectures:** • Classification of different engineering materials and its properties. **Labs/Tutorials:** • Applications to engineering materials and its properties.	12
9	**Lectures:** • Inspection and laboratory tests. **Labs/Tutorials:**	13

	• Applications to Inspection and laboratory tests.	
10	**Lectures:** • Different types of buildings **Labs/Tutorials:** • Disscussions to different types of buildings.	**14**
11	**Lectures:** • Excavation works, foundations, and floors. **Labs/Tutorials:** • Disscussions to excavation works, foundations, and floors.	**15**

5 Teaching and Learning Methods

Course s LO's		**Teaching and Learning Method**														
		Face-to-face Lecture	**Online Lecture**	**Flipped Classroom**	**Presentation and Movies**	**Discussion**	**Tutorial**	**Problem solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning and Research Report**	**Cooperative**	**Discovering**	**Modeling**	**Playing**
Levels A	A1.1	X	X		X	X										
	A1.2	X	X		X	X										
	A1.3	X	X		X		X	X								
	A1.4	X	X		X		X	X								
	A1.5	X	X		X		X	X								
	A1.6	X	X		X	X	X	X								
	A2.1	X	X		X		X	X								
	A10.1	X	X		X		X	X								
	A10.2	X	X		X	X						X				
	A10.3	X	X		X	X						X				
	A10.4	X	X		X	X						X				

6 Teaching and Learning Methods of Disable Students

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments
3	Give them specific tasks.
4	Repeat the explanation of some of the material and tutorials.

7 Student assessment

7.1 Student Assessment Methods

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A1.5, A2.1, A10.1
2	Tutorial and report assessment	A1.3, A1.4, A1.5, A1.6, A2.1, A10.1
3	Quizzes - online quizzes	A1.2, A1.3, A1.4, A1.5, A1.6, A2.1, A10.1, A10.2, A10.3, A10.4
4	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A1.6, A2.1, A10.1, A10.2, A10.3, A10.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9th
2	Tutorial and report assessment	Every week
3	Quizzes - online quizzes	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Tutorial and report assessment	10
3	Quizzes - online quizzes	10
4	Final Term Examination (written)	70
Total		100%

8 List of References

Course Notes	1.The course notes were prepared by structural analysis professors in the civil engineering department in the faculty
Essential Books (Textbooks)	1.Wagih Mohamed El-Dakhakhni, "Theory of Structures Part 1", Dar Al-Maaref, Cairo, 1983. 2. Jack C. Mc Cormac, H, Surveying Fundamentals, Prentice Hall, Englewood, New Jersy 7th edition 2017

9 Facilities Required for Teaching and Learning

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10 Matrix of Knowledge and Skills of the Course

No.	Topic	Aim	LOs
1	**Lectures:** • Introduction to major fields of Civil Engineering. • Distance measuring methods and electronic instruments. **Labs/Tutorials:** • Disscussion and Applications on Distance measuring methods	**1**	A1.1 A1.2
2	**Lectures:** • Leveling and method of level calculation **Labs/Tutorials:** • Applications to Leveling and method of level calculation	**1**	A1.1 A1.2
3	**Lectures:** • Review of plane static’s • Types of loads, supports, and static stability of beams and frames. **Labs/Tutorials:** • Applications to plane static’s • Applications to structures stability.	**1**	A1.3 A1.4
4	**Lectures:** • Determination of reactions in Beams, Frames, and Trusses **Labs/Tutorials:** • Applications to Determination of reactions in Beams, Frames, and Trusses	**1**	A1.4 A10.1
5	**Lectures:** • Structural Analysis of beams and frames **Labs/Tutorials:** Applications to Structural Analysis of beams and frames	**1**	A1.4 A1.5 A2.1 A10.1
6	**Lectures:** • Analytical determination of internal forces in trusses. • Graphical determination of internal forces in trusses. **Labs/Tutorials:** • Applications to trusses internal forces determination.	**1**	A1.4 A1.5 A10.1
7	**Lectures:** • Classification of different engineering materials and its properties.	**1**	A1.6

	Labs/Tutorials: - Applications to engineering materials and its properties.		
8	**Lectures:** - Inspection and laboratory tests. **Labs/Tutorials:** - Applications to Inspection and laboratory tests.	**1**	A10.2
9	**Lectures:** - Different types of buildings **Labs/Tutorials:** - Disscussions to different types of buildings.	**1**	A10.3
10	**Lectures:** - Excavation works, foundations, and floors. **Labs/Tutorials:** - Disscussions to excavation works, foundations, and floors.	**1**	A10.4

Course: Civil Engineering	
Course Los	**Program Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Define the basic needs for surveying in civil engineering projects. A1.2 Describe the fundamentals of surveying and topographic mapping. A1.3 Identify the structure loads, supports, and reactions. A1.4 Calculate the structure reaction. A1.5 Analyze the structures to external and internal forces. A1.6 Classify the different engineering materials and its properties.
A2. 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.	A2.1 Sketch the straining action diagram using data obtained from structure reaction and applied loads
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Determine the structure reactions and internal forces. A10.2 Recognize the inspection and laboratory tests. A10.3 Classify different types of buildings A10.4 Recognize the excavation works, foundations, and floors.

Course Coordinator: Marwa Hassan Azzam

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	HUF102		
Year/ Level	First year- 2nd semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical
	2	---	---

2. Course Aims:

No.	Aim
5	Master self-learning and life-long learning strategies and communicate effectively using different modes, tools, and languages to improve technical English writing skills and provide a technical manuscript and reports following different writing styles. More specifically the course introduces different section of a technical report and how to write each section.

3. Learning Outcomes (LOs):

A8-1	Identify the importance and usage of different types of technical report for engineers.
A8-2	Recognize the differences between the different sections of technical reports.
A8-3	Prepare accurate, clear, efficient, and comprehensive engineering technical report.
A8-4	Presents accurate, clear, efficient, and comprehensive engineering technical report.
A8-5	Explore different ideas, views, and knowledge from a range of sources to organize, collect, analyze, and evaluate information for writing a technical report.
A10-1	Refer to various literatures regarding writing styles and rules.
A10-2	Practice writing the list of references in a different format.

4. Course Contents:

Week No.	Topic	Total Hours	Contact hrs		
			Lec.	Tut.	Lab.
Week-1	Introduction	2	2	--	--
Week-2	Formatting Guidelines (templates, pages, and text)	2	2	--	--
Week-3-4	Components of a report (preliminary pages)	4	4	--	--
Week-5-7	Components of a report (text of a report : introduction, main section, conclusion, recommendations)	6	6	--	--
Week-9	Mid-term Exam	2	2	--	--
Week-8-11	Referencing of sources and originality (author-date, and numerical referencing)	6	6	--	--
Week-12	Planning and writing	2	2	--	--
Week-13-14	Practice and discuss how to prepare and write a technical report.	4	4	--	--

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture (online-In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A8-1	x	x		x	x			x				x			
	A8-2	x	x		x											
	A8-3	x	x		x											
	A8-4	x	x		x											
	A8-5		x		x							x	x			
	A10-1	x	x		x				x							
	A10-2	x	x		x	x			x			x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written)	A8-1, A8-2, A8-3, A8-5, A10-1
2	Formative (quizzes – presentation - reports)	A8-1, A8-2, A8-3, A8-4, A8-5, A10-1, A10-2
3	Final Term Examination (written)	A8-1, A8-2, A8-3, A8-4, A8-5, A10-1, A10-2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written)	9th
2	Formative (quizzes – presentation - reports)	Three times through the semester
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written)	١٠
2	Formative (quizzes – presentation - reports)	10
3	Final Term Examination (written)	80
Total		100%

8. List of References

No.	Reference List
1	Su-Hie Ting, and Syaharom Abdullah, *Report Writing Skills of Engineering Students*, Proceedings of The Second International Conference on the Roles of the Humanities and Social Sciences in Engineering, July 2012.
2	Ann Winckel, and Bonnie Hart, *Report Writing Style Guide For Engineering Students*, Flexible Learning Centre, University of Australia, 4th edition July 2002.
3	Nell Ann Pickett, *Technical English: Writing, Reading, and Speaking*, 8th edition, Pearson international edition, 2014.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Introduction	5	A8-1
2	Formatting Guidelines (templates, pages, and text)	5	A8-2, A8-4, A10-1
3	Components of a report (preliminary pages)	5	A8-2, A8-4, A10-1
4	Components of a report (text of a report : introduction, main section, conclusion, recommendations)	5	A8-2, A8-4, A10-1
5	Mid-term Exam	5	A8-1, A8-2, A8-3, A8-5, A10-1
6	Referencing of sources and originality (author-date, and numerical referencing)	5	A10-1, A10-2
7	Planning and writing	5	A8-1, A8-3, A8-4, A10-1, A10-2
8	Practice and discuss how to prepare and write a technical report.	5	A8-1, A8-2, A8-3, A8-4, A10-1, A10-2

Course: Technical Report Writing	
Program LOs	**Course LOs**
A8 - Communicate effectively, graphically, verbally and in writing, with a range of audiences using contemporary tools.	A8-1 Identify the importance and usage of different types of technical report for engineers.
	A8-2 Recognize the differences between the different sections of technical reports.
	A8-3 prepare accurate, clear, efficient, and comprehensive engineering technical report.
	A8-4 Presents accurate, clear, efficient, and comprehensive engineering technical report.
	A8-5 Explore different ideas, views, and knowledge from a range of sources to organize, collect, analyze, and evaluate information for writing a technical report.
A10 - Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Refer to various literatures regarding writing styles and rules.
	A10-2 Practice writing the list of references in a different format.

Course Coordinator: Dr. Rabab Abdel-Kader

Program Coordinator: Dr. Rania Abdallah

Head of Department: Assoc. Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

Course Specifications

Second Year

For

B. Sc. in Electrical Engineering Program

(Specialization: Electronics and Communications Engineering)

Bylaw 2014

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	SCI226		
Year/ Level	Second year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	aim
1	Apply knowledge of mathematics to deal with special functions and its applications, to evaluate double and triple Integrals and its applications, the evaluation methods of the Line Integral, Curl and Divergence of vector fields, the concept of Surface Integrals and its applications, the concept of Green, Stokes and Gauss theorems, and the potential of using them in some applications.

3. Learning Outcomes (LOs):

A1.1	Identify the solution of ordinary differential equations using series.
A1.2	Review the theories and concepts used in the Special functions.
A1.3	Recognize the contribution and impacts on Special functions in different areas of science.
A1.4	Describe the nature and operations of vector analysis.
A2.1	Estimate the gradient of a scalar field and the divergence and curl of a vector field.
A2.2	Apply the concepts and theories of the basic properties of using the Green theorem as an effective methodology of solving engineering problems.
A2.3	Conduct the application of the divergence theorem, Stokes' theorem and Gauss theorem as an effective methodology of solving engineering problems.
A10.1	Identify the problem and select appropriate mathematical methods for modeling and analyzing it.
A10.2	Use different methods for solving the different types of problems and select the most appropriate solutions based on analytical thinking.
B2.1	Apply knowledge of mathematics, science, and engineering practice integrally to solve engineering problems related to the course topics.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Chapter 1:** Solution in series - case I - case II - case III - case IV **Tutorials:** -Solve the cases problems.	1-4
2	**Lectures:** **Chapter2:** Special functions - The Gamma function - The Beta function - The Bessel functions - The Legendre polynomials **Tutorials:** -Discuss problems and the possible solutions.	5-6
3	**Lectures:** **Chapter 3:** Vector analysis - Scalar and Vector Fields - Vector addition - Dot and Cross product of vectors - application of vectors **Tutorials:** -Solve the problems.	7-8
4	**Midterm**	9
5	**Lectures:** **Chapter 4:** Differential operators - The gradient of a scalar field - The divergence of a vector field - The curl of a vector field **Tutorials:** -Solve the problems.	10-12
6	**Lectures:** **Chapter 5: -** Calculus of functions of several variables -The line integral - The double integral - The triple integral **Tutorials:** -Solve the problems.	13
7	**Lectures:** **Chapter 6:** **-** Fundamental theorems that connect differentiation and integration in multivariable calculus	14-15

	-Green theory - Stocks theory -Gauss theory **Tutorials:** - Solve the problems	

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x				x	x								
	A1.2	x				x	x	x								
	A1.3	x					x	x								
	A1.4	x				x	x	x	x							
	A2.1	x				x	x	x								
	A2.2	x	x			x	x	x	x							
	A2.3	x				x	x	x								
	A10.1	x					x		x							
	A10.2						x		x							
B-Level	**B2.1**		x			x	x		x							

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4,A10.1,A10.2
2	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A2.2, A2.3,A10.1,A10.2, B2.1
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4,A10.1,A10.2, A2.1, A2.2, A2.3, B2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes- presentation - reports)	10
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Erwin Kreyszig, "Advanced Engineering Mathematics" John Wiley & Sons Inc., 10th Edition, (2010).
2	R.KENT NAGLE & EDWARD B. SAFF, "Fundamental of Differential Equations.", Publisher: Pearson; 9 edition, (Jan 11, 2017).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** **Chapter 1:** Solution in series - case I - case II - case III - case IV **Tutorials:** -Solve the cases problems	1	A1.1
2	**Lectures:** **Chapter2:** Special functions - The Gamma function - The Beta function - The Bessel functions - The Legendre polynomials **Tutorials:** -Discuss problems and the possible solutions.	1	A1.2, A1.3
3	**Lectures:** **Chapter 3:** Vector analysis - Scalar and Vector Fields - Vector addition - Dot and Cross product of vectors - application of vectors **Tutorials:** -Solve the problems.	1	A1.4
4	Midterm.	1	A1.1, A1.2, A1.3, A1.4,A10.1,A10.2
5	**Lectures:** **Chapter 4:** Differential operators - The gradient of a scalar field - The divergence of a vector field - The curl of a vector field **Tutorials:** -Solve the problems.	1	A2.1
6	**Lectures:** **Chapter 5:** - Calculus of functions of several variables -The line integral - The double integral - The triple integral **Tutorials:** -Solve the problems.	1	A2.2, A2.3,A10.2
7	**Lectures:**	1	A2.2,

	Chapter 6: **-** Fundamental theorems that connect differentiation and integration in multivariable calculus -Green theory - Stocks theory -Gauss theory **Tutorials:** -Solve the problems		A2.3,A10.1,A10.2,B2.1

Course: Mathematics (5-A)	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the solution of ordinary differential equations using series. A1.2 Review the theories and concepts used in the Special functions. A1.3 Recognize the contribution and impacts on Special functions in different areas of science. A1.4 Describe the nature and operations of vector analysis.
A2. 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.	A2.1 Estimate the gradient of a scalar field and the divergence and curl of a vector field. A2.2 Apply the concepts and theories of the basic properties of using the Green theorem as an effective methodology of solving engineering problems. A2.3 Conduct the application of the divergence theorem, Stokes' theorem and Gauss theorem as an effective methodology of solving engineering problems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Identify the problem and select appropriate mathematical methods for modeling and analyzing it. A10.2 Use different methods for solving the different types of problems and select the most appropriate solutions based on analytical thinking.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 **1** Apply knowledge of mathematics, science, and engineering practice integrally to solve engineering problems related to the course topics.

Course Coordinator: Dr. Mohamed Youssef Farghly

Dr. Ibrahim hosny

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE204		
Year/ Level	Second year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
6	Manipulate with the basics of electronic devices, all the way from the basic op-amp circuits as a black box to the analysis and design of multistage and multitransistor circuits.

3. Learning Outcomes (LOs):

A1.1	Identify the basic configurations of the BJT and FET amplifiers.
A1.2	Solve typical amplifier problems to determine its basic performance metrics.
A2.1	Assess different oscillator and amplifier topologies.
A2.2	Evaluate typical amplifier topologies from the point of view of gain and bandwidth.
A6.1	State the main limitations of operational amplifiers.
A8.1	Describe the main applications of the pn-junction diode.
A10.1	Apply knowledge of electronic circuits to solve real-life problems.
B2.1	Analyze a typical amplifier or oscillator circuit.
B4.1	Interpret the performance of electronic circuits experimentally.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - **Diode circuit analysis and design:** Introduction: context of electronic circuits - Diode as a circuit element - Meter check of a diode - Analysis of large-signal diode circuits - Analysis of small-signal diode circuits – Load line analysis of diode circuits – Diode applications: Half-wave rectifier, Full wave rectifier, Rectifiers comparison and design trade off, Zener diode regulation circuits, Design DC voltage source with three terminals IC voltage regulators, Wave shaping circuits: The clamping circuit; Clipping or Limiter circuits - Piecewise linear voltage transfer characteristics (VTC) of a diode circuit – Dynamic switching behaviors of the diode. **Labs/Tutorials:** - Dealing with the Workbench software capabilities.	**Week** **1, 2**
2	**Lectures:** 1. **Bipolar junction transistor (BJT) Circuits Analysis and Design:** Review of bipolar transistor modeling and characteristics - BJT amplifier circuits biasing techniques – Small signal analysis of BJT amplifier circuits: Common emitter amplifier, Common collector amplifier, Common base amplifier, Multi-stage amplifiers. **Labs/Tutorials:** - Use the electronic laboratory equipment to test the various BJT amplifier circuits. - Use software packages such as workbench to test the various BJT amplifier circuits. - Identify appropriate specifications for required devices to test the various BJT amplifier circuits. - Demonstrate problem solving ability in the completion of their homework assignments related to the BJT biasing techniques (sheet 1) and the various BJT amplifier circuits (Sheet 2).	**Week** **3, 5**
3	**Lectures:** 2. **Field Effect Transistor (FET) Circuits Analysis and Design:** Review of FET transistor modeling and characteristics - FET amplifier circuits biasing techniques – Small signal analysis of	**Week** **6-8**

	FET amplifier circuit's configurations. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the various FET amplifier circuits. • Use software packages such as workbench to test the various FET amplifier circuits. • Identify appropriate specifications for required devices to test the various FET amplifier circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the FET amplifier circuits (Sheet 3).	
	Mid-Term Exam	**Week 9**
4	**Lectures:** **3. Compound circuits (BJT + FET) analysis and Design::** DC analysis and Small signal analysis of Compound transistor configurations: Darlington and cascade amplifier circuits. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Compound circuits. • Use software packages such as workbench to test the Compound circuits. • Identify appropriate specifications for required devices to test the Compound circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the Compound circuits (Sheet 4).	**Week** **10**
5	**Lectures:** **Ideal operational amplifiers and their basic applications:** OP-AMP Basics – Practical OP-AMP Circuits- OP-AMP applications: Constant gain multiplier; Multiple stage gains; Voltage summing; Voltage subtraction; Voltage Buffer; Controlled Sources. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the operational amplifiers circuits. • Use software packages such as workbench to test the operational amplifiers circuits. • Identify appropriate specifications for required devices to be used to test the operational amplifiers circuits.	**Week** **11, 12**

	• Demonstrate problem solving ability in the completion of their homework assignments related to the operational amplifiers circuits. (Sheet 5).	
6	**Lectures:** **4. Feedback amplifiers: analysis, design, stability:** Feedback concepts – Feedback connection types – Practical feedback circuits – Feedback amplifiers. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Feedback amplifiers circuits. • Use software packages such as workbench to test the Feedback amplifiers circuits. • Identify appropriate specifications for required devices to be used to test the Feedback amplifiers circuits. Demonstrate problem solving ability in the completion of their homework assignments related to the Feedback amplifiers circuits. (Sheet 6).	**Week 13**
7	**Lectures:** **5. Oscillators:** Oscillator Operation – Phase shift oscillator – Tuned oscillator circuits – Crystal oscillator. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Oscillators circuits. • Use software packages such as workbench to test the Oscillators circuits. • Identify appropriate specifications for required devices to be used to test the Oscillators circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the Oscillators circuits. (Sheet 7).	**Week 14**
8	**6. Review, the project assessment and lab test**	**Week 15**

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x	x			x	x								
	A1.2	x	x			x			x	x				x		
	A2.1		x				x		x		x					
	A2.2					x			x					x	x	
	A6.1				x			x				x				
	A8.1					x					x			x		
	A10.1	x	x			x	x	x		x						
B-Level	B2.1		x				x			x		x				
	B4.1						x			x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A2.1, A2.2, B2.1, B4.1
2	Practical Examination	A2.1, A2.2, A10.1, B2.1, B4.1
3	Oral Examination	A8.1
4	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A2.2, A6.1, A8.1, B4.1
5	Final Term Examination (written)	A2.2, A10.1, B2.1, B4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	A. S. Sedra and K. C. Smith, *Microelectronic Circuits*, Seventh Edition, Oxford University Press, Oxford, New York, 2015.
2	B. Razavi, *Fundamentals of Microelectronics*, Second Edition, Wiley, USA, 2014.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LOs
1	**Lectures:** • **Diode circuit analysis and design:** Introduction: context of electronic circuits - Diode as a circuit element - Meter check of a diode - Analysis of large-signal diode circuits - Analysis of small-signal diode circuits – Load line analysis of diode circuits – Diode applications: Half-wave rectifier, Full wave rectifier, Rectifiers comparison and design trade off, Zener diode regulation circuits, Design DC voltage source with three terminals IC voltage regulators, Wave shaping circuits: The clamping circuit; Clipping or Limiter circuits - Piecewise linear voltage transfer characteristics (VTC) of a diode circuit – Dynamic switching behaviors of the diode. **Labs/Tutorials:** • Dealing with the Workbench software capabilities.	6	A1.1, A1.2, B2.1, B4.1
2	**Lectures:** 7. **Bipolar junction transistor (BJT) Circuits Analysis and Design:** Review of bipolar transistor modeling and characteristics - BJT amplifier circuits biasing techniques – Small signal analysis of BJT amplifier circuits: Common emitter amplifier, Common collector amplifier, Common base amplifier, Multi-stage amplifiers. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the various BJT amplifier circuits. • Use software packages such as workbench to test the various BJT amplifier circuits. • Identify appropriate specifications for required devices to test the various BJT amplifier circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the BJT biasing techniques (sheet 1) and the various BJT amplifier circuits (Sheet 2).1	6	A1.1, A1.2, A6.1, A8.1, A10.1, B2.1, B4.1

3	**Lectures:** **8. Field Effect Transistor (FET) Circuits Analysis and Design:** Review of FET transistor modeling and characteristics - FET amplifier circuits biasing techniques – Small signal analysis of FET amplifier circuit's configurations. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the various FET amplifier circuits. • Use software packages such as workbench to test the various FET amplifier circuits. • Identify appropriate specifications for required devices to test the various FET amplifier circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the FET amplifier circuits (Sheet 3).	6	A2.1, A2.2, A8.1, B2.1, and B4.1
	Mid-Term Exam		A2.1, A2.2, A8.1, B2.1, and B4.1
4	**Lectures:** **9. Compound circuits (BJT + FET) analysis and Design::** DC analysis and Small signal analysis of Compound transistor configurations: Darlington and cascade amplifier circuits. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Compound circuits. • Use software packages such as workbench to test the Compound circuits. • Identify appropriate specifications for required devices to test the Compound circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the Compound circuits (Sheet 4).	6	A2.1, A2.2, A8.1, B2.1, and B4.1

5	**Lectures:** **Ideal operational amplifiers and their basic applications:** OP-AMP Basics – Practical OP-AMP Circuits- OP-AMP applications: Constant gain multiplier; Multiple stage gains; Voltage summing; Voltage subtraction; Voltage Buffer; Controlled Sources. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the operational amplifiers circuits. • Use software packages such as workbench to test the operational amplifiers circuits. • Identify appropriate specifications for required devices to be used to test the operational amplifiers circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the operational amplifiers circuits. (Sheet 5).	6	A2.1, A2.2, A8.1, B2.1, and B4.1
6	**Lectures:** **10. Feedback amplifiers: analysis, design, stability:** Feedback concepts – Feedback connection types – Practical feedback circuits – Feedback amplifiers. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Feedback amplifiers circuits. • Use software packages such as workbench to test the Feedback amplifiers circuits. • Identify appropriate specifications for required devices to be used to test the Feedback amplifiers circuits. Demonstrate problem solving ability in the completion of their homework assignments related to the Feedback amplifiers circuits. (Sheet 6).	6	A1.1, A1.2, B2.1, B4.1
7	**Lectures:**	6	A1.1, A1.2, B2.1, B4.1

	11. Oscillators: Oscillator Operation – Phase shift oscillator – Tuned oscillator circuits – Crystal oscillator. **Labs/Tutorials:** • Use the electronic laboratory equipment to test the Oscillators circuits. • Use software packages such as workbench to test the Oscillators circuits. • Identify appropriate specifications for required devices to be used to test the Oscillators circuits. • Demonstrate problem solving ability in the completion of their homework assignments related to the Oscillators circuits. (Sheet 7).		
8	**Review, the project assessment and lab test**		B2.1, B4.1

Course: Electronic Circuits	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the basic configurations of the BJT and FET amplifiers. A1.2 Solve typical amplifier problems to determine its basic performance metrics.
A2. 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	A2.1 Assess different oscillator and amplifier topologies. A2.2 Evaluate typical amplifier topologies from the point of view of gain and bandwidth.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 State the main limitations of operational amplifiers.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Describe the main applications of the pn-junction diode.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply knowledge of electronic circuits to solve real-life problems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design**.**	B2.1 Analyze a typical amplifier or oscillator circuit.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Interpret the performance of electronic circuits experimentally.

Course Coordinator: Dr. Osama Refaat

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE205		
Year/ Level	Second year- First Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	3	2	-

2. Course aims:

No.	Aim
9	Model, analyze, design and Recognize the characteristics of different types of waves, the skills necessary for analysis of electromagnetic wave radiation, propagation and reflection.

3. Learning Outcomes (LOs):

A1.1	Recognize the mathematical concepts necessary for understanding electromagnetic fields theory.
A1.2	Illustrate the wave characteristics and wave phenomena such as propagation, reflection and refraction of electromagnetic waves.
A1.3	Explain the radiation of electromagnetic waves.
A10.1	Apply knowledge of electromagnetic waves on communications and other applications.
B2.1	Analyze the wave phenomena using the suitable mathematical and computer-based methods to solve propagation problems.
B2.2	Identify the suitable tools required to optimize the wave propagation.
C1.1	Apply the physical phenomena of the wave characteristics performance to solve the wave problems.
C5.1	Demonstrate the knowledge about state of the art of electromagnetic waves applications.
C7.1	Demonstrate additional abilities related to model and analyze electromagnetic waves components.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Maxwell's equations:** • Time dependent fields – Maxwell's equations in different forms- Wave equation. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Maxwell's equations & wave equation (sheet 1)	1-2
2	**Lectures:** **Plane waves:** • Plane wave parameters- Plane waves in different media- Poynting theorem **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the wave parameters & Poynting theorem (sheet 2)	3-4
3	**Lectures:** **Wave polarization:** • Definition – Different types of wave polarization – Theorems **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the wave parameters & Poynting theorem (sheet 3)	5
4	**Lectures:** **Reflection and refraction**: • Reflection and refraction by a planar interface between two dielectric media – Reflection from good conductor- Transmission line analogy – Standing waves – Reflection by a dielectric slab **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the reflection and refraction (sheet 3)	6-8
5	**Midterm**	9
6	**Lectures:** **Electromagnetic radiation:** • Electromagnetic radiation – Inhomogeneous wave equations – Radiation integrals- Radiation from infinitesimal current element **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the radiation from infinitesimal current element (sheet 4)	10-12

7	**Lectures:** **Radio wave propagation** • Line of sight propagation **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to Line of sight propagation (sheet 4)	13-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	A1-2	x			x		x	x								
	A1-3	x			x		x	x								
	A10-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
C-Level	**C1-1**	x			x		x	x								
	C5-1	x			x		x	x				x				
	C7-1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, A1-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A1-2, A1-3, A10-1, B2-1, B2-2, C1-1, C5-1, C7-1
3	Final Term Examination (written)	A1-1, A1-2, A1-3, B2-1, B2-2, C1-1, C5-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	16
2	Formative (quizzes- online quizzes- presentation - reports)	16
3	Final Term Examination (written)	68
Total		100%

8. List of References

No.	Reference List
1	F. T. Ulaby, U. Ravaioli “Fundamentals of Applied Electromagnetics,” Pearsone, 7th Ed, 2015.
2	William Hayt and John Buck, “Engineering Electromagnetics” 8th edition, McGraw-Hill Education; 2018.
3	David K. Cheng, “Fundamentals of Engineering Electromagnetics,” Addison-Wesley, 2003.
4	R. Plonsey and R. E. Collin, “Principles and Applications of Electromagnetic Fields,” McGraw-Hill, 1961.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** **Maxwell's equations:** • Time dependent fields – Maxwell's equations in different forms- Wave equation. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Maxwell's equations & wave equation (sheet 1)	9	A1-1, C1-1
2	**Lectures:** **Plane waves:** • Plane wave parameters- Plane waves in different media- Poynting theorem **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the wave parameters & Poynting theorem (sheet 2)	9	A1-1, A1-2, B2-1,C1-1, C5-1
3	**Lectures:** **Wave polarization:** • Definition – Different types of wave polarization – Theorems **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the wave parameters & Poynting theorem (sheet 3)	9	A1-1, A1-2, C7-1
4	**Lectures:** **Reflection and refraction**: • Reflection and refraction by a planar interface between two dielectric media – Reflection from good conductor- Transmission line analogy – Standing waves – Reflection by a dielectric slab	9	A1-2, B2-1, B2-2, C1-1

	Tutorials: - Demonstrate problem solving ability in the completion of their homework assignments related to the reflection and refraction (sheet 3)		
5	**Midterm**	9	A1-1, A1-2, B2-1, B2-2, C1-1
6	**Lectures:** **Electromagnetic radiation:** - Electromagnetic radiation – Inhomogeneous wave equations – Radiation integrals- Radiation from infinitesimal current element **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to the radiation from infinitesimal current element (sheet 4)	9	A1-3, B2-1, B2-2, C5-1
7	**Lectures:** **Radio wave propagation** - Line of sight propagation **Tutorials:** - Demonstrate problem solving ability in the completion of their homework assignments related to Line of sight propagation (sheet 4)	9	A1-2, B2-1, B2-2, C1-1, C5-1, C7-1

Course: Electromagnetic Waves	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1 Recognize the mathematical concepts necessary for understanding electromagnetic fields theory. A1-2 Illustrate the waves characteristics, and wave phenomena such as propagation, reflection and refraction of electromagnetic waves. A1-3 Explain the radiation of electromagnetic waves.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply knowledge of electromagnetic waves on communications and other applications.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze the waves phenomena using the suitable mathematical and computer-based methods to solve propagation problems. B2-2 Identify the suitable tools required to optimize the wave propagation.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1-1 Apply the physical phenomena of the waves characteristics performance to solve the wave propagation problems.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate the knowledge about state of the art of electromagnetic waves applications.
C7. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems.	C7-1 Demonstrate additional abilities related to model and analyze electromagnetic waves components.

Course Coordinator: Dr. Rania Abdallah

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">ECE206</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Second year- First semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>-</td><td>-</td><td>5 days ×4 Hours – Total 20 Hours per week (for 4 weeks)</td></tr>
</table>

2. Course aims:

No.	aims
1	Apply knowledge of mathematics, basic sciences and engineering principles to solve problems, analyze and interpret data related to a wide spectrum of electronics and communications engineering problems.
3	Work in and lead a heterogeneous group of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.
4	Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
5	Master self-learning and life-long learning strategies and communicate effectively using different modes, tools, and languages to engage in research studies and deal with challenges in the contemporary engineering issues.

3. Learning Outcomes (LOs):

A2.1	Conduct the basic methodology of using MATLAB, Multisim and Visio software for engineering problem solving.
A2.2	Classify the measuring instrumentations according to their function methodologies**.**
A7-1	Collaborate effectively within multidisciplinary team field during the training.
A8.1	Write a report about the training activities of each week.
B2.1	Analyze circuits using Multisim and Visio software.
B4.1	Use computational facilities, measuring instruments, laboratory equipment to design experiments, collect, analyze and interpret results.
C2.1	Analyze problem solving ability in the completion of their training assignments using the appropriate software packages such as MATLAB, Visio and Multisim.
C4.1	Demonstrate the general principle of electrical machines operation and the measuring instrumentations.

4. Course Contents:

No.	Topics	Week
1	Introduction about the training system and regulations. Using MATLAB Software Package: • Insulation procedure for MATLAB software package. • Programming concepts in MATLAB. • Matrix operation using MATLAB • 2D plotting in MATLAB • 3D plotting in MATLAB • Training examples • Week assessment.	1
2	• Using of measurement devices. • Perform some basic practical Experiments related to electronic circuits. • Week assessment.	2
3	• Using of measurement devices. • Perform some basic practical experiments related to the basics of electrical circuits. • Notes about Basic principles of Electrical Machines, Transformer, Generators, Motors. • Perform some basic practical experiments related to the basics of Electrical Machines, Transformer, Generators, and Motors. • Week assessment.	3
4	Using Different Software Packages to Draw and Analysis Electronic and Electrical Circuits: • Explain the Visio program. • Learn how to use Visio program to draw circuit schematic such as: ✓ Drawing clock generator and driver for 86 & 88 processors block diagram ✓ Drawing 8-bit companded A/D and D/A converter block diagram ✓ Drawing floating point processing unit block diagram. ✓ Drawing three phase AC current generator overload protection circuit. ✓ Drawing Differential protection circuit for three-phase generator. • Learning the basic tools of Multisim 12.0 circuit simulator. • Learning how to draw the circuit schematic in the Multisim's workspace. • Learning how to analyze and simulate circuits using Analysis tools. • Performing DC analysis, Transient analysis and Parameter sweep analysis. • Learning how to extract the Net-list file of the electric circuit to construct the PCB layout of the circuit. • Practical examples • Week assessment.	4

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	x				x							x		x	x
	A2.2					x							x		x	x
	A7-1					x				x		x	x		x	x
	A8.1					x				x		x	x		x	x
B-Level	**B2.1**	x				x				x					x	x
	B4.1					x							x		x	x
C-Level	**C2.1**	x				x									x	x
	C4.1					x				x			x		x	x

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Written Exam (written/ online)	A2.1 – A2.2 – B2.1 – B4.1– C2.1– C4.1
2	Practical Examination	A7.1– A8.1 – B2.1 – B4.1– C2.1– C4.1
3	Oral Examination	A7.1– A8.1
4	Simulation and Lab test	A2.1 – A7.1– B2.1 – C2.1
5	Final Term Examination (written)	No Final Exam

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Written Exam (written/ online)	The end of each week
2	Practical/ Oral Examination	The end of each week
3	Simulation and Lab test	The end of each week
4	Final Term Examination (written)	No Final Exam

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Written Exam (written/ online)	40
2	Practical/ Oral Examination	30
3	Simulation and Lab test	30
4	Final Term Examination (written)	No Final Exam
Total		100%

8. List of References

No.	Reference List
1	Lab manuals
2	Software packages manuals

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Introduction about the training system and regulations. Using MATLAB Software Package: • Insulation procedure for MATLAB software package. • Programming concepts in MATLAB. • Matrix operation using MATLAB • 2D plotting in MATLAB • 3D plotting in MATLAB • Training examples • Week assessment.	1,3,4,5	A2.1- A7.1-A8.1-C2.1
2	• Using of measurement devices. • Perform some basic practical Experiments related to electronic circuits. • Week assessment.	1,3,4,5	A2.2-A7.1-A8.1-B4.1-C4.1
3	• Using of measurement devices. • Perform some basic practical experiments related to the basics of electrical circuits. • Notes about Basic principles of Electrical Machines, Transformer, Generators, Motors. • Perform some basic practical experiments related to the basics of Electrical Machines, Transformer, Generators, and Motors. • Week assessment.	1,3,4,5	A2.2-A7.1-A8.1-B4.1-C4.1
4	Using Different Software Packages to Draw and Analysis Electronic and Electrical Circuits**:** • Explain the Visio program. • Learn how to use Visio program to draw circuit schematic such as: ✓ Drawing clock generator and driver for 86 & 88 processors block diagram ✓ Drawing 8-bit companded A/D and D/A	1,3,4,5	A2.1- A7.1-A8.1- B2.1-C2.1

	converter block diagram ✓ Drawing floating point processing unit block diagram. ✓ Drawing three phase AC current generator overload protection circuit. ✓ Drawing Differential protection circuit for three-phase generator. • Learning the basic tools of Multisim 12.0 circuit simulator. • Learning how to draw the circuit schematic in the Multisim's workspace. • Learning how to analyze and simulate circuits using Analysis tools. • Performing DC analysis, Transient analysis and Parameter sweep analysis. • Learning how to extract the Net-list file of the electric circuit to construct the PCB layout of the circuit. • Practical examples • Week assessment.		

Course: Summer Training (1)	
Program LOs	**Course LOs**
A2. 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.	A2.1 Conduct the basic methodology of using MATLAB, Multisim and Visio software for engineering problem solving. A2.2 Classify the measuring instrumentations according to their function methodologies.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7-1 Collaborate effectively within multidisciplinary team field during the training.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Write a report about the training activities of each week.
B2. Design, model and analyze an electrical/electronic/digital system or component fora specific application; and identify the tools required to optimize this design.	B2.1 Analyze circuits using Multisim and Visio software.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Use computational facilities, measuring instruments, laboratory equipment to design experiments, collect, analyze and interpret results.
C2. Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance	C2.1 Analyze problem solving ability in the completion of their training assignments using the appropriate software packages such as MATLAB, Visio and Multisim.
C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.	C4.1 Demonstrate the general principle of electrical machines operation and the measuring instrumentations.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rezk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	EPM 211		
Year/ Level	Second year- First term		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	aim
4	Use contemporary engineering tools, techniques, and skills to analyze the transmission systems and use distribution theory to recognize the importance of electrical transformers and induction machines by studying their construction, operation, types, characteristics, and applications.

3. Learning Outcomes (LOs):

A١.1	Describe the different types of T.L and models to obtain its electrical and physical parameters
B١.1	Illustrate the types of electrical power transmission and distribution systems circuitry and their model parameters.
B2.1	Recognize the different types of the transformers and Induction Machines and their equivalent circuits.
B3.1	Select appropriate mathematical and computer –based methods for modeling and analyzing problems related to machines and electrical power systems.
B3.2	Apply knowledge of mathematics, science information to solve the problems related to machines and electrical power systems.
B4.1	Use the engineering knowledge to select a suitable magnetic and conductor for given a high performance design

4. Course Contents:

No.	Topics	Week
1	**Introduction to electrical power system elements**: Prime movers, alternators, power transformers, transmission lines …etc and their elctrical and physical characteristics	1-2
2	**Lectures:** - Basics of power conversion -Types and scopes of the electrical power (generation) stations over the world.	3
3	**Lectures:**	4-5

	- Electrical power transmission systems circuitry and modeling: D.C. system, single phase A.C. system, two phase A.C. system, Three phase A.C. system - Comparison of volume of copper used for different system – **Tutorials:** Comparison of volume of copper used for different system - Illustrative examples	
4	**Lectures:** Different types of T.L models and calculation of their parameters (resistance, inductance and capacitance) - Performance and efficiency of T.L. - Determination of generalized constants A,B,C,D for T.L. - Representation methods of lumped parameters of a medium length transmission line: End condenser method, nominal T method, nominal Π method. Exercises.	6-8
5	**Midterm written examination**	9
6	**Lectures:** D.C. and A.C. Distribution: Different types of D. C. distributors: having concentrated loads, having uniformly loads, fed at one end or both ends with equal or unequal potential. A. C. distribution: Methods of solving problems: P.F. referred to R.E. voltage, P.F. referred to respective load voltage. Illustrative examples.	10-11
7	**Lectures:** **Transformers:** Types and construction - Ideal single-phase transformer - theory of operation of practical single-phase transformers - **The Equivalent circuit of a transformer**: exact equivalent circuit / Approximate equivalent circuit, determining the values of components in the transformer model: Open-circuit test / Short-circuit test.	12
8	**Lectures:** Three-phase Induction Motor: Construction – Principles of Operation - Equivalent circuits -Induction motor torque, power, efficiency, and testing -Characteristics of induction motor - types and connections of induction Motors - Starting of induction motor, speed control of induction motor.	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	B1-1	x					x	x								
	B2-1	x			x		x	x								
	B3-1	x			x		x	x				x			x	
	B4-1	x			x		x	x				x			x	

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, B1-1, B2-1.
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, B1-1,
3	Final Term Examination (written)	A1-1, B1-1, B2-1 ,B3-1, B4-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	William D.Stevenson, Jr.: Element of power system analysis. MCGraw-Hill. 5th 2013.
2	A.T.Star: Generation transmission and utilization of electrical power, 2012.
3	Energy Conversion by Yogi Goswami, 2012.
4	Stephen J. Chapman: “Electric Machinery Fundamentals”, International Edition McGraw Hill, 6th, 2010.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LO's
1	**Lectures:** Introduction to electrical power system elements: Prime movers, alternators, power transformers, transmission lines …etc and their electrical and physical characteristics	4	A1-1
2	**Lectures:** - - Basics of power conversion -Types and scopes of the electrical power (generation) stations over the world.	4	A1-1, B1-1,
3	**Lectures:** - Electrical power transmission systems circuitry and modeling: D.C. system, single phase A.C. system, two phase A.C. system, Three phase A.C. system - Comparison of volume of copper used for different system – - Tutorial: - Comparison of volume of copper used for different system •	4	A1-1, B1-1,
4	**Lectures:** • Different types of T.L models and calculation of their parameters (resistance, inductance and capacitance) - Performance and efficiency of T.L. - Determination of generalized constants A,B,C,D for T.L. - Representation methods of lumped parameters of a medium length transmission line: End condenser method, nominal T method, nominal Π method. ● Exercises.	4	A1-1, B1-1,B2-1
5	• **Midterm written examination**	4	A1-1, B1-1,B2-1
6	Lectures D.C. and A.C. Distribution: Different types of D. C. distributors: having concentrated loads, having uniformly loads, fed at one end or both ends with equal or unequal potential. A. C. distribution: Methods of solving problems: P.F. referred to R.E. ..voltage, P.F. referred to respective load voltage • ● Illustrative examples.	4	B1-1,B2-1, B3-1
7	**Lectures:** **Transformers:** Types and construction - Ideal	4	B1-1,B2-1, B3-1, B4-1

	single-phase transformer - theory of operation of practical single-phase transformers - **The Equivalent circuit of a transformer**: exact equivalent circuit / Approximate equivalent circuit, determining the values of components in the transformer model: Open-circuit test / Short-circuit test.		
8	**:Lectures** Three-phase Induction Motor: Construction – Principles of Operation - Equivalent circuits -Induction motor torque, power, efficiency, and testing -Characteristics of induction motor - types and connections of induction Motors - Starting of induction motor, speed control of induction motor.	4	B1-1,B2-1, B3-1, B4-1

Course: Electrical Power and Machines	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Describe the different types of T.L and models to obtain its electrical and physical parameters
B1 Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.	B1.1 Illustrate the types of electrical power transmission and distribution systems circuitry and their model parameters.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Recognize the different types of the transformers and Induction Machines and their equivalent circuits.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Select appropriate mathematical and computer –based methods for modeling and analyzing problems related to machines and electrical power systems.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Use the engineering knowledge to select a suitable magnetic and conductor for given a high performance design

Course Coordinator: Dr. Ramadan Aly Ahmed

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE204		
Year/ Level	Second year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	Aim
1	Apply knowledge of theoretical and systematic synthesis techniques to design practical digital systems and logic circuits.

3. Learning Outcomes (LOs):

A2.1	Conduct experiments to Compare experimental results with predictions from theory by analyzing experimental data giving the explanation of any discrepancies
A2.2	Analyze the problems concerning sequential circuits.
A2.3	Evaluate the performance of the sequential circuits.
A3.1	Apply appropriate mathematical and computer-based methods for modeling and designing the sequential logic circuits.
A3.2	Apply ethical principles showing the responsibilities of computing practice that appreciate the need for continuing professional development
A6.1	Plan the management process for the projects which include the implementation and testing of the sequential logic circuits.
A9.1	Use innovative solutions and leadership skills for designing the sequential logic circuits.
B2.1	Identify the steps of analysis and design of the sequential logic circuits.
B2.2	Design the standard sequential logic circuits that are used in computer systems.
B2.3	Identify the tools needed for the implementation and testing of the complete developed system.
B2.4	Design computer system that uses sequential circuits using computational facilities, technological and professional tools.
B4.1	Measure the performance of the standard logic sequential circuits using computational facilities and techniques, measuring instruments, and laboratory equipment.
B4.2	Evaluate the suitability of the sequential circuits by identifying the testing steps and acceptance methods for problem solution and implementation
C6.1	Carry out the design steps of the sequential circuits to finalize the implementation steps and testing the complete developed system.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Introduction to sequential logic circuits. **Tutorial / Lab:** • Introduction to the computational facilities and techniques, measuring instruments, and laboratory equipment that can be used to analysis and design the sequential circuits.	1
2	**Lecture:** Sequential systems: definition of synchronous and asynchronous sequential systems - State description of finite state systems - Illustrative examples: Mealy and Moore machines. **Tutorial / Lab:** • Solving examples concerning both systems. Possible solutions.	٢
3	**Lecture:** Representation of state transition and output functions: State diagram and names - Time behavior and finite state machines: Input-output sequence pairs from state description. **Tutorial / Lab:** Solving illustrative examples.	3
4	**Lecture:** Finite memory sequential systems - Equivalent sequential systems and minimization of states: State description with redundant states. Equivalent systems. Procedure to minimize the number of states. **Tutorial / Lab:** Solving illustrative examples as applications.	4
5	**Lecture:** Binary specification of sequential systems. Application examples. Sequential Networks: Canonical form of sequential networks. **Tutorial / Lab:** Solving illustrative examples as applications.	5
6	**Lecture:** High level and binary implementations - Analysis of sequential networks. **Tutorial / Lab:** Analyzing illustrative examples as applications.	6-7
7	**Lecture:**	8

	Design of sequential networks. Application examples. Standard Sequential Modules: Registers **Tutorial / Lab:** Analyzing illustrative examples as applications and verify them by design laboratory experiments and compare the results.	
8	**Midterm written examination**	9
9	**Lecture:** Shift Registers (SR): serial-in/serial-out shift register, serial-in/parallel-out SR, parallel-in/serial-out, parallel-in/ parallel-out SR. Uses of Shift Registers: transferring data. **Tutorial / Lab:** Design a Shift Register using laboratory equipment.	10
10	**Lecture:** Uses of Shift Registers: bit serial operations, state register. Counters: counters classification - counter analysis, counter design - Types of counters: Ripple counters, binary up/ and down counters **Tutorial / Lab:** Binary up/down counter analysis and design	11-12
11	**Lecture:** Ring counters, twisted-tail Ring counters, binary counter with parallel input. **Tutorial / Lab:** Analyzing and design illustrative examples as counting applications.	13
12	**Lecture:** Programmable Modules: Programmable sequential arrays (PSA) - Read-only memories (ROM. **Tutorial / Lab:** Analyzing and design illustrative examples as Programmable sequential arrays.	14-15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online / in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	x	x	x			x	x							x	x
	A2.2	x	x	x		x	x	x	x							
	A2.3	x	x	x		x	x	x	x	x					x	x
	A3.1	x	x	x		x	x	x							x	x
	A3.2	x	x	x												
	A6.1	x	x	x				x		x					x	x
	A9.1			x			x	x		x					x	x
B-Level	**B2.1**	x	x	x						x					x	x
	B2.2	x	x	x						x					x	x
	B2.3	x							x						x	x
	B2.4	x							x						x	x
	B4.1	x							x						x	X
	B4.2	x							x	x					x	x
C-Level	**C6.1**								x	x					x	x

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, A2.2, A2.3, A3.1, A9.1,B2.1
2	Practical Examination	A2.1, A2.3, B2.4, B4.1, B2.4, C6.1.
3	Formative (quizzes- online quizzes)	A2.1, A2.2, A2.3, A3.1, A9.1,B2.1, B2,4 , C6.1
4	Final Term Examination (written)	A2.1, A2.2, A2.3, A3.1, A9.1,B2.1,B4.1,B4.2,C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical Examination	15
3	Formative (quizzes- online quizzes)	Week 3,7,13
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical Examination	20
3	Formative (quizzes- online quizzes- Tutorial,)	10
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Harris, David, and Sarah Harris. *Digital design and computer architecture*. Morgan Kaufmann, 2010.
2	M. Morris Mano, “Digital Design“, 3rd. Edition, Prentice Hall, 2008.
3	M. Ercegovac, T. Lang and J. H. Moreno, Introduction to Digital Systems, John Wiley & Sons, Inc., 1999.
4	S. G. Shiva, Introduction to Logic Design, Scott and Foresman Publishing Co., 1988.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Introduction to sequential logic circuits. **Tutorial / Lab:** • Introduction to the computational facilities and techniques, measuring instruments, and laboratory equipment that can be used to analysis and design the sequential circuits.	1	A2.2
2	**Lecture:** Sequential systems: definition of synchronous and asynchronous sequential systems - State description of finite state systems - Illustrative examples: Mealy and Moore machines. **Tutorial / Lab:** • Solving examples concerning both systems. Possible solutions.	1	A2.2,A3.1,B2.1
3	**Lecture:** Representation of state transition and output functions: State diagram and names - Time behavior and finite state machines: Input-output sequence pairs from state description. **Tutorial / Lab:** • Solving illustrative examples.	1	A2.2,A3.1,A9.1 ,B2.1

4	**Lecture:** Finite memory sequential systems - Equivalent sequential systems and minimization of states: State description with redundant states. Equivalent systems. Procedure to minimize the number of states. **Tutorial / Lab:** • Solving illustrative examples as applications.	1	A2.2,A3.1,A9.1,B2.1,B4.2,B4.1
5	**Lecture:** Binary specification of sequential systems. Application examples. Sequential Networks: Canonical form of sequential networks. **Tutorial:** • Solving illustrative examples as applications.	1	A2.2,A3.1,A9.1,B2.1,B4.2,B4.1
6	**Lecture:** High level and binary implementations - Analysis of sequential networks. **Tutorial / Lab:** • Analyzing illustrative examples as applications.	1	A2.2,A3.1,A9.1,B2.1,B4.2,B4.1
7	**Lecture:** Design of sequential networks. Application examples. Standard Sequential Modules: Registers **Tutorial / Lab:** Analyzing illustrative examples as applications and verify them by design laboratory experiments and compare the results.	1	A2.1,A2.2,A3.1,A6.1,A9.1,B2.1,B2.2,B4.2,B4.1,C6.1

8	**Lecture:** Shift Registers (SR): serial-in/serial-out shift register, serial-in/parallel-out SR, parallel-in/serial-out, parallel-in/ parallel-out SR. Uses of Shift Registers: transferring data. **Tutorial / Lab:** Design a Shift Register using laboratory equipment.	1	A2.1,A2.2,A3.1,A6.1,A9.1,B2.1,B2.2,B4.2,B4.1,C6.1
9	**Lecture:** Uses of Shift Registers: bit serial operations, state register. Counters: counters classification - counter analysis, counter design - Types of counters: Ripple counters, binary up/ and down counters **Tutorial / Lab:** Binary up/down counter analysis and design	1	A2.1,A2.2,A3.1,A6.1,A9.1,B2.1,B2.2,B4.2,B4.1,C6.1
10	**Lecture:** Ring counters, twisted-tail Ring counters, binary counter with parallel input. **Tutorial / Lab:** Analyzing and design illustrative examples as counting applications.		A2.1,A2.2,A3.1,A6.1,A9.1,B2.1,B2.2,B4.2,B4.1,C6.1
11	**Lecture:** Programmable Modules: Programmable sequential arrays (PSA) - Read-only memories (ROM. **Tutorial / Lab:** Analyzing and design illustrative examples as Programmable sequential arrays.		A2.1,A2.2,A3.1,A6.1,A9.1,B2.1,B2.2,B4.2,B4.1,C6.1

Course: Logic Circuits (2)	
Program LOs	**Course LOs**
A2. Develop and conduct appropriate experimentation and/or simulation, analyze andinterpret data, assess and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.	A2.1 Conduct experiments to Compare experimental results with predictions from theory by analyzing experimental data giving the explanation of any discrepancies A2.2 Analyze the problems concerning sequential circuits. A2.3 Evaluate the performance of the sequential circuits.
A3. 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.	A3.1 Apply appropriate mathematical and computer-based methods for modeling and designing the sequential logic circuits. A3.2 Apply ethical principles showing the responsibilities of computing practice that appreciate the need for continuing professional development
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Plan the management process for the projects which include the implementation and testing of the sequential logic circuits.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Use innovative solutions and leadership skills for designing the sequential logic circuits.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Identify the steps of analysis and design of the sequential logic circuits. B2.2 Design the standard sequential logic circuits that are used in computer systems. B2.3 Identify the tools needed for the implementation and testing of the complete developed system. B2.4 Design computer system that use sequential circuits using computational facilities, technological and professional tools.
B4. Estimate and measure the performance	B4.1 Measure the performance of the standard logic sequential circuits using

of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	computational facilities and techniques, measuring instruments, and laboratory equipment. B4.2 Evaluate the suitability of the sequential circuits by identifying the testing steps and acceptance methods for problem solution and implementation
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (Embedded) systems.	C6.1 Carry out the design steps of the sequential circuits to finalize the implementation steps.

Course Coordinator: Dr. Rabab Mostafa Ramadan

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	HUU204		
Year/ Level	Second year- First Semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	-

2. Course aims:

No.	aim
4	Use contemporary engineering tools, techniques, and skills to recognize the concepts, principles, problems, and applications of marketing and management.

3. Learning Outcomes (LOs):

A7.1	Analyze the importance of social responsibility and ethics on marketing.
A7.2	Identify environmental factors that affect both global and domestic marketing decisions.
A9.1	Explain the concepts of the marketing mix in the development of marketing strategy and tactics.
A9.2	Analyze the importance of social responsibility and ethics on marketing.
A10.1	Apply essential marketing concepts to research and write a strategic marketing plan.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - An Overview of Marketing.	**1**
2	**Lectures:** - Strategic Planning for Competitive Advantage.	**٢**
3	**Lectures:** - Social Responsibility, Ethics, and the Marketing Environment.	**3-4**
4	**Lectures:** - Developing a Global Vision.	**5**
5	**Lectures:** - Consumer Decision Making.	**6**
6	**Lectures:** - Business Marketing.	**7**
7	**Lectures:** Segmenting and Targeting Markets.	**8**
8	**Midterm**	**9**
9	**Lectures:** - Product Concepts.	**10**
10	**Lectures:** - Services and Non-profit Organization Marketing.	**11**
11	**Lectures:** - Marketing Channels and Supply Chain Management.	**12**
12	**Lectures:** - Advertising and Public Relations.	**13**
13	**Lectures:** - Sales Promotion and Personal Selling. - Pricing Concepts.	**14-15**

5. Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A7.1	x			x	x							x			
	A7.2	x			x	x		x					x			
	A9.1	x			x			x	x				x			
	A9.2	x			x	x		x	x				x			
	A10.1	x			x					x						

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A7.1, A7.2, A9.1, A9.2
2	Formative (quizzes- online quizzes- presentation - reports)	A7.1, A7.2, A9.1, A9.2, A10.1
3	Final Term Examination (written)	A7.1, A7.2, A9.1, A9.2, A10.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Project	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	5
2	Project	10
3	Formative (quizzes- online quizzes- presentation - reports)	5
4	Final Term Examination (written)	80
Total		100%

8. List of References

No.	Reference List
1	Course notes
2	Essential books (text books) - Lamb, Hair and McDaniel, MKTG, South-Western Publishing .U.S.A. 2009.
3	Recommended books. - Kotler, Philip, Kevin Lane Keller, Marketing management, Prentice hall, Europe,2008.
4	Periodicals, Web sites, etc http://marketing.about.com http://www.slideshare.net http://www.knowthis.com http://www.studymarketing.org Course Prof:Dr: - Kotler, Philip , Kevin Lane Keller ,Marketing management, Prentice hall, Europe,2008.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • An Overview of Marketing.	4	A7.1, A7.2, A9.1, A9.2
2	**Lectures:** • Strategic Planning for Competitive Advantage.	4	A7.1, A7.2, A9.1, A9.2
3	**Lectures:** • Social Responsibility, Ethics, and the Marketing Environment.	4	A7.1, A7.2, A9.1, A9.2, A10.1
4	**Lectures:** • Developing a Global Vision.	4	A7.1, A9.2, A10.1
5	**Lectures:** • Consumer Decision Making.	4	A7.1, A7.2,A10.1
6	**Lectures:** Business Marketing.	4	A7.1, A9.1, A9.2, A10.1
7	**Lectures:** • Segmenting and Targeting Markets.	4	A7.2, A9.1, A9.2, A10.1
8	**Midterm**	4	A7.1, A7.2, A9.1, A9.2
9	**Lectures:** • Product Concepts	4	A7.1, A10.1
10	**Lectures:** • Services and Non-profit Organization Marketing.	4	A7.1, A7.2, A9.1, A9.2
11	**Lectures:** • Marketing Channels and Supply Chain Management.	4	A7.1, A9.1, A9.2, A10.1

12	**Lectures:** - Advertising and Public Relations.	4	A7.1, A7.2, A9.1
13	**Lectures:** - Sales Promotion and Personal Selling. Pricing Concepts.	4	A7.1, A7.2, A9.1, A9.2, A10.1

Course: Management and Marketing	
Program LOs	**Course LOs**

A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7.1 Analyze the importance of social responsibility and ethics on marketing. A7.2 Identify environmental factors that affect both global and domestic marketing decisions.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Explain the concepts of the marketing mix in the development of marketing strategy and tactics. A9.2 Analyze the importance of social responsibility and ethics on marketing.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply essential marketing concepts to research and write a strategic marketing plan.

Course Coordinator: Dr. Mona Hammouda

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	Electrical Engineering		
Department offering the Program	Electrical Power Engineering		
Department Responsible for the Course	Physics and Mathematical Engineering		
Course Code	SCI230		
Year/ Level	Second year -Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	aim
1	Apply knowledge of mathematics, basic sciences and engineering principles to provide students with the basic concept of data analysis and statistical computing and perform this analysis on small data sets and spreadsheet software (such as Excel) to analyze large data sets.

3. Learning Outcomes (LOs):

A1.1	Recognize the basic statistical methodology of data analysis including; graphs, descriptive statistics
A1.2	Show and describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams
A1.3	List the probabilities of joint events such as unions and intersections from the probabilities of individual events
A1.4	Show the conditional probabilities of events
A1.5	Select the independence of events and use independence to calculate probabilities
A10.1	Apply Bayes' theorem to calculate conditional probabilities
A10.2	Solve random variables and its distributions
A10.3	Estimate the Expected value of the random variable
A10.4	List Some special probability distributions -The Normal distribution.
B2.1	Analyze problems statistical and appreciate the application of these equations in many fields of engineering.
B2.2	Solve many probabilities problems to appreciate their application for engineering problem
B2.3	Demonstrate random circumstances, interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities
B2.4	Interpret random variables, displays of discrete random variables, summarizing a random variable: expected value (mean) and standard deviation, binomial random variables, continuous random variables, normal random variables, approximating a binomial random variable using a normal random variable

4. Course Contents:

No.	Topics	Week
1	**Lectures: Chapter 1** -The basic statistical methodology of data analysis including; graphs, descriptive statistics - Understand and describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams **Tutorials:** -graphs, descriptive statistics -describe sample spaces and events for random experiments with graphs,	1-4
2	**Lectures: Chapter 2** -Calculate the probabilities of joint events such as unions and intersections from the probabilities of individual events -Studying and calculate the conditional probabilities of events -Determine the independence of events and use independence to calculate probabilities. **Tutorials:** -Solve the conditional probabilities of events problems.	5-8
3	**Midterm**	9
4	**Lectures: Chapter 3** -Use Bayes' theorem to calculate conditional probabilities -Understand random variables and its distributions -Studying the Expected value of the random variable Have Some special probability distributions -The Normal distribution **Tutorials:** - Solve conditional probabilities by . Bayes' theorem -Find the Expected value of the random variable	10-11
5	**Lectures: Chapter 4** - Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities -Discrete random variables,expected value (mean) –,standard deviation,- binomial random variables,continuous random variables -Normal random variables, approximating a binomial random variable using a normal random variable . **Tutorials:** Solve the problems.	12-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x				x	x								
	A1.2	x	x													
	A1.3	x	x			x	x	x								
	A1.4	x	x				x									
	A1.5	x	x			x										
	A10.1	x	x				x		x							
	A10.2	x	x					x								
	A10.3	x	x					x								
	A10.4	x	x			x		x								
B-Level	B2.1	x	x													
	B2.2	x	x													
	B2.3	x	x													
	B2.4	x	x													

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A1.5
2	Formative (quizzes- online quizzes- presentation)	A10.2, B2.1, B2.4
3	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A1.5, A10.1, A10.2, A10.3, A10.4, B2.1, B2.2, B2.3,B2.4

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (quizzes- online quizzes- presentation)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Formative (quizzes- online quizzes- presentation)	10
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Walpole, Ronald E., et al. Probability and statistics for engineers and scientists. Vol. 5. New York: Macmillan, 10th Edition 2013
2	Mendenhall, William, Robert J. Beaver, and Barbara M. Beaver. Introduction to probability and statistics. Cengage Learning, 2th Edition 2015.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Chapter 1** - The basic statistical methodology of data analysis including; graphs, descriptive statistics - Understand and describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams	1	A1.1, A1.2,
2	**Chapter 2** - Calculate the probabilities of joint events such as unions and intersections from the probabilities of individual events -Studying and calculate the conditional probabilities of events- -Determine the independence of events and use independence to calculate probabilities.	1	A1.3, A1.4, A1.5
3	Midterm	1	A1.1, A1.2, A1.3, A1.4, A1.5
4	**Chapter 3** -Use Bayes' theorem to calculate conditional probabilities -Understand random variables and its distributions -Studying the Expected value of the random variable Have Some special probability distributions -The Normal distribution	1	A10.1, A10.2, A10.3, A10.4
5	**Chapter 4** -Interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities -Discrete random variables,expected value (mean),standard deviation	1	B2.1, B2.2, B2.3, B2.4

	binomial random variables, continuous random variables -Normal random variables, approximating a binomial random variable using a normal random variable		

Course : Statistics and Probability	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A-1-1 Recognize the basic statistical methodology of data analysis including; graphs, descriptive statistics A-1-2 Show and describe sample spaces and events for random experiments with graphs, tables, lists, or tree diagrams A-1-3 List the probabilities of joint events such as unions and intersections from the probabilities of individual events A-1-4 Show the conditional probabilities of events A-1-5 Select the independence of events and use independence to calculate probabilities
A10 Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A-10-1 Apply Bayes' theorem to calculate conditional probabilities A10-2 Solve random variables and its distributions A10-3 Estimate the Expected value of the random variable A10-4 list Some special probability distributions -The Normal distribution.
B2-Design model and analyze an electrical/ electronic /digital system or component for a specific application and identify the tools required to optimize this design.	B2-1 Analyze problems statistical and appreciate the application of these equations in many fields of engineering. B2-2 Solve many probabilities problems to appreciate their application for engineering problem B2-3 Demonstrate random circumstances, interpretations of probability, probability definitions and relationships, basic rules for finding probabilities, strategies for finding complicated probabilities B2-4 Interpret random variables, displays of

	discrete random variables, summarizing a random variable: expected value (mean) and standard deviation, binomial random variables, continuous random variables, normal random variables, approximating a binomial random variable using a normal random variable

Course Coordinator: Dr. Moanis Moaz

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE207		
Year/ Level	Second year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	2

2. Course aims:

No.	aim
1	Apply knowledge of continuous and discrete-time signals and systems to know how use sampling circuits, the realization of discrete-time systems and the properties of Discrete Fourier Transform (DFT), as well as using software tools like Matlab.

3. Learning Outcomes (LOs):

A1.1	Recognize the various mathematical models used for modeling continuous and discrete-time signals and systems.
A1.2	Define Laplace, Fourier and Z-transform and different methods for computing the inverse transformations.
A2-1	Analyze the relation between time and frequency response and the effect of different signal operations.
A2.2	Simulate the sampling theory, A/D and D/A conversions.
A5.1	Prepare researches about types of signals and systems with examples in reality.
A6.1	Use software programing and hardware implementation to apply different operations on audio and video signals as a course project.
A8-1	Demonstrate communication skills between teamwork members during Lab sessions.
B2.1	Apply knowledge of software programing and hardware implementation to effectively design a digital system.
B4.1	Demonstrate creative skills of designing, building, measuring and testing of practical circuits using Digital Signal Processing modules and interpret the results.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Introduction to signals and systems:** Classification of signals - Elementary signals - Signal operations - Examples of systems - Classification of systems - Interconnection of systems **Labs/ Tutorials:** • Signal implementation with MATLAB. • Demonstrate problem solving ability in the completion of their homework assignments related to the signal representation & system operations (sheet 1)	1
2	**Lectures:** **Differential equation and Laplace transform:** Review solving passive circuits using differential equations – Laplace transformation concept and properties- solving steady state response of passive circuit using Lapalce – inverse Laplace transform. **Lab/Tutorials:** • Use software packages such as Matlab to introduce Fourier transformations • Demonstrate problem solving ability in the completion of their homework assignments related to the Laplace (sheet 2)	2-3
3	**Lectures:** **Impulse response, convolution and stability theorem:** Study impulse response concept- study stability physical concept- stability check in time domain- convolution- pole- zero pattern - stability check in Laplace domain**.** **Labs/Tutorials:** • Use the laboratory equipment to test the various stability cases. • Use software packages such as Matlab to test the various stability cases. • Demonstrate problem solving ability in the completion of their homework assignments related to the stability (Sheet 3).	4-5
4	**Lectures:** **Fourier Transformation:** Review of Fourier series and transform- sampling concept, conditions and reconstruction - Analog to digital and digital to analog conversions. **Labs/Tutorials:** • Use the laboratory equipment to test the various sampling conditions. • Use software packages such as Matlab to test the various sampling conditions. • Demonstrate problem solving ability in the completion of their homework assignments related to the sampling (Sheet 4).	6-8
5	**Mid-Term Exam**	9

6	**Lectures:** **Z-Transform:** Difference equation Z-transform; concept and characteristics – Pole-zero pattern. **Labs/Tutorials:** • Use software packages such as Matlab to identify z-transform properties. • Demonstrate problem solving ability in the completion of their homework assignments related to z-transform (Sheet 5).	10
7	**Lectures:** **Inverse Z-transform, Impulse response and stability:** identify inverse Z-transform and different methods for computing the inverse z-transform - stability check in time domain - stability check in z-domain**.** **Labs/Tutorials:** • Use software packages such as Matlab to test the various stability cases. • Demonstrate problem solving ability in the completion of their homework assignments related to the stability (Sheet 6).	11-12
8	**Lectures:** **Digital Linear time invariant systems realization:** Realization concepts – Realization forms – series and parallel realization. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Digital systems realization. (Sheet 7).	13
9	**Lectures:** **Discrete Fourier transform (DFT):** Study DFT concepts and properties **Labs/Tutorials:** • Use software packages such as Matlab to to identify DFT properties.. • Demonstrate problem solving ability in the completion of their homework assignments related to DFT. (Sheet 8).	14
10	**Review, the project assessment and lab test**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x				x	x	x								
	A1.2	x				x	x	x								
	A2.1	x	x			x	x		x						x	x
	A2.2	x	x			x			x	x		x			x	
	A5.1			x					x			x				
	A6.1			x		x				x			x			
	A8.1									x					x	x
B-Level	**B2.1**		x	x		x				x		x			x	
	B4.1			x						x		x			x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1 – A1.2 – A2.1 – A2.2
2	Practical Examination	A5.1 – A6.1 – A8.1 – B2.1 – B4.1
3	Oral Examination	A1.1 - A6.1 – A8.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1 – A1.2 – A2.1 – A2.2 – B4.1
5	Final Term Examination (written)	A1.1 – A1.2 – A2.1 – A2.2 – A5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	12
2	Practical/ Oral Examination	12
3	Formative (quizzes- online quizzes- presentation - reports)	16
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Alan V. Oppenheim, Alan S. Willsky, with S. Hamid-Signals and Systems -Prentice Hall (1996)
2	Luis F. Chaparro, Signals and Systems Using Matlab, Academic Press, 2015
3	Shaila D. Apte, " Advanced Digital Signal Processing", Wiely India, 2013

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** **Introduction to signals and systems:** Classification of signals - Elementary signals - Signal operations - Examples of systems - Classification of systems - Interconnection of systems **Labs/ Tutorials:** • Signal implementation with MATLAB. • Demonstrate problem solving ability in the completion of their homework assignments related to the signal representation & system operations (sheet 1)	1	A1.2
2	**Lectures:** **Differential equation and Laplace transform:** Review solving passive circuits using differential equations – Laplace transformation concept and properties- solving steady state response of passive circuit using Lapalce – inverse Laplace transform. **Lab/Tutorials:** • Use software packages such as Matlab to introduce Fourier transformations • Demonstrate problem solving ability in the completion of their homework assignments related to the Laplace (sheet 2)	1	A1.2
3	**Lectures:** **Impulse response, convolution and stability theorem:** Study impulse response concept- study stability physical concept- stability check in time domain- convolution- pole- zero pattern - stability check in Laplace domain. **Labs/Tutorials:** • Use the laboratory equipment to test the various stability cases. • Use software packages such as Matlab to test the various stability cases. • Demonstrate problem solving ability in the completion of their homework assignments related to the stability (Sheet 3).	1	A2.1, A8.1, B2.1, B4.1
4	**Lectures:** **Fourier Transformation:** Review of Fourier series and transform- sampling concept, conditions and reconstruction - Analog to digital and digital to analog conversions. **Labs/Tutorials:** • Use the laboratory equipment to test the various sampling conditions. • Use software packages such as Matlab to test the various sampling conditions.	1	A2.1, A2.2, B2.1, B4.1

	• Demonstrate problem solving ability in the completion of their homework assignments related to the sampling (Sheet 4).		
5	**Mid-Term Exam**	1	A1.1, A1.2, A2.1, A2.2
6	**Lectures:** **Z-Transform:** Difference equation Z-transform; concept and characteristics – Pole- zero pattern. **Labs/Tutorials:** • Use software packages such as Matlab to identify z-transform properties. • Demonstrate problem solving ability in the completion of their homework assignments related to z-transform (Sheet 5).	1	A1.1, A2.1, A2.2, A6.1,
7	**Lectures:** **Inverse Z-transform, Impulse response and stability:** identify inverse Z-transform and different methods for computing the inverse z-transform - stability check in time domain - stability check in z-domain**.** **Labs/Tutorials:** • Use software packages such as Matlab to test the various stability cases. • Demonstrate problem solving ability in the completion of their homework assignments related to the stability (Sheet 6).	1	A2.1, A2.2, B4.1
8	**Lectures:** **Digital Linear time invariant systems realization:** Realization concepts – Realization forms – series and parallel realization. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments related to the Digital systems realization. (Sheet 7).	1	A2.2
9	**Lectures:** **Discrete Fourier transform (DFT):** Study DFT concepts and properties **Labs/Tutorials:** • Use software packages such as Matlab to to identify DFT properties.. • Demonstrate problem solving ability in the completion of their homework assignments related to DFT. (Sheet 8).	1	A2.1, A2.2, A6.1, A8.1, B2.1, B4
10	**Review, the project assessment and lab test**	1	A1.2, A2.1, A2.2, A6.1, A8.1, B2.1, B4.1

Course: **Signals and Systems Analysis**	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Recognize the various mathematical models used for modeling continuous and discrete-time signals and systems. A1.2 Define Laplace, Fourier and Z-transform and different methods for computing the inverse transformations.
A2. 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.	A2-1 Analyze the relation between time and frequency response and the effect of different signal operations. A2-2 Simulate the sampling theory, A/D and D/A conversions.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Prepare researches about types of signals and systems with examples in reality.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Use software programing and hardware implementation to apply different operations on audio and video signals as a course project.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Demonstrate communication skills between teamwork members during Lab sessions.
B2. Design, model and analyze an electrical/electronic/digital system or component fora specific application; and identify the tools required to optimize this design.	B2.1 Apply knowledge of software programing and hardware implementation to effectively design a digital system.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Demonstrate creative skills of designing, building, measuring and testing of practical circuits using Digital Signal Processing modules and interpret the results.

Course Coordinator: Dr. Islam E. Shaalan

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rezk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: electronics and Communications Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE207		
Year/ Level	Second year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
4	Use contemporary numerical methods to formulate and solve engineering problems with the help of a computer using the concepts and theories of numerical analysis and programming that appropriate to the electrical engineering disciplines.

3. Learning Outcomes (LOs):

A1.1	Identify optimal numerical methodology of solving mathematical problems.
A1.2	Formulate the different numerical methods to solve engineering problems.
A2.1	Develop methods for modeling various scientific problems to find out numerical solutions
A2.2	Use Matlab program and develop routine to solve numerical problems using different numerical techniques.
A2.3	Analyze the results of numerical technique and analysis of the errors and suggest the appropriate correction.
A5.1	Practice research techniques to evaluate the solutions to the engineering problems using a general-purpose numerical/simulation software package
A9.1	Use optimum solutions for engineering and physical problems based on analytical thinking by using essential facts, concepts, principles and theories relating to numerical analysis.
A9.2	Use innovative solutions and leadership skills for solving complicated mathematical problems.
A10.1	Apply suitable numerical method to analyze and solve Practical real-life problems
B2.1	Identify the steps of analysis and modeling of the various scientific problems using the basic numerical principles to find out numerical solutions
C6.1	Carry out reasoning numerical techniques to solve engineering problems using a general-purpose numerical/simulation software package and Matlab Program

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Introduction: Numerical analysis techniques for different engineering problems. **Lab /Tutorial:** Learn to use the corresponding MATLAB functions and performing different basic calculations.	1
2	**Lectures:** Numerical solution methods of system of algebraic linear and nonlinear equations. **Lab /Tutorial:** Problem solving related to Solution of system of algebraic linear and nonlinear equations - Using MATLAB functions develop a complete routine to solve the same problems and compare the two solutions.	2-3
3	**Lectures:** Numerical solution methods of system of ordinary and partial differential equations. **Lab /Tutorial:** Problem solving related to system of ordinary and partial differential equations - Using MATLAB functions develop a complete routine to solve the same problems and compare the two solutions.	4-5
4	**Lectures:** Systematic numerical methods to interpolate and fit data to predefined models (curve fitting) and polynomial approximation. **Lab /Tutorial:** Problem solving related to data interpolation and curve fitting and polynomial approximation- Using MATLAB functions develop a complete routine to solve the same problems and compare the two solutions.	6-8
5	**Midterm written examination**	9
6	**Lectures:** Systematic numerical methods to do numerical integration and differentiation. **Lab /Tutorial:** Problem solving related to numerical integration and differentiation - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.	10
7	**Lectures:** Getting the optimal solutions for optimization problems numerically. **Lab /Tutorial:**	11-12

	Problem solving related to optimal solutions - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.	
8	**Lectures:** Using finite differencesmethod to solve engineering problems. **Lab /Tutorial:** Problem solving related to finite differencesmethod - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.	13-14
9	**Lectures/ Lab /Tutorial:** Using MATLAB program to solve practical problems related to electric engineering	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x		x			x	x								
	A1.2	x		x			x	x								
	A2.1	x		x			x	x								
	A2.2	x		x			x	x							x	
	A2.3	x	x	x			x	x	x							
	A5.1	x	x	x			x	x	x						x	
	A9.1	x	x	x			x	x	x							
	A9.2	x	x	x			x	x	x						x	
	A10.1	x	x	x			x	x	x						x	
B-Level	**B2.1**	x	x	x			x	x	x							
C-Level	**C6.1**	x	x	x			x	x	x						x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1,A1.2,A2.1,A2.2,A10.1,B2.1
2	Practical Examination	A1.1,A1.2,A2.1,A2.2,A9.1,A10.1,C6.1
3	Formative (quizzes- online quizzes)	A1.1,A1.2,A2.1,A2.2,A10.1,B2.1
4	Final Term Examination (written)	A1.1,A1.2,A2.1,A2.2,A9.1,A10.1,B2.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical Examination	15
3	Formative (quizzes- online quizzes-)	Week 3,6,13
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical (Examination – Projects)	20
3	Formative (quizzes- online quizzes)	10
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Applied Numerical Methods with MATLAB for Engineers and Scientists, S. C. Chapra, 3rd Edition., McGraw-Hill, 2012
2	Numerical Methods for Engineers, S. C. Chapra and R. P. Canale, 6th Edition, McGraw-Hill, 2010
3	Numerical Analysis, J. Douglas Faires and Richard L. Burden, Thomson Press, 2004
4	Numerical Methods Using MATLAB, J.H. Mathews & K.D. Fink, 4th Edition., Pearson, 2004

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Introduction: Numerical analysis techniques for different engineering problems. **Lab:** Learn to use the corresponding MATLAB functions and performing different basic calculations.	4	A1.1,A10.1,B2.1
2	**Lectures:** Numerical solution methods of system of algebraic linear and nonlinear equations. **Lab /Tutorial:** Problem solving related to Solution of system of algebraic linear and nonlinear equations - Using MATLAB functions develop a complete routine to solve the same problems and	4	A1.2,A2.1,A2.2, A10.1,B2.1

	compare the two solutions.		
3	**Lectures:** Numerical solution methods of system of ordinary and partial differential equations. **Lab /Tutorial:** Problem solving related to system of ordinary and partial differential equations - Using MATLAB functions develop a complete routine to solve the same problems and compare the two solutions.	4	A1.2,A2.1,A2.2, A10.1,B2.1
4	**Lectures:** Systematic numerical methods to interpolate and fit data to predefined models (curve fitting) and polynomial approximation. **Lab /Tutorial:** Problem solving related to data interpolation and curve fitting and polynomial approximation- Using MATLAB functions develop a complete routine to solve the same problems and compare the two solutions.	4	A1.2,A2.1,A2.2, A10.1,B2.1
5	**Midterm written examination**	4	
6	**Lectures:** Systematic numerical methods to do numerical integration and differentiation. **Lab /Tutorial:** Problem solving related to numerical integration and differentiation - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.	4	A1.2,A2.1,A2.2, A10.1,B2.1
7	**Lectures:** Getting the optimal solutions for optimization problems numerically. **Lab /Tutorial:**	4	A1.2,A2.1,A2.2, A5.1,A9.1,A10.1 ,B2.1,C6.1

	Problem solving related to optimal solutions - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.		
8	**Lectures:** Using finite differences method to solve engineering problems. **Lab /Tutorial:** Problem solving related to finite differencesmethod - Using MATLAB functions, develop a complete routine to solve the same problems and compare the two solutions.	4	A1.2,A2.1,A2.2, A5.1,A9.1,A10.1 ,B2.1,C6.1
9	**Lectures/ Lab /Tutorial:** Using MATLAB program to solve practical problems related to electric engineering	4	A1.2,A2.1,A2.2, A5.1,A9.1,A10.1 ,B2.1,C6.1

Course: Numerical Analysis and Programming	
Program LOs	**Course Los**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify optimal numerical methodology of solving mathematical problems. A1.2 Formulate the different numerical methods to solve engineering problems.
A2. 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.	A2.1 Develop methods for modeling various scientific problems to find out numerical solutions A2.2 Use Matlab program and develop routine to solve numerical problems using different numerical techniques. A2.3 Analyze the results of numerical technique and analysis of the errors and suggest the appropriate correction**.**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Practice research techniques to evaluate the solutions to the engineering problems using a general-purpose numerical/simulation software package
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Use optimum solutions for engineering and physical problems based on analytical thinking by using essential facts, concepts, principles and theories relating to numerical analysis A9.2 Use innovative solutions and leadership skills for solving complicated mathematical problems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 apply suitable numerical method to analyze and solve Practical real-life problems
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Identify the steps of analysis and modeling of the various scientific problems using the basic numerical principles to find out numerical solutions
C6: Carry out design, development, testing, debugging, operation and maintenance of digital Systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Carry out reasoning numerical techniques to solve engineering problems using a general-purpose numerical/simulation software package and Matlab Program

Course Coordinator: Dr. Rabab Mostafa Ramadan

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">CCE208</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Second year- Second semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>0</td><td>2</td></tr>
</table>

2. Course aims:

No.	Aim
1	Apply knowledge to understand the basics of computer architecture, data representations, and aspects of distributed systems and to write machine language and assembly language programs and compare implications of various computer architectural attributes on the overall system performance.

3. Learning Outcomes (LOs):

A2.1	Investigate the performance of digital circuits by using laboratory facilities to design experiments, collect, analyze and interpret results.
A3.1	Analyze the most contemporary design technologies used in synthesizing modern computer architectures.
A3.2	Recognize the basics knowledge of design and analysis of problems and tradeoffs encountered in the design of computer processors.
A3.3	Recognize the basics knowledge of design and analysis of various addressing modes and data/instruction formats including Reduced Instruction Set Architectures.
A3.4	Recognize the basics knowledge of design and analysis principles of operation of various computer components including memory and I/O design.
A5.1	Recognize the differences of computer architectures by practice research techniques and methods of investigation as an inherent part of learning.
A10.1	Recognize the design techniques of computer architectures by applying knowledge of mathematics, science, design, and engineering practice integrally.
B2.1	Analyze the most contemporary design technologies used in synthesizing modern computer architectures.
B3.1	Select appropriate optimization techniques to enhance processor performance.
B4.1	Assess and evaluate tradeoffs in instruction set design.
B4.2	Assess and evaluate the characteristics and performance metrics in in the design of computer processors.
C6.1	Practice designing and analyzing digital circuits with colleagues.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Overview and history - Main components of a computer. **Labs/Tutorials:** • Introduction and installation of simulation software and virtual breadboard.	1
2	**Lectures:** • Data representation. **Labs/Tutorials:** • Gain proficiency in the use of common logic circuits components like Breadboards, Relays, LEDs, Diodes, Switches, 7-Seg Displays.	2
3	**Lectures:** • Instruction Set + Addressing modes + Fetch-Execute Cycle **Labs/Tutorials:** • Gain proficiency in the use of common logic circuits components like Breadboards, Relays, LEDs, Diodes, Switches, 7-Seg Displays and microcontrollers.	3-4
4	**Lectures:** • Assembly and Machine language **Labs/Tutorials:** • Problem solving related to assembly and machine language programming.	5-6
5	**Lectures:** • Datapath design. **Labs/Tutorials:** • Problem solving related to datapath design and analysis.	7-8
6	**Midterm**	9
7	**Lectures:** • Control Unit Design and Operation. **Labs/Tutorials:** • Problem solving related to control unit design and analysis.	10
8	**Lectures:** • Memory hierarchy - Random Access Memory (RAM) Cache Virtual Memory **Labs/Tutorials:** • Search for information on the internet to learn how microcontrollers can be used to design different controller systems. • Problem solving related to cache and virtual memory design.	11-12
9	**Lectures:** • Input and Output. **Labs/Tutorials:** • Use lab facilities to design microcontroller based systems - Prepare and present technical reports relevant to microcontroller controlled	13-14

	systems.	
10	**Final Oral Exam and Project Submission**	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	X	X	X		X		X							X	X
	A3.1	X	X		X		X			X						
	A3.2	X	X		X		X			X						
	A3.3	X	X		X		X			X						
	A3.4	X	X		X		X			X						
	A5.1					X			X		X	X				X
	A10.1	X	X			X	X			X		X	X		X	X
B-Level	**B2.1**	X	X	X		X				X		X			X	X
	B3.1	X	X	X		X				X		X			X	X
	B4.1	X	X	X		X				X		X			X	X
	B4.2	X	X	X		X				X		X			X	X
C-Level	**C6.1**		X			X			X	X	X	X	X		X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, A3.3,A3.4, A2.1, A10.1,B3.1,B3.2
2	Practical Examination	A2.1, A3.1, A3.2, A3.3, A3.4, A5.1, A10.1, B3.1, B3.2, B4.1, B4.2, C6.1
3	Oral Examination	A3.1, A3.2, A3.3, A3.4, A5.1
3	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A3.1, A3.2, A3.3, A3.4,A5.1, A10.1, B3.1, B3.2, B4.1, B4.2, C6.1
4	Final Term Examination (written)	A2.1, A3.1, A3.2, A3.3, A3.4,A5.1, A10.1, B3.1, B3.2, B4.1, B4.2, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Project assessment	10
5	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Computer Organization and Design MIPS Edition: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design) 5th Edition, by: David A. Patterson and John L. Hennessy, 2013, Morgan Kaufmann Publishers.
2	Digital Design and Computer Architecture, 2nd Edition, by: David Harris and Sarah Harris, 2012, Morgan Kaufmann Publishers.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Overview and history - Main components of a computer. **Labs/Tutorials:** • Introduction and installation of simulation software and virtual breadboard.	1	A3.1
2	**Lectures:** • Data representation. **Labs/Tutorials:** • Gain proficiency in the use of common logic circuits components like Breadboards, Relays, LEDs, Diodes, Switches, 7-Seg Displays.	1	A3.1, A3.2, A10.1
3	**Lectures:** • Instruction Set + Addressing modes + Fetch-Execute Cycle **Labs/Tutorials:** • Gain proficiency in the use of common logic circuits components like Breadboards, Relays, LEDs, Diodes, Switches, 7-Seg Displays and microcontrollers.	1	A3.3, A10.1
4	**Lectures:** • Assembly and Machine language	1	A3.3,A3.4,A2.1,

	Labs/Tutorials: • Problem solving related to assembly and machine language programming.		A10.1,B3.2
5	**Lectures:** • Datapath design. **Labs/Tutorials:** • Problem solving related to datapath design and analysis.	1	A3.3,A3.4,A2.1, A10.1,B3.2
6	**Midterm**	1	A3.1, A3.2, A3.3,A3.4, A2.1, A10.1,B3.1,B3.2
7	**Lectures:** • Control Unit Design and Operation. **Labs/Tutorials:** • Problem solving related to control unit design and analysis.	1	A3.4, A2.1, A5.1, A10.1,B2.1,B3.1
8	**Lectures:** • Memory hierarchy - Random Access Memory (RAM) Cache Virtual Memory **Lab:** • Search for information on the internet to learn how microcontrollers can be used to design different controller systems. **Tutorial:** • Problem solving related to cache and virtual memory design.	1	A5.1, A10.1,B2.1,B3.1,B4.1,B4.2
9	**Lectures:** • Input and Output. **Labs/Tutorials:** • Use lab facilities to design microcontroller based systems - Prepare and present technical reports relevant to microcontroller controlled systems.	1	A5.1, A10.1,B2.1,B3.1,B4.1,B4.2, C6.1
10	**Final Oral Exam and Project Submission**		

Course: Computer Architecture	
Program LOs	**Course LOs**
A2. 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.	A2.1 Investigate the performance of digital circuits by using laboratory facilities to design experiments, collect, analyze and interpret results.
A3. 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.	A3.1 Analyze the most contemporary design technologies used in synthesizing modern computer architectures. A3.2 Recognize the basics knowledge of design and analysis of problems and tradeoffs encountered in the design of computer processors. A3.3 Recognize the basics knowledge of design and analysis of various addressing modes and data/instruction formats including Reduced Instruction Set Architectures. A3.4 Recognize the basics knowledge of design and analysis principles of operation of various computer components including memory and I/O design.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Recognize the differences of computer architectures by practice research techniques and methods of investigation as an inherent part of learning.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning	A10.1 Recognize the design techniques of computer architectures by applying

strategies.	knowledge of mathematics, science, design, and engineering practice integrally.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Analyze the most contemporary design technologies used in synthesizing modern computer architectures.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Select appropriate optimization techniques to enhance processor performance.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Assess and evaluate tradeoffs in instruction set design. B4.2 Assess and evaluate the characteristics and performance metrics in in the design of computer processors.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Practice designing and analyzing digital circuits with colleagues.

Course Coordinator: Dr. Emad El Sayed

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Computer and Control)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE210		
Year/ Level	Second year – Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	2

2. Course aims:

No.	aim
7	Apply the fundamental issues of the relational model, relational languages, database design and query processing to be able to develop database systems and application programs on a DBMS.

3. Learning Outcomes (LOs):

A2.1	Describe the Database Management System.
A2.2	Trace the history and development process of data warehouse
A2.3	Understand different data mining technologies
A3.1	Identify the latest database query tools.
B2.1	Recognize the organization and Structure of database systems
B2.2	Identify the recent types of relational management systems
B3.1	Describe different entity-relationship models

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to DBMS, View of data and data model + Fundamental of Relational Model **Labs/Tutorials:** • Learn to use MySQL and Performing some basic operations Review examples of the previously mentioned project through Google Earth	1-2
2	**Lectures:** • SQL and other relational languages + Fundamental constructs and concepts of SQL **Labs/Tutorials:** • Use MySQL to create simple data base and perform the insert, delete, and update operations.	3-5

3	**Lectures:** • Advance in Queries types **Labs/Tutorials:** • Perform advanced insert, delete, and update operations.	6-8
4	Midterm	9
5	**Lectures:** • Data base design, entity relationship modeling + Normalization **Labs/Tutorials:** • Draw entity relationship diagrams	١٠-١٢
6	**Lectures:** • Data base design, Normalization **Labs/Tutorials:** • Draw entity relationship diagrams • Perform Normalization operations	1٣-14
7	**General Revision and Project Submission and Discussion.**	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A2.1	x	x	x			x	x								
	A2.2	x	x			x			x	x				x		
	A2.3	x	x			x	x	x		x						
	A3.1		x				x			x		x				
C-Level	B2.1		x			x			x		x					
	B2.2		x		x					x				x	x	
	B3.1		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, A2.2, B2.1, B2.2
2	Practical Examination	A2.1, A2.2, A3.1, B2.1, B2.2, B3.1
3	Oral Examination	A3.1, B2.1
4	Formative (quizzes- online quizzes-presentation - reports)	A2.1, A2.2, A3.1, B2.1, B2.2, B3.1
5	Final Term Examination (written)	A2.1, A2.2, A3.1, B2.1, B2.2, B3.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes-presentation - reports)	٢٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	A. Silberschatz. (2015) "Database system concepts" (7th Ed.).
2	Date, C.J. (2004): "An Introduction to Database Systems" (8th Edit.).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Introduction to DBMS, View of data and data model + Fundamental of Relational Model **Labs/Tutorials:** • Learn to use MySQL and Performing some basic operations Review examples of the previously mentioned project through Google Earth	7	A2.1
2	**Lectures:** • SQL and other relational languages + Fundamental constructs and concepts of SQL **Labs/Tutorials:** • Use MySQL to create simple data base and perform the insert, delete, and update operations.	7	A2.1
3	**Lectures:** • Advance in Queries types **Labs/Tutorials:** • Perform advanced insert, delete, and update operations.	7	A2.1, A2.2, A2.3
4	Midterm	7	A2.1, A2.2, A2.3
5	**Lectures:** • Data base design, entity relationship modeling + Normalization **Labs/Tutorials:** • Draw entity relationship diagrams	7	A2.1, A2.2, A2.3, A3.1
6	**Lectures:** • Data base design, Normalization **Labs/Tutorials:** • Draw entity relationship diagrams • Perform Normalization operations	7	A2.1, A2.2, A2.3, B2.1, B2.2

7	**General Revision and Project Submission and Discussion.**	7	A2.1, A2.2, A2.3, B2.1, B3.1

Course: Introduction to Database	
Program LOs	**Course LOs**
A2. 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.	A2.1 Describe the Database Management System. A2.2 trace the history and development process of data warehouse A2.3 Understand different data mining technologies
A3. 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.	A3.1 Identify the latest database query tools.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Recognize the organization and Structure of database systems B2.2 identify the recent types of relational management systems.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Describe different entity-relationship models

Course Coordinator: Dr. Walaa Elsayed Saber

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Civil Engineering Dept. & Naval Architecture and Marine Engineering Dept.		
Department Responsible for the Course	Faculty requirement		
Course Code	HUF 203		
Year/ Level	Second Year- Second Semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	-

2. Course aims:

No.	aim
2	Behave professionally in natural science of the marine environment. Also, understand Marine Engineering Applications, Port Planning and its types. Learning about Suez Canal Marine Environment characteristics, Projects, Institutions and Authorities.

3. Learning Outcomes (LOs):

A3.1	Recognize the ethics and impacts of engineering solutions on society and the marine environment characteristics.
A3.2	Identify Suez Canal Marine Projects, Institutions and Authorities.
A3.3	Classify and identify the types of Ports and its master plans.
A3.4	Describe the different designs of port structures such as breakwaters and berths and the forces affected on them.
A7.1	Discuss Marine Engineering Applications and its Environment Pollution.
A7.2	Discuss the environmental effects of the bad planning of port master plan systems.
A10.1	Apply new knowledge and practice self about the engineering problems related to marine environment.
A10.2	Apply code of ministry of water resources and irrigation and international navigation code for designing Ports structures.

4. Course Contents:

No.	Topics	Week
1	Lectures: • Suez Canal Marine Environment characteristics.	1
2	Lectures: • Suez Canal Marine Projects, Institutions and Authorities.	٢
3	Lectures: • Marine Suez Canal Marine Projects, Institutions and Authorities. Engineering Applications and its Environment Pollution.	3-5
4	Lectures: • Types of: Ports, Master plans, and ship.	6-8
5	Midterm	9
6	Lectures: • Breakwater and berths types. • Forces affected on Breakwater and berths.	10-11
7	Lectures: • Determining the no. of berths required for Harbor.	12
8	Lectures: • Determining the no. of berths required for Harbor. • Dredging and Land area of the Port.	13-14

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture (online/offline)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	x	x			x						x				
	A3.2	x	x	x		x						x				
	A3.3	x	x	x		x										
	A3.4	x				x										
	A7.1	x				x						x				
	A7.2	x				x						x				
	A10.1	x														
	A10.2	x														

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional video tutorials
2	Online lectures

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, A3.3, A7.1, A7.2, A10.1
2	Formative (self-learning assignments)	A3.1, A3.2, A3.3, A3.4, A7.1, A7.2, A10.1, A10.2
3	Final Term Examination (written)	A3.1, A3.2, A3.3, A3.4, A7.1, A7.2, A10.1, A10.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Formative (self-learning assignments)	7
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10%
2	Formative (quizzes- online quizzes- presentation - reports)	10%
3	Final Term Examination (written)	80%
Total		100%

8. List of References

No.	Reference List
1	European Maritime Safety Agency "Annual Overview Of Marine Casualties And Incidents 2014" (to be updated every year).
2	Bowersox, D J, Closs, D J and Cooper, M B (2007) Supply Chain Logistics Management, 2nd edn, McGraw Hill.
3	K.J. Rawson & E.C. TUPPER " Basic Ship Theory " , fifth edition , Butterworth – Heinemann, 2005
4	http://www.suezcanal.gov.eg
٥	Adrian Jarvis; Port and harbour engineering, 2016.
6	Per Bruun, Port engineering, 1993.
7	Gregory Tsinker; Handbook of Port and Harbor Engineering : Geotechnical and Structural Aspects.2014.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Lectures: Suez Canal Marine Environment characteristics.	2	A3.1, A10.1
2	Lectures: Suez Canal Marine Projects, Institutions and Authorities.	2	A3.1, A3.2
3	Lectures: Marine Suez Canal Marine Projects, Institutions and Authorities. Engineering Applications and its Environment Pollution.	2	A3.1, A3.2, A7.1, A10.1
4	Lectures: Types of: Ports, Master plans, and ship.	2	A3.3, A7.2, A10.2
5	Lectures: • Breakwater and berths types. Forces affected on Breakwater and berths.	2	A3.4, A10.2
6	Lectures: Determining the no. of berths required for Harbor.	2	A3.4, A10.2
7	Lectures: • Determining the no. of berths required for Harbor. • Dredging and Land area of the Port.	2	A3.4, A10.2

Course: Engineering applications in the marine environment	
Program LOs	**Course LOs**
A3. 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.	A3.1 Recognize the ethics and impacts of engineering solutions on society and the marine environment characteristics. A3.2 Identify Suez Canal Marine Projects, Institutions and Authorities. A3.3 Classify and identify the types of Ports and its master plans. A3.4 Describe the different designs of port structures such as breakwaters and berths and the forces affected on them.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7.1 Discuss Marine Engineering Applications and its Environment Pollution. A7.2 Discuss the environmental effects of the bad planning of port master plan systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply new knowledge and practice self about the engineering problems related to marine environment. A10.2 Apply code of ministry of water resources and irrigation and international navigation code for designing Ports structures.

Course Coordinator: Assoc. Prof. /Elsayed Mohamed Galal

Program Coordinator: Dr. /Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	HUF204		
Year/ Level	Second year- Second semester		
Specialization	Minor		
Teaching Hours	**Lectures**	**Tutorial**	**Practical/Lab.**
	2	-	-

2. Course aims:

No.	aim
2	Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as environmental, health and safety and how to implement it in workplace and use of scientific information to prevent injuries and illnesses in workplace.

3. Learning Outcomes (LOs):

A4-1	Recognize the regulations and standards codes for occupational safety related to environmental issues.
A4-2	Discuss Occupational and Human health safety related to the different types of pollution, and methods of prevention.
A4-3	Define of the phenomenon of global warming, green houses, and predict future inviromenmtal hazards and their impact on the inveronment.
A6-1	Practice applying the quality assurance procedures in all environmental and occupational safety
A6-2	Apply appropriate steps to design safe systems at work and manage their risk in effective ways.
A6-3	Plan and implement techniques in professional manner to manage the risks of the most types of pollutions such as: air pollution, water pollution, chemical pollution, electromagnetic pollution.
A10-1	Identify multiple environmental factors, and their environmental impacts related to economic dimensions.
A10-2	Explore the methodes to treat environmental problems by following professional standereds, and the effects of these solutions on society.

4. Course Contents:

No.	Topic	Weeks
1	Introduction to environmental science and occupational safety	1
2	Elements of environmental systems	2
3	Air pollutions, Chemical Pollution, Water Pollution, Pollution caused by acid rain and acid fog, Oil Pollution, Biological weapons, and mechanical methods to remove oil spills.	3-8
4	Midterm Exam	9
5	Occupational and Human health and safety.	10-11
6	The impact of climate change on the population	12-13
7	Assessing the environmental impact and occupational safety of industrial applications including all standard codes.	14-15

5. Teaching and Learning Methods:

Courses LO's		Teaching and Learning Method														
		Face-to-Face Lecture	Online Lecture	Flipped Classroom	Presentation and Movies	Discussion	Tutorial	Problem solving	Brain storming	Projects	Site visits	Self learning and Research	Cooperative	Discovering	Modeling	Playing
A-Level	A4-1	x	x	x	x	x						x				
	A4-2	x	x	x	x	x						x				
	A4-3	x	x	x	x	x						x				
	A6-1	x	x	x	x	x						x				
	A6-2	x	x	x	x	x						x				
	A6-3	x	x	x	x	x				x		x				
	A10-1	x	x	x	x	x				x		x				
	A10-2	x	x	x	x	x						x				

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A4-1, A4-2, A6-1, A6-2
2	Tutorial, report, discussions, and presentation assessment	A4-1, A4-2, A4-3, A6-1, A6-2, A10-1, A10-2
3	Final Term Examination (written)	A4-1, A4-2, A4-3, A6-1, A6-2, A10-1, A10-2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	9
2	Tutorial, report, discussions, and presentation assessment	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Tutorial, report, discussions, and presentation assessment	10
3	Final Term Examination (written)	80
Total		100%

8. List of References

Essential Books (Text Books):	(١) تلوث البيئة في مصر –مبروك سعد النجار- الهيئة المصرية العامة للكتاب ١٩٩٤ (٢) التلوث مشكلة اليوم والغد- د.توفيق محمد قاسم-الهيئة المصرية العامة للكتاب١٩٩٥ (٣) التلوث الهوائي والبيئة – الجزء الأول-د.طلعت ابراهيم الاعوج – سلسلة العلم والحياة ١٩٩٤ (٤) الانسان وتلوث البيئة – محمد السيد أرناؤوط – الهيئة المصريةالعامة للكتاب - ١٩٩٩ (٥) القانون رقم ٤ لسنة ١٩٩٤- بأصدار قانون في شأن حماية البيئة ولائحته التنفيذية جهاز شئون البيئة - القاهرة- ١٩٩٩ (٦) دليل أسس واجراءات تقييم التأثير البيئي-جهاز شئون البيئة – قطاع الادارة البيئة القاهرة-اكتوبر ١٩٩٦ (٧) التلوث الكهرومغناطيسي – د.عبد المقصود حجو – الهيئة المصرية العامة للكتاب ٢٠٠٥ السلامة والصحة المهنية – مصطفى حامد محمد الجندى **(8)** (٩) أهداف ومفهوم السلامة والصحة المهنية والأحكام المنظمة لها (مقالات اكاديمية)- تعد بواسطة استاذ المقرر.
Recommended Text Books:	Eldon D. Enger, Bradley F. Smith, “Environmental Science, A study of Interrelationships”, PUBLISHER: McGraw-Hill, ISBN#: 97800-07-338327-9, 2018, 13th ed.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course

Topic No.	Topic	Aim	Course LOs Covered (By No.)
1	Introduction to environmental science and occupational safety	2	A4-1, A6-1, A6-2, A6-3
2	Elements of environmental systems	2	A6-1, A6-2, A6-3
3	Air pollutions, Chemical Pollution, Water Pollution, Pollution caused by acid rain and acid fog, Oil Pollution, Biological weapons, and mechanical methods to remove oil spills.	2	A4-2, A6-1, A6-2, A6-3
4	Midterm Exam	2	A4-1, A4-2, A6-1, A6-2
5	Occupational and Human health and safety.	2	A6-1, A6-2, A6-3, A10-1, A10-2
6	The impact of climate change on the population	2	A4-3, A6-1, A6-2, A6-3

Course: Environmental sciences and Professional safety	
Course LOs	**Program LOs**
A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4-1 Recognize the regulations and standards codes for occupational safety related to environmental issues. A4-2 Discuss Occupational and Human health safety related to the different types of pollution, and methods of prevention. A4-3 Define of the phenomenon of global warming, greenhouses, and predict future inviromenmtal hazards and their impact on the inveronment.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6-1 practice applying the quality assurance procedures in all environmental and occupational safety. A6-2 Apply appropriate steps to design safe systems at work and manage their risk in effective ways. A6-3 Plan and implement techniques in professional manner to manage the risks of the most types of pollutions such as: air pollution, water pollution, chemical pollution, electromagnetic pollution.
A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Identify multiple environmental factors, and their environmental impacts related to economic dimensions. A10-2 Explore the methodes to treat environmental problems by following professional standereds, and the effects of these solutions on society.

Course coordinator: Prof. Dr. Sobhy Serry

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

Course Specifications

Third Year

For

B. Sc. in Electrical Engineering Program

(Specialization: Electronics and Communications Engineering)

Bylaw 2014

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: electronics and Communications Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE308		
Year/ Level	Third year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
1	Apply knowledge of mathematics, basic sciences and engineering principles to recognize the tools of analog filter design, the common approximation techniques of finding an appropriate transfer functions, and the most common building blocks of passive and active filters design.

3. Learning Outcomes (LOs):

A1.1	Identify engineering problems relevant to passive and active filters synthesis.
A1.2	Recognize theorems, methods and the principles to synthesis a given filter transfer function using a given group of passive components.
A6.1	Identify appropriate specifications for the required transfer functions to synthesis an analog filter with certain response.
A6.2	Investigate design experiments, and their results interpretation.
A10.1	State available market products that are utilized to synthesize passive and active filters.
B2.1	Design a computer program using MATLAB software package to synthesis analog filters.
B4.1	Evaluate the characteristics and performance of passive and active filters to satisfy a certain transfer function.
C2.1	Practice effective dealing with MATLAB software package capabilities to analysis and design the analog filters.
C3.1	Illustrate the types of filters: Low-pass; High-pass; Band-reject; Gain equalizers; Delay equalizers - Passive and active filters.
C7.1	Identify design technologies used in synthesizing analog filter such as Foster and Cauer methods.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** • Introduction to analog filter design. • Network (Positive Real) Functions, Realizability of functions, and positive realness test: Introduction, Properties of network functions, Poles and zeros of network functions. Magnitude and phase of network functions, Hurwitz polynomial test, Properties of positive real function, properties of driving point functions (RC, RL, LC, RLC). **Tutorial/Lab:** • Learn to use the corresponding MATLAB functions and performing positive real function and Hurwitz tests using MATLAB.	1, 2
2	**Lecture:** • Analog Filter Design Concepts: Categorization of filters: Low-pass; High-pass; Band-reject; Gain equalizers; Delay equalizers - Passive and active filters. • Driving points realization using Foster and Cauer methods. **Tutorial/Lab:** • Problem solving related to positive real functions and how to predict the kinds of driving point functions that are realizable using a given group of passive components.	3-5
3	**Lecture:** • Passive Network Synthesis (LC, RC, and RLC realization) and Passive Realization of Transfer Functions: Driving point Synthesis: by inspection; Using partial fraction expansion; Using continued fraction expansion. Transfer function synthesis: Singly terminated ladder networks; Synthesis with zero shifting technique; Doubly terminated ladder networks. **Tutorial/Lab:** • Search for information on the internet and refer to relevant literatures to	6-7

	learn how MATLAB can be used to synthesis the passive filters - Using MATLAB functions, develop a complete routine to synthesis of singly and doubly terminated ladder structure passive networks based on Butterworth and Chebyshev approximations as a part of complete project - Problem solving related to synthesis of singly and doubly terminated ladder structure passive networks based on Butterworth and Chebyshev approximations - Prepare and present technical reports relevant to synthesis of passive two port networks - Using lab farcicalities study the performance of different types of passive filters	
4	**Midterm**	8
5	**Lecture:** • Realization of transfer functions using Chebyshev and Butterworth mathematical functions. **Tutorial/Lab:** • Training on how to use functions using Chebyshev and Butterworth mathematical functions.	9-11
6	**Lecture:** • Basics of Switched-capacitors filters analysis and design: The MOS switch - Simulation of resistors by switched capacitor - Switched-capacitor circuits for op-amp based analog operations: addition, subtraction, multiplication, integration and differentiation; First order and second order switched capacitor circuits. **Tutorial/Lab:** • Use the Analog Electronic kit and lab facilities to build different first-order and second-order switched-capacitor circuits - Problem solving related to synthesis of switched capacitor circuits.	12-14
7	**General Revision and Project Submission and Discussion.**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A1.1	x	x	x			x	x								
	A1.2	x	x			x			x	x				x		
	A6.1	x	x			x	x	x		x						x
	A6.2	x	x			x			x	x				x		
	A10.1		x			x			x		x					
B-Level	B2.1		x				x			x		x				x
	B4.1						x			x				x	x	
C-Level	C2.1		x			x			x		x					
	C3.1		x		x					x				x	x	x
	C7.1		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A6.1, A6.2, B4.1, C2.1, C3.1, C7.1
2	Practical Examination	A10.1, B2.1, C2.1, C3.1
3	Oral Examination	A1.1, A1.2, A6.1, A6.2
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A6.1, A6.2, B4.1, A6.2, C2.1, C3.1, C7.1, B2.1, C2.1, C3.1
5	Final Term Examination (written)	A1.1, A1.2, A6.1, A6.2, B4.1, A6.2, C2.1, C3.1, C7.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Ghosh, S. P., and A. K. Chakraborty. Network analysis and synthesis. Tata McGraw Hill, 2014.
2	Lam, Harry YF. "Analog and digital filters: design and realization." (1979).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** • Introduction to analog filter design. • Network (Positive Real) Functions, Realizability of functions, and positive realness test: Introduction, Properties of network functions, Poles and zeros of network functions. Magnitude and phase of network functions, Hurwitz polynomial test, Properties of positive real function, properties of driving point functions (RC, RL, LC, RLC). **Tutorial/Lab:** • Learn to use the corresponding MATLAB functions and Performing positive real function and Hurwitz tests using MATLAB.	1	A1.1, A1.2, C3.1
2	**Lecture:** • Analog Filter Design Concepts: Categorization of filters: Low-pass; High-pass; Band-reject; Gain equalizers; Delay equalizers - Passive and active filters. • Driving points realization using Foster and Cauer methods. **Tutorial/Lab:** • Problem solving related to positive real functions and how to predict the kinds of driving point functions that are realizable using a given group of passive components.	1	A1.1, A1.2
3	**Lecture:** • Passive Network Synthesis (LC, RC, and RLC realization) and Passive Realization of Transfer	1	A6.1, A6.2, B2.1, C2.1,

	Functions: Driving point Synthesis: by inspection; Using partial fraction expansion; Using continued fraction expansion. Transfer function synthesis: Singly terminated ladder networks; Synthesis with zero shifting technique; Doubly terminated ladder networks. **Tutorial/Lab:** • Search for information on the internet and refer to relevant literatures to learn how MATLAB can be used to synthesis the passive filters - Using MATLAB functions, develop a complete routine to synthesis of singly and doubly terminated ladder structure passive networks based on Butterworth and Chebyshev approximations as a part of complete project - Problem solving related to synthesis of singly and doubly terminated ladder structure passive networks based on Butterworth and Chebyshev approximations - Prepare and present technical reports relevant to synthesis of passive two port networks - Using lab farcicalities study the performance of different types of passive filters		C7.1
4	• **Midterm**	1	A6.1, A6.2, C3.1, C7.1
5	**Lecture:** • Realization of transfer functions using Chebyshev and Butterworth mathematical functions. **Tutorial/Lab:** • Training on how to use functions using Chebyshev and Butterworth mathematical functions.	1	A6.1, A6.2, B2.1, C2.1, C7.1
6	**Lecture:** • Basics of Switched-capacitors filters analysis and design: The MOS switch - Simulation of resistors by switched capacitor - Switched-capacitor circuits for op-amp based analog operations: addition, subtraction, multiplication, integration and differentiation; First order and second order switched capacitor circuits. **Tutorial/Lab:** • Use the Analog Electronic kit and lab facilities to build different first-order and second-order switched-capacitor circuits - Problem solving related to synthesis of switched capacitor circuits.	1	B4.1, A10.1
7	**General Revision and Project Submission and Discussion.**	1	B4.1, A10.1

Course: Design of Analog Filters	
Program LOs	**Course LOs**
A2. 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.	A1.1 Identify engineering problems relevant to passive and active filters synthesis. A1.2 Recognize theorems, methods and the principles to synthesis a given filter transfer function using a given group of passive components.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Identify appropriate specifications for the required transfer functions to synthesis an analog filter with certain response. A6.2 Investigate design experiments, and their results interpretation.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 State available market products that are utilized to synthesize passive and active filters.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Design a computer program using MATLAB software package to synthesis analog filters.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate the characteristics and performance of passive and active filters to satisfy a certain transfer function.
C2: Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance	C2.1 Practice effective dealing with MATLAB software package capabilities to analysis and design the analog filters.
C3: Design and compare between alternative components and systems in Electronics and Communications Engineering	C3.1 Illustrate the types of filters: Low-pass; High-pass; Band-reject; Gain equalizers; Delay equalizers - Passive and active filters.
C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7.1 Identify design technologies used in synthesizing analog filter such as Foster and Cauer methods.

Course Coordinator: Dr. Ahmad Abdalrazik Ahmad

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE309		
Year/ Level	Third year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
8	Recognize and analyze analog communications systems including amplitude and frequency modulation systems.

3. Learning Outcomes (LOs):

A1.1	Describe the principle of the design of analog modulation and demodulation communication systems.
A2.1	Evaluate the performance of various communication systems.
A3.1	Select the suitable analog communication technique based on analysis and performance requirement.
A5.1	Prepare researches about modulators and demodulators in communication systems.
A8.1	Prepare lab reports
B3.1	Implement analog communication systems.
B4.1	Evaluate the performance of analog communication systems based on power, complexity, bandwidth tradeoff, and noise immunity
C6.1	Analyze analog communication systems.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to Communication theory and systems. **Labs/Tutorials:** • Review examples on signals and systems	1
2	**Lectures:** • Review of the basic concepts of continuous-time Signals and systems. Signal classification. Signal Energy and Power. Common signals. System properties and classification. Linear Time Invariant (LTI) systems. LTI system characterization. Impulse response. **Labs/Tutorials:** • Solve examples on Fourier series and transform, and frequency-domain representation of signals.	٢
3	**Lectures:** • Double sideband Amplitude Modulation DSB-SC. Demodulation. Amplitude Modulation (AM) . **Labs/Tutorials:** • Solve examples on AM systems • Perform AM modulation and demodulation in the lab.	3-5
4	**Lectures:** • Bandwidth-efficient Amplitude Modulation: Single Sideband amplitude modulation (SSB). Vestigial sideband amplitude modulation (VSB). Quadrature amplitude modulation (QAM). Carrier Acquisition. **Labs/Tutorials:** • Solve examples on Bandwidth-efficient Amplitude Modulation • Perform corresponding lab experiments.	6-7
5	Midterm	8
6	**Lectures:** • Angle Modulation and Demodulation: Frequency modulation (FM)-Phase Modulation (PM). Bandwidth of angle modulated signals. Generation of FM Signals (direct and Indirect methods). Demodulation of FM signals. **Labs/Tutorials:** • Discuss Angle Modulation and Demodulation • Solve examples on Angle Modulation • Perform corresponding lab experiments.	9-14

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x			x	x	x								
	A2.1	x	x			x	x	x								
	A3.1	x	x			x	x	x								
	A5.1											x				
	A8.1															x
B-Level	B3.1		x												x	x
	B4.1	x					x	x							x	x
C-Level	C6.1	x	x			x		x	x		x					x

6. Teaching and Learning Methods of Disabled Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2.1, A3.1, B4.1, C6.1
2	Practical Examination	B3.1, B4.1, C6.1
3	Oral Examination	A1.1, A2.1, A8.1
4	Formative (quizzes- online quizzes- presentation)	A1.1, A2.1, A3.1, A5.1, B4.1, C6.1
5	Lab participation and lab reports.	A8.1, B3.1, C6.1
6	Final Term Examination (written)	A1.1, A2.1, A3.1, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation)	Every week
4	Lab participation and lab reports.	Biweekly
5	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation)	1٠
4	Lab participation and lab reports.	10
5	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	B.P. Lathi; Zhi Ding, “Modern digital and analog communication systems”, 5th edition, Oxford University Press (2018)
2	Simon Hayken, Michael Moher, “Communication Systems”, 5th Edition, Wiley (2009)

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** - Introduction to Communication theory and systems. **Labs/Tutorials:** - Review examples on signals and systems	8	A1.1
2	**Lectures:** - Review of the basic concepts of continuous-time Signals and systems. Signal classification. Signal Energy and Power. Common signals. System properties and classification. Linear Time Invariant (LTI) systems. LTI system characterization. Impulse response. **Labs/Tutorials:** - Solve examples on Fourier series and transform, and frequency-domain representation of signals.	8	A1.1
3	**Lectures:** - Double sideband Amplitude Modulation DSB-SC. Demodulation. Amplitude Modulation (AM) . **Labs/Tutorials:** - Solve examples on AM systems - Perform AM modulation and demodulation in the lab.	8	A1.1, A2.1, A3.1, A8.1, B3.1, B4.1, C6.1
4	**Lectures:** - Bandwidth-efficient Amplitude Modulation: Single Sideband amplitude modulation (SSB). Vestigial sideband amplitude modulation (VSB). Quadrature amplitude modulation (QAM). Carrier Acquisition. **Labs/Tutorials:** - Solve examples on Bandwidth-efficient Amplitude Modulation - Perform corresponding lab experiments.	8	A1.1, A2.1, A3.1, B3.1, A5-1, A8.1, B4.1, C6.1
5	- Midterm	8	
6	**Lectures:** - Angle Modulation and Demodulation: Frequency modulation (FM)- Phase Modulation (PM). Bandwidth of angle modulated signals. Generation of FM Signals (direct and Indirect methods). Demodulation of FM signals. **Labs/Tutorials:** - Discuss Angle Modulation and Demodulation - Solve examples on Angle Modulation - Perform corresponding lab experiments.	8	A1.1, A2.1, A3.1, A8.1, B3.1, B4.1, C6.1

Course: Communications Theory	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Describe the principle of the design of analog modulation and demodulation communication systems.
A2. 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.	A2.1 Evaluate the performance of various communication systems.
A3. 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.	A3.1 Select the suitable analog communication technique based on analysis and performance requirement.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Prepare researches about communication systems.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Prepare lab reports
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Implement analog communication systems.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate the performance of analog communication systems based on power, complexity, bandwidth tradeoff, and noise immunity
C6. Carry out design, development, testing, debugging, operation and maintenance of digital	C6.1 Analyze analog communication systems.

systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	

Course Coordinator: Dr. Sherif Abuelenin

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE310		
Year/ Level	Third year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	-	-	5 days × 4 Hours – Total 20 Hours per week (for 5 weeks)

2. Course aims:

No.	aim
2	Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
3	Work in and lead a heterogeneous group of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.
4	Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
5	Master self-learning and life-long learning strategies and communicate effectively using different modes, tools, and languages to engage in research studies and deal with challenges in the contemporary engineering issues.

3. Learning Outcomes (LOs):

A2.1	Think in a creative and innovative way in problem solving and design in the work environment.
A4.1	Assess and evaluate the current technology used in organization of the training.
A7-1	Collaborate effectively within multidisciplinary team field during the training and sharing ideas with real work team and under supervision with giving and receiving clear instructions.
A8.1	Write a technical report on the training subjects.
B4.1	Provide students with practical experience in the field of electronics and communications engineering and linking theoretical study with the practical reality using computational facilities, measuring instruments, and laboratory equipment of the field training organization.
B5.1	Apply the quality assurance requirements, professional ethics codes of practice and standards, health and safety requirements and environmental issues in the work environment.

C2.1	Conduct theoretical study with the practical reality using a wide range of analytical tools, techniques, equipment, and software packages.
C4.1	Characterize components, and systems using computational facilities, measuring instruments, and laboratory equipment of the field training organization.

4. Teaching and Learning Methods:

Teaching and Learning Methods	LO's
Mastery of the skills acquired**.**	B4.1
Summarizing ideas.	A8.1, B4.1, C2.1,C4.1
Reorganization of the basic technical skills.	A2.1
Creation of new solutions to technical problems.	A2.1
Knowing the required Interpersonal Skills in the work environment.	A7.1, B4.1
Taking advantage from experienced colleagues.	B4.1, C2.1
Acquiring skill of evaluation technologies.	A4.1, B4.1
Linking theoretical study with the practical reality using computational facilities, measuring instruments, and laboratory equipment of the field training organization.	B4.1, C2.1
Exchange knowledge and skills with engineering community and industry.	A2.1, A4.1, B4.1, B5.1, C4.1
Compliance with the rules and regulations of the work.	A7.1, B4.1, C2.1

5. Student assessment:

5.1 List required assignments

1. After the end of training in field, students write a technical report and submit it to the coordinator of the field training followed by presentation.
2. The report and presentation are evaluated by faculty members in the field training committee. The evaluation of the report and the presentation is carried out in an open session and include:
    - Discuss the new knowledge and skills gained in field training.
    - Discuss the benefit of use the personal skills in the work environment.
    - Discuss the ways that he used it to take advantage from experienced training team.
    - Discussion of all the observations related to the technology used in the company.
3. The field campus sends its evaluation and attendance behavior of students.

5.2- Assessment Schedule and Grades Distribution

Assessment Method	Percentage	week
Final Examination	No Final Exam	
Written Exam	No Written Exam	
Final Evaluation (Company)	20%	Decided by the department council during the first semester of the third year.
Final report • The overall quality of the report writing is sufficient in length to discuss all aspects of the training. • The objectives of the training are adequately organized, well written, and well discussed	20%	
The quality of Final Presentation	20%	
Final Evolution and discussion (Department field training committee) • The students' understanding of the background of the Training. • The extent to which the training Field is related to the major Specialized (Electronic and Communications). • The extent to which to which the student answers the Asked questions.	40%	
Total	100%	

5.3 Committee Final Evaluation Criteria:

In principle, the evaluators will assess a student's overall achievements by:

1. Examining the **report** they submit,
2. Observing the **presentation and demonstration** they make,

Asking questions and requesting for further clarifications as appropriate

6. Description of Field Training Activities:

The major student activities taking place during the field training can be described as:

1. Compliance with the rules and regulations of the work.
2. Coordination with the supervisor of the training company regarding the final evaluation during the training period and send it to make sure the department head.
3. Collect needed data; write technical report with observations and conclusion.
4. Use any new instruments related to the field of training in electronics and communications science practice.
5. Apply analysis, design, implementation, testing, and maintenance concepts practically in the practical field.
6. Share ideas, discussion and communicate effectively with the supervision and the technical teams.
7. Apply technical writing and presentation skills.
8. Apply management and communication techniques.
9. Apply ethical principles and commit to professional ethics, responsibilities and norms of electronics and communications science practice.
10. Presentation and discussion of the final report at the beginning of the first semester of the third year.

7. Field Training responsibility:

1. The field training committee formed by the department council arranges student placements in training organization for field experiences.
2. According to the field training organization the training required will be identified.
3. According to the field training organization place the supervision required will be identified
4. The students work for five weeks in the selected public or private organization in an electronics and communications related field.
5. The supervisor at the workplace is responsible for guiding and assigning tasks to the student as well as reporting the student’s final progress to the supervisor in the electronics and communications section in the electrical engineering department.
6. The report and presentation are evaluation process is the responsibilities of the department.

Course: Summer Training (2)	
Program LOs	**Course LOs**
A2. 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.	A2.1 Think in a creative and innovative way in problem solving and design in the work environment.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Assess and evaluate the current technology used in organization of the training.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7-1 Collaborate effectively within multidisciplinary team field during the training and sharing ideas with real work team and under supervision with giving and receiving clear instructions.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Write a technical report on the training subjects.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Provide students with practical experience in the field of electronics and communications engineering and linking theoretical study with the practical reality using computational facilities, measuring instruments, and laboratory equipment of the field training organization.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 Apply the quality assurance requirements, professional ethics codes of practice and standards, health and safety requirements and environmental issues in the work environment.

C2. Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance	C2.1 Conduct theoretical study with the practical reality using a wide range of analytical tools, techniques, equipment, and software packages.
C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.	C4.1 Characterize components, and systems using computational facilities, measuring instruments, and laboratory equipment of the field training organization.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rezk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE311		
Year/ Level	Third year- 1st semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	-	-	2

2. Course aims:

No.	aim
8	Design, operate and maintain basic electronic and digital circuits through designing, implementing and testing electronic and digital circuits those contain PN-junction diodes, bipolar, OP-amps, timers, and MOS transistors.

3. Learning Outcomes (LOs):

A2.1	Conduct experimentation and simulation of PN-junction diodes applications.
A2.2	Analyze experimentation and simulation of BJTs and MOSFETs.
A4.1	Apply safe systems at the electronic laboratory.
A4.2	Use standard values for different components to synthesize electronics circuits.
A6.1	Write a report on a project and lab experiments.
A7.1	Performs the lab experiments and projects in groups.
A10.1	Search for information about modern electronic circuits.
B4.1	Evaluate the characteristics and performance of OP-amps.
B4.2	Assess the characteristics and performance of 555 timers.
B5.1	Investigate the failure of components in electronic circuits.
C6.1	Design digital logic circuits (DTL, TTL and RTL)

4. Course Contents:

No.	Topics	Week
1	**Labs/Tutorials:** Diode applications. • Clipping and Clamping Circuits • Voltage Regulation using Zener Diodes • Diode Logic circuits	1-2
2	**Labs/Tutorials:** **BJT and FET applications** • Large signal circuits (Switches and inverters) • Small signal circuits (Amplifiers). • Transistor pairings.	3-5
3	**Labs/Tutorials:** **The applications of op amps.** • Inverting and Non-inverting • Summing • Integrator and Differentiator	6-7
4	Midterm	8
5	**Labs/Tutorials:** **Multivibrator circuits** • Astable multivibrator • Monostable multivibrator • Bistable multivibrator	9-11
6	**Labs/Tutorials:** **Digital logic- families circuit** • RTL • DTL • TTL.	12-13
7	**Labs/Tutorials:** • Project	14
8	**Labs/Tutorials:** • Revision	15

5. Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**					X	X							X	X	X
	A2.2					X	X							X	X	X
	A4.1									X			X			X
	A4.2									X					X	X
	A6.1									X				X	X	X
	A7.1									X			X			X
	A10.1									X	X	X				
B-Level	**B4.1**					X	X							X	X	X
	B4.2					X	X							X	X	X
	B5.1					X				X		X			X	X
C-Level	**C6.1**					X	X							X	X	X

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, A2.2, B4.1
2	Practical Examination	A2.1, A2.2, A4.1, A4.2, B4.1, B4.2, B5.1, C6.1
3	Oral Examination	A6.1, A7.1
4	Formative (Project- quizzes- online quizzes- reports)	A4.2, A6.1, A7.1, A10.1, B5.1
5	Final Term Examination (written)	A2.1, A2.2, B4.1, B4.2, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (Project- quizzes- online quizzes- reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	20
2	Practical/ Oral Examination	20
3	Formative (Project- quizzes- online quizzes- reports)	10
4	Final Term Examination (written)	٥٠
Total		100%

8. List of References

No.	Reference List
1	Labs original Manuals
2	Labs Manuals that provide by the course coordinators
3	Adel S. Sedra and Kenneth, *Microelectronic Circuits*, Oxford University Press, Seventh Edition, 2015.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lab Facilities
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Labs/Tutorials:** Diode applications. • Clipping and Clamping Circuits • Voltage Regulation using Zener Diodes • Diode Logic circuits	8	A2.1, A4.1, A6.1, A7.1
2	**Labs/Tutorials:** **BJT and FET applications** • Large signal circuits (Switches and inverters) • Small signal circuits (Amplifiers). • Transistor pairings.	8	A2.2, A4.1, A6.1, A7.1
3	**Labs/Tutorials:** **The applications of op amps.** • Inverting and Non-inverting • Summing • Integrator and Differentiator	8	A4.1, A6.1, A7.1, B4.1
4	Midterm	8	A2.1, A2.2, B4.1
5	**Labs/Tutorials:** **Multivibrator circuits** • Astable multivibrator • Monostable multivibrator • Bistable multivibrator	8	A4.1, A6.1, A7.1, B4.2
6	**Labs/Tutorials:** **Digital logic- families circuit** • RTL • DTL • TTL.	8	A4.1, A6.1, A7.1, C6.1
7	**Labs/Tutorials:** • Project	8	A4.2, A6.1, A7.1, A10.1, B5.1
8	**Labs/Tutorials:** • Revision	8	A2.1, A2.2, B4.1, B4.2, C6.1

Course: Electronics Laboratory	
Program LOs	**Course LOs**
A2. 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.	A2.1 Conduct experimentation and simulation of PN-junction diodes applications. A2.2 Analyze experimentation and simulation of BJTs and MOSFETs
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Apply safe systems at the electronic laboratory A4.2 Use standard values for different components to synthesize electronics circuits.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Write a report on a project and lab experiments.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1 Performs the lab experiments and projects in groups.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Search for information about modern electronic circuits.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate the characteristics and performance of OP-amps. B4.2 Assess the characteristics and performance of 555 timers.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 Investigate the failure of components in electronic circuits.
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Design digital logic circuits (DTL, TTL and RTL)

Course Coordinator: Dr. Saly Saad Hassaneen

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE322		
Year/ Level	Third year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	2

2. Course aims:

No.	aim
7	Apply the fundamental elements, problem solving, and software engineering of JAVA-programming, the specific mechanisms and skills needed to develop effective solutions to any programming problem.

3. Learning Outcomes (LOs):

A3.1	Describe principles of data types used in JAVA-language programming.
A3.2	Recognize JAVA-program elements used in building arithmetic model and computer program.
A3.3	Define methods for designing math model that representing system into numerical.
B1.1	Select suitable model for different computer problems and data types based on the analysis.
B2.1	Interpret math model representing system into numerical suitable for designing and writing JAVA program.
B3.1	Solve problems using computers by creating mathematical model for each problem and writing programs that allow different data types.
C6.1	Communicate effectively with colleagues and others to interchange knowledge and information in advanced programming techniques.
C6.2	Professionally combine engineering knowledge, understanding, and feedback to improve JAVA program design.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • What computer specifications is and its components. • Objectives of computer languages. • Characteristics of compiler and Interpreter. **Labs/Tutorials:** • Search the Internet about Advanced Programming Techniques.	1
2	**Lectures:** • Defining general principles of programming: Algorithms, flowcharts and mathematical model. • Introduction to JAVA language. **Labs/Tutorials:** • Learn how to download the JAVA program and use its interface.	٢
3	**Lectures:** • Defining the fundamentals of JAVA - Languages: Data types, relational operators, logical operators and assignment operators. **Labs/Tutorials:** • Using lab facilities to apply the fundamentals of JAVA language.	3
4	**Lectures:** • Characteristics of data input and output, character pointer and arrays. **Labs/Tutorials:** • Training on how to use the data input and output to build a JAVA program.	4-5
5	**Lectures:** • Control Statements in Programming: - Description. - Forms. - How to design. **Labs/Tutorials:** • Learn how to develop a computer program using the JAVA software package, related to the lectures.	6-7
6	Midterm	8
7	**Lectures:** • Define functions and macros prototype. • Define recursion. **Labs/Tutorials:** Learn how to apply the functions and recursion in the JAVA program.	9
8	**Lectures:** • Object oriented programming: - Emphasize the concepts of a data type. - Use, create, and design data types.	10

	Labs/Tutorials: • Learn how to apply the object-oriented programming in the lab.	
9	**Lectures:** • Project: Design algorithms and data structures. **Labs/Tutorials:** • Training on how to use the data structures to build a JAVA program.	11-14
10	General Revision and Project Submission and Discussion.	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3.1**	x	x	x			x	x								
	A3.2	x	x			x			x	x				x		
	A3.3	x	x			x	x	x		x						
B-Level	**B1.1**		x				x			x		x			x	
	B2.1						x			x				x	x	
	B3.1		x			x				x					x	x
C-Level	**C6.1**		x			x			x		x					
	C6.2		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, B1.1, C6.1
2	Practical Examination	A3.1, A3.2, A3.3, B1.1, B2.1, C6.1, C6.2
3	Oral Examination	A3.1, A3.2, A3.3, B1.1
4	Formative (quizzes- online quizzes- presentation - reports)	A3.1, A3.2, A3.3, B2.1, B3.1, C6.1, C6.2
5	Final Term Examination (written)	A3.2, A3.3, B2.1, B3.1, C6.1, C6.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	2٠
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Paul J. Deitel and Harvey Deitel, "Java How To Program (late objects)", Pearson, (11th Edition), (March 3, 2017).
2	John R. Hubbard, "Schaum's outline of Programming with JAVA", (Second Edition), (January 1, 2019).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • What computer specifications is and its components. • Objectives of computer languages. • Characteristics of compiler and Interpreter. **Labs/Tutorials:** • Search the Internet about Advanced Programming Techniques.	7	A3.1
2	**Lectures:** • Defining general principles of programming: Algorithms, flowcharts and mathematical model. • Introduction to JAVA language. **Labs/Tutorials:** • Learn how to download the JAVA program and use its interface.	7	A3.1
3	**Lectures:** • Defining the fundamentals of JAVA - Languages: Data types, relational operators, logical operators and assignment operators. **Labs/Tutorials:** • Using lab facilities to apply the fundamentals of JAVA language.	7	A3.1, B1.1, C6.1
4	**Lectures:** • Characteristics of data input and output, character pointer and arrays. **Labs/Tutorials:** • Training on how to use the data input and output to build a JAVA program.	7	A3.1, B2.1, C6.2
5	**Lectures:** • Control Statements in Programming: - Description. - Forms. - How to design.	7	A3.1, A3.2, B3.1, C6.1

	Labs/Tutorials: - Learn how to develop a computer program using the JAVA software package, related to the lectures.		
6	**Lectures:** - Define functions and macros prototype. - Define recursion. **Labs/Tutorials:** - Learn how to apply the functions and recursion in the JAVA program.	7	A3.1, A3.2, B2.1, C6.1, C6.2
7	Midterm	7	A3.1, A3.2, B1.1, C6.1
8	**Lectures:** - Object oriented programming: - Emphasize the concepts of a data type. - Use, create, and design data types. **Labs/Tutorials:** - Learn how to apply the object-oriented programming in the lab.	7	A3.2
9	**Lectures:** - Project: Design algorithms and data structures. **Labs/Tutorials:** - Training on how to use the data structures to build a JAVA program.	7	A3.1, A3.2, A3.3, B2.1, B3.1, C6.1, C6.2
10	General Revision and Project Submission and Discussion.	7	A3.2, A3.3, B2.1, B3.1, C6.1, C6.2

Course: Advanced Programming Techniques	
Program LOs	**Course LOs**
A3. 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.	A3.1 Describe principles of data types used in JAVA-language programming. A3.2 Recognize JAVA-program elements used in building arithmetic model and computer program. A3.3 Define methods for designing math model that representing system into numerical.
B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems	B1.1 Select suitable model for different computer problems and data types based on the analysis.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Interpret math model representing system into numerical suitable for designing and writing JAVA program.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Solve problems using computers by creating mathematical model for each problem and write programs that allow different data types.
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Communicate effectively with colleagues and others to interchange knowledge and information in advanced programming techniques. C6.2 Professionally combine engineering knowledge, understanding, and feedback to improve JAVA program design.

Course Coordinator: Dr. Radwa Mahmoud Attia

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	EPM319		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	-	2

2. Course aims:

No.	Aim
6	Manipulate with the power semiconductor devices and applications to controlled power electronic circuits

3. Learning Outcomes (LOs):

A3.1	Apply engineering design processes to produce cost of power electronic circuits that meet specified needs with consideration for economic
A3.2	Apply engineering design processes to produce effective solutions of Power Electronic Circuits within the principles and contexts of sustainable design and development.
B1.1	Select the structure, characteristics, rating, and operation of different types of power electronic switching devices.
B1.2	Analyze basic types of power electronic devices and circuits using circuit's simulator software (EWB and/or MATLAB), in computer Lab.
B2.1	Evaluate the characteristics and performance of power electronics circuits to satisfy a certain function
B2.2	Design, modeling, and describing the principle of operation of the different types of controlled power electronic circuits (rectifier / converter topologies), and DC choppers.
B3.1	Create a process, component or system to carry out specialized power electronics circuits, (AC/DC, DC/DC converters, and a DC drive system) in Power Electronics and Drive Lab**.**
C6.1	Describe the principle of the design protection circuits, and firing gate circuits for different types of power electronic switching devices.
C6.2	Identify engineering problems to solve problems of AC/DC, DC/DC converters, and DC drive systems.
C6.3	Design experiments in Power Electronics and Drive Lab to analyze and interpret experimental results related to Power electronic circuits, and drive systems.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** • **Power electronics switching devices:** Construction and Characteristics of power diodes, thyristors, GTOs, Triac, and Power transistors: (BJTs, MOSFETs, and IGBTs), • **Rating and protection:** protection and cooling systems and heat sink calculation. • **Drive circuits:** Triggering circuits and gate requirements. **Computer Lab:** Learn to use the corresponding MATLAB functions and Performing some transfer functions of equivalent circuits of different power semiconductor devices. **Power Electronics Lab:** Carry-out experiments to realize the characteristics of power semiconductor switching devices.	1-3
2	**Lecture:** • **Naturally Commutating Converters:** Princpale operation and analysis of the performance parameters (FF, RF, TUF, Efficiency, and PF). • **Single-phase thyristors controlled rectifier circuits** with R, R-L, and R-L-E loads. **Computer Lab:** Obtain some approximation functions using MATLAB software for a given rectifier circuit and how to use Simulink to find and study the rectifier circuits performances. **Power Electronics Lab:** Carry-out experiments to realize the performance rectifier circuits, as well as analyze and interpret experimental results.	4-6
3	**Lecture:** **Three-phase thyristors controlled rectifier circuits** with R, R-L, and R-L-E loads. Overlap operation. Design of a controlled rectifier circuit. **Computer Lab:** Obtain some approximation functions using MATLAB software for a given rectifier circuit and how to use Simulink to find and study the rectifier circuits performances. **Power Electronics Lab:** Carry-out experiments to realize the performance rectifier circuits, as well as analyze and interpret experimental results.	7
4	**Midterm**	8
5	**Lecture:** • **Forced Commutating DC-DC Converters:** Forced commutating techniques. Select and design of forced commutating circuit. • Principal operation, methods of control, types, study and analysis the performance parameters of different types of DC-DC converters (DC chopper circuits).	9-12

	• Classification, switching regulators, design of DC chopper circuits. **Computer Lab:** Obtain some functions using MATLAB Simulink software to find and analysis the performance parameters of a given DC chopper circuit. **Power Electronics Lab:** Carry-out some experiments to realize the performance of DC chopper circuit, as well as analyze and interpret experimental results.	
6	**Lecture** • **DC drive system:** Speed Control of a DC motor (basic principles, and analysis). DC motor operation methodologies. • Speed control of a DC motor by using rectifier circuits, and/or DC chopper circuit. • Closed loop DC motors speed control. **Computer Lab:** Obtain some functions using MATLAB Simulink software to analysis the performance of a given closed-loop DC motor speed control.	13-14
7	**Practical Exam.**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	x	x													
	A3.2	x														
B-Level	B1.1	x	x		x										x	
	B1.2	x													x	x
	B2.1	x	x		x					x					x	
	B2.3	x	x													
	B3-1		x		x					x						x
C-Level	C6.1		x							x						x
	C6-2	x	x													x
	C6-3	x													x	x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student Assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, B1.1, B1.2, B2.2
2	Practical Examination	B1.1, B1.2, B2.1, B3.1, C6.1, C6.2, C6.3
3	Oral Examination	A3.1, A3.2, B1.1
4	Formative (quizzes - online quizzes-presentation - reports)	A3.2, B1.1, B1.2, B2.1, B2.2, C6. 1, C6.2
5	Final Term Examination (written)	A3.1, A3.2, B1.1, B2.1, B2.2, C6.1, C6.2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes-presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	W. Lander, “Power electronics,” Tata McGraw-Hill, 3rd edition, 1993.
2	M. H. Rashid, “Power electronics: circuits, devices, and applications,” Pearson - Prentice Hall, 4rd edition, 2014.
3	N. Mohan, T. M. Undeland, and W.P. Robbins “Power Electronics Converters, Applications and Design,” John Wiley, 2nd edition, 1995.
4	Barry W. Williams, "Principales and Elements of Power Electronics, Devices, Drivers, Application and Passive components", ELBS edition, 2006.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No	Topic	Aim	LO's
1	**Lecture:** • **Power electronics switching devices:** Construction and Characteristics of power diodes, thyristors, GTOs, Triac, and Power transistors: (BJTs, MOSFETs, and IGBTs), • **Rating and protection:** protection and cooling systems and heat sink calculation. • **Drive circuits:** Triggering circuits and gate requirements. **Computer Lab:** Learn to use the corresponding MATLAB functions and Performing some transfer functions of equivalent circuits of different power semiconductor devices. **Power Electronics Lab:** Carry-out experiments to realize the characteristics of power semiconductor switching devices.	6	**A3-1, A3-2, B1-1, B1-2, B2-1, C6-1**
2	**Lecture:** • **Naturally Commutating Converters:** Princpale operation and analysis of the performance parameters (FF, RF, TUF, Efficiency, and PF). • **Single-phase thyristors controlled rectifier circuits** with R, R-L, and R-L-E loads. **Computer Lab:** Obtain some approximation functions using MATLAB software for a given rectifier circuit and how to use Simulink to find and study the rectifier circuits performances. **Power Electronics Lab:** Carry-out experiments to realize the performance rectifier circuits, as well as analyze and interpret experimental results.	6	**B1-2, B2-1, B2-2, B3-1, C6-1, C6-2**
3	**Lecture:** **Three-phase thyristors controlled rectifier circuits** with R, R-L, and R-L-E loads. Overlap operation. Design of a controlled rectifier circuit. **Computer Lab:** Obtain some approximation functions using MATLAB software	6	**B1-2, B2-1, B2-2, B3-1, C6-1, C6-2**

	for a given rectifier circuit and how to use Simulink to find and study the rectifier circuits performances. **Power Electronics Lab:** Carry-out experiments to realize the performance rectifier circuits, as well as analyze and interpret experimental results.		
4	**Midterm**	6	**A3.1, A3.2, B1.1, B1.2, B2.2**
5	**Lecture:** • **Forced Commutating DC-DC Converters:** Forced commutating techniques. Select and design of forced commutating circuit. • Principal operation, methods of control, types, study and analysis the performance parameters of different types of DC-DC converters (DC chopper circuits). • Classification, switching regulators, design of DC chopper circuits. **Computer Lab:** Obtain some functions using MATLAB Simulink software to find and analysis the performance parameters of a given DC chopper circuit. **Power Electronics Lab:** Carry-out some experiments to realize the performance of DC chopper circuit, as well as analyze and interpret experimental results.	6	**A3-2, B1-2, B2-1, B2-2, B3-1, C6-2**
6	**Lecture** • **DC drive system :** Speed Control of a DC motor (basic principles, and analysis). DC motor operation methodologies. • Speed control of a DC motor by using rectifier circuits, and/or DC chopper circuit. • Closed loop DC motors speed control. **Computer Lab:** Obtain some functions using MATLAB Simulink software to analysis the performance of a given closed-loop DC motor speed control.	6	**B1-2, B2-1, B2-2, B3-1, C6-2, C6-3**

Course: Power Electronics	
Program LOs	**Course LOs**
A3- 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.	A3-1- Apply engineering design processes to produce cost of power electronic circuits that meet specified needs with consideration for economic. A3-2- Apply engineering design processes to produce effective solutions of Power Electronic Circuits within the principles and contexts of sustainable design and development.
B1- Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.	B1-1 Select the structure, characteristics, rating, and operation of different types of power electronic switching devices. B1-2 Analyze basic types of power electronic devices and circuits using circuit's simulator software (EWB and/or MATLAB), in computer Lab.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Evaluate the characteristics and performance of power electronics circuits to satisfy a certain function. B2-2 Design, modeling, and describe the principle of operation of the different types of controlled power electronic circuits (rectifier / converter topologies), and DC choppers.
B3- Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3-1 Create a process, component or system to carry out specialized power electronics circuits, (AC/DC, DC/DC converters, and a DC drive system) in Power Electronics and Drive Lab.
C6- Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6-1 Describe the principle of the design protection circuits, and firing gate circuits for different types of power electronic switching devices. C6-2 Identify engineering problems to solve problems of AC/DC, DC/DC converters, and DC drive systems. C6-3 Design experiments in Power

	Electronics and Drive Lab. to analyze and interpret experimental results related to Power electronic circuits, and drive systems

Course Coordinator : Dr. Attia M. El-Saadawi.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE311		
Year/ Level	Third year - First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	0	2

2. Course aims:

No.	Aim
1	Apply knowledge to understand the concepts of microprocessor architecture, instruction set, assembly language and write efficient assembly and machine code for programming the microprocessor that can be efficiently used in many systems and applications.

3. Learning Outcomes (LOs):

A1.1	Select appropriate solutions for engineering problems based on analytical thinking.
A3.1	Describe the principle of the design computer processes.
A3.2	Describe the principle of the design of Instruction Set Architectures
A4.1	Identify the problems and tradeoffs encountered in the design of computer processors.
A4.2	Recognize knowledge and understanding of the principles of operation of various computer processes models.
A4.3	Recognize knowledge and understanding of cache design.
A4.4	Recognize knowledge and understanding of I/O subsystem design.
A8.1	Prepare a project technical report.
B1.1	Solve engineering problems, often on the basis of limited and possibly contradicting information.
B2.1	Re-Design and modify various computer processors.
B3.1	Use microcontroller design simulation computer software.
B4.1	Evaluate tradeoffs in instruction set design.
B4.2	Evaluate the characteristics and performance metrics in in the design of computer processors.
B5.1	State specific example from the current state of the art family of Reduced Instruction Set Architectures.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Overview of Computer Architecture **Labs/Tutorials:** - Introduction and installation of simulation software and virtual breadboard.	1
2	**Lectures:** - The Role of Performance - Instruction Set Design Tradeoffs. **Labs/Tutorials:** - Gain proficiency in the use of common logic circuits components like Breadboards, LEDs, Diodes, Switches, 7-Seg Displays and microcontrollers.	2
3	**Lectures:** - The MIPS Instruction Set Architecture **Labs/Tutorials:** - Problem solving related to assembly and machine language programming.	3-4
4	**Lectures:** - The Single Cycle Data Path **Labs/Tutorials:** - Problem solving related to single cycle datapath design and analysis - Creating a Microship PIC16 Project.	5
5	**Lectures:** - The Single Cycle Control **Labs/Tutorials:** - Problem solving related to datapath design and analysis.	6
6	**Lectures:** - The Multi Cycle Data Path **Labs/Tutorials:** - Problem solving related to multi-cycle datapath design and analysisControlling a LED using Arduino	7
7	**Midterm Written Exam**	8
8	**Lectures:** - The Multi Cycle Control **Labs/Tutorials:** - Problem solving related to Multicycle datapath design and analysis.	9
9	**Lectures:** - Design of a Pipeline Processor. **Labs/Tutorials:** - Problem solving related to pipelined datapath design and analysis - Programming an Arduino from VBB	10

10	**Lectures:** • The Memory Subsystem **Labs/Tutorials:** • Practical Project	11
11	**Lectures:** • Cache Design **Labs/Tutorials:** • Practical Project	12-13
12	**Lectures:** • The I/O Subsystem Bus Architectures **Labs/Tutorials:** • Practical Project	14
13	**Final Oral Exam and Project Submission**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x	x		x		x							x	x
	A3.1	x	x		x		x			x						
	A3.2	x	x		x		x			x						
	A4.1	x	x		x		x			x		x			x	
	A4.2	x	x		x		x			x		x			x	
	A4.3	x	x		x		x			x		x				
	A4.4	x	x		x		x			x		x			x	
	A8.1					x			x	x	x	x	x		x	x
B-Level	B1.1	x	x	x		x				x		x			x	x
	B2.1	x	x	x		x				x		x			x	x
	B3.1	x	x	x		x				x		x			x	x
	B4.1		X			X			X	X	X	X	X		X	
	B4.2		X			X			X	X	X	X	X		X	
	B5.1		X			X			X	X	X	X	X		X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1,A3.1,A3.2, A3.3,A3.4,A2.1, A10.1,B3.2, B1.1, B2.1, B4.1,B4.2
2	Practical Examination	A1.1, A3.1, A3.2, A4.1, A4.2, A4.3, A4.4, A8.1, B1.1, B2.1, B3.1, B4.1, B4.2, B5.1
3	Oral Examination	A1.1, A4.1, A4.2, A4.3, A4.4, A8.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A3.1, A3.2, A4.1, A4.2, A4.3, A4.4, A8.1, B1.1, B2.1, B3.1, B4.1, B4.2, B5.1
5	Final Term Examination (written)	A1.1, A3.1, A3.2, A4.1, A4.2, A4.3, A4.4, A8.1, B1.1, B2.1, B3.1, B4.1, B4.2, B5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	10
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Project assessment	10
5	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Computer Organization and Design MIPS Edition: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design) 5th Edition, by: David A. Patterson and John L. Hennessy, 2013, Morgan Kaufmann Publishers.
2	Microprocessors and Interfacing, by: N. Senthil Kumar, M. Saravanan, S. Jeevananthan, and Satish Shah. 2012, Oxford University Press, Inc., USA.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Overview of Computer Architecture **Labs/Tutorials:** • Introduction and installation of simulation software and virtual breadboard.	1	A1.1, A3.1
2	**Lectures:** • The Role of Performance - Instruction Set Design Tradeoffs. **Labs/Tutorials:** • Gain proficiency in the use of common logic circuits components like Breadboards, LEDs, Diodes, Switches, 7-Seg Displays and microcontrollers.	1	A1.1, A3.1, A3.2, B4.1, B4.2
3	**Lectures:** • The MIPS Instruction Set Architecture **Labs/Tutorials:** • Problem solving related to assembly and machine language programming.	1	A1.1, A3.1, A3.2, A4.1, A4.2
4	**Lectures:** • The Single Cycle Data Path **Labs/Tutorials:**	1	A3.3,A3.4,A2.1, A10.1,B3.2

	- Problem solving related to single cycle datapath design and analysis - Creating a Microship PIC16 Project.		
5	**Lectures:** - The Single Cycle Control **Labs/Tutorials:** - Problem solving related to datapath design and analysis.	1	A3.3,A3.4,A2.1, A10.1,B3.2, B1.1, B2.1
6	**Lectures:** - The Multi Cycle Data Path **Labs/Tutorials:** - Problem solving related to multi-cycle datapath design and analysisControlling a LED using Arduino	1	A3.3,A3.4,A2.1, A10.1,B3.2, B1.1, B2.1
7	**Midterm Written Exam**	1	A1.1,A3.1,A3.2, A3.3,A3.4,A2.1, A10.1,B3.2, B1.1, B2.1, B4.1,B4.2
8	**Lectures:** - The Multi Cycle Control **Labs/Tutorials:** - Problem solving related to Multicycle datapath design and analysis.	1	A3.3,A3.4,A2.1, A10.1,B3.1, B3.2, B1.1, B2.1
9	**Lectures:** - Design of a Pipeline Processor. **Labs/Tutorials:** - Problem solving related to pipelined datapath design and analysis - Programming an Arduino from VBB	1	A3.3,A3.4,A2.1, A10.1,B3.1, B3.2, B1.1, B2.1
10	**Lectures:** - The Memory Subsystem **Labs/Tutorials:** - Practical Project	1	A2.1, A10.1,B3.1, B3.2, B1.1, B2.1, A8.1
11	**Lectures:** - Cache Design **Labs/Tutorials:** - Practical Project	1	A2.1, A10.1,B3.1, B3.2, B1.1, B2.1, A8.1, B4.3
12	**Lectures:** - The I/O Subsystem Bus Architectures **Labs/Tutorials:** - Practical Project	1	A2.1, A10.1,B3.1, B3.2, B1.1, B2.1, A8.1, B4.4
13	**Final Oral Exam and Project Submission**	1	A1.1, A3.1, A3.2, A4.1, A4.2, A4.3, A4.4, A8.1, B1.1, B2.1, B3.1, B4.1, B4.2, B5.1

Course: Microprocessors and Applications	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Select appropriate solutions for engineering problems based on analytical thinking.
A3. 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.	A3.1 Describe the principle of the design computer processes. A3.2 Describe the principle of the design of Instruction Set Architectures.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Identify the problems and tradeoffs encountered in the design of computer processors. A4.2 Recognize knowledge and understanding of the principles of operation of various computer processes models. A4.3 Recognize knowledge and understanding of cache design. A4.4 Recognize knowledge and understanding of I/O subsystem design.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Prepare a project technical report.
B1. Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation, transmission and distribution of electrical power systems.	B1.1 Solve engineering problems, often on the basis of limited and possibly contradicting information.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Re-Design and modify various computer processors.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Use microcontroller design simulation computer software.
B4. Estimate and measure the performance of an	B4.1 Assess and evaluate tradeoffs

electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	in instruction set design. B4.2 Assess and evaluate the characteristics and performance metrics in in the design of computer processors.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 State specific example from the current state of the art family of Reduced Instruction Set Architectures.

Course Coordinator: Dr. Emad El Sayed

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">CCE313</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Third year – First semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>1</td><td>1</td></tr>
</table>

2. Course aims:

No.	aim
4	Use current advanced techniques, skills, and tools necessary to demonstrate different principles to verify the fundamentals of computer networks.

3. Learning Outcomes (LOs):

A1.1	Identify the fundamentals of the computer network and its key components.
A2.1	Develop the layered network architecture and standard network models.
A3.1	Design with simulating simulation for different network topologies
A5.1	Apply knowledge of network to analyze the network performance.
A8.1	Prepare presentation for technical report represent solutions for problems for network models.
B3.1	Implement simulation for different network topologies.
B4.1	Design solutions for problems of network models.
C6.1	Integrate economic, social and environmental aspects in network design projects.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** The fundamentals of computer networks and their applications –The key components of data networks –The characteristics of network architecture: fault tolerance, scalability, and quality of services. ***Tutorial/Lab:*** • Skills Integration Challenge- Use appropriate mathematical methods and/or IT tool to solve problems related to Packet tracer and examination.	1-2
2	**Lectures:** Layered network architecture and standard network models (OSI and TCP/IP) ***Tutorial/Lab:*** • Skills Integration Challenge-Configuring Hosts and Services.	3
3	**Lectures:** Different Layers functionality and protocols: Application layer functionality and protocols - Transport layer protocols (TCP and UDP), error handling, and reliability - Network layer protocols (IPv4 and IPv6). ***Tutorial/Lab:*** • Skills integration challenge-Analyzing the different layers protocols performance considering: error handling, reliability, packet routing - Connecting a wired and wireless LAN.-	4-7
4	Midterm	8
5	**Lecture:** the principles of grouping and division of devices - Addressing the Network-IPv4, classification of networks - Data link layer protocols, the media access control methods, the network topologies, and encapsulation - Physical layer protocols and services , signaling, encoding, and the common media. ***Tutorial/Lab:*** • Problem solving related to addressing and media access control.	9
6	**Lectures:** Ethernet characteristics, the Ethernet frame, and the access media of Ethernet. ***Tutorial/Lab:*** • Make your Ethernet do something practically.	10

7	**Lecture:** Planning and Cabling Networks : Planning, cabling, configuring, and testing a computer networks. **Tutorial/Lab:** Creating a computer network topology: that requires connecting network devices and configuring host computers for basic network connectivity including subnets.	11-13
8	**Lecture:** A Survey of computer network simulation tools. **Tutorial/Lab:** Problem solving related to evaluation for network parameters. Simulation of Subnetting of a Large Network.	14-15

5. Teaching and Learning Methods:

LO’s		**Teaching and Learning Method**														
		Lecture(online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1.1**	x	x													
	A2.1	x	x				x	x								
	A3.1	x	x			x				x						
	A5.1	x	x	x			x	x				x			x	
	A8.1	x				x	x	x							x	
B-Level	**B3.1**	x					x			X					x	
	B4.1	X					x			x		x				
C-Level	**C6.1**		x			x				x			x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2.1,B2.1, B3.1, C6.1
2	Formative (quizzes- online quizzes- presentation)	A2.1, A5.1, A8.1, B3.1, B4.1, C6.1
3	practical examination and project assessment	A8.1, B3.1, B4.1, C6.1
4	Oral examination	A1.1, A8.1
5	Tutorial and report assessment	A5.1, B3.1, B4.1, C6.1
6	Final Examination	A1.1, A2.1, A3.1, A5.1, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation)	Continuous
3	Oral/practical examination + project assessment	15th
4	Tutorial and report assessment	Weakly
5	Final Examination	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Assignment &Quizzes assessment	5
3	Oral/practical examination + project assessment	١٠
4	Tutorial and report assessment	5
5	Final Examination	٧٠
Total		100%

8. List of References

No.	Reference List
1	Peter Lars Dordal, An Introduction to Computer Networks. Creative Commons Attribution-No Derivs-Non Commercial 1.0 Generic, 2016
2	S. Tanenbaur, Computer Networks. Upper Saddle River, NJ: Prentice-Hall, 2011.
3	M. Schwartz, Broadband Integrated Networks. Upper Saddle River, NJ: Prentice-Hall, 2002

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** The fundamentals of computer networks and their applications –The key components of data networks –The characteristics of network architecture: fault tolerance, scalability, and quality of services. ***Tutorial/Lab:*** • Skills Integration Challenge- Use appropriate mathematical methods and/or IT tool to solve problems related to Packet tracer and examination.	4	A1.1, A2.1, B3.1
2	**Lectures:** Layered network architecture and standard network models (OSI and TCP/IP) ***Tutorial/Lab:*** • Skills Integration Challenge-Configuring Hosts and Services.	4	A5.1, A8.1, B4.1
3	**Lectures:** Different Layers functionality and protocols: Application layer functionality and protocols - Transport layer protocols (TCP and UDP), error handling, and reliability - Network layer protocols (IPv4 and IPv6). ***Tutorial/Lab:***	4	A2.1, B3.1, C6.1

	• Skills integration challenge-Analyzing the different layers protocols performance considering: error handling, reliability, packet routing - Connecting a wired and wireless LAN.-		
4	• Midterm	4	A1.1, A2.1, A3.1, A5.1,A8.1, B3.1, B4.1,C6.1
5	**Lecture:** the principles of grouping and division of devices - Addressing the Network-IPv4, classification of networks - Data link layer protocols, the media access control methods, the network topologies, and encapsulation - Physical layer protocols and services , signaling, encoding, and the common media. ***Tutorial/Lab:*** • Problem solving related to addressing and media access control.	4	A5.1, A8.1, B4.1
6	**Lectures:** Ethernet characteristics, the Ethernet frame, and the access media of Ethernet. ***Tutorial/Lab:*** • Make your Ethernet do something practically.	4	A2.1, A3.1, B3.1, C6.1
7	**Lecture:** Planning and Cabling Networks : Planning, cabling, configuring, and testing a computer networks. **Tutorial/Lab:** Creating a computer network topology: that requires connecting network devices and configuring host computers for basic network connectivity including subnets.	4	A1.1, A2.1,A8.1, B4.1
8	**Lecture:** A Survey of computer network simulation tools. **Tutorial/Lab:** Problem solving related to evaluation for network parameters. Simulation of Subnetting of a Large Network.	4	, B3.1, C6.1

Course: Wireless Computer Networks	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the fundamentals of the computer network and its key components.
A2. 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.	A2.1 Develop the layered network architecture and standard network models.
A3. 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.	A3.1 Design with simulating simulation for different network topologies
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Apply knowledge of network to analyze the network performance.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Prepare presentation for technical report represent solutions for problems for network models.
B3. Design and implement: elements, modules, sub-systems or systems in digital engineering using technological and professional tools.	B3.1 Implement simulation for different network topologies.
B4. Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations and procedures involved.	B4.1 Design solutions for problems of network models.

C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1. Integrate economic, social and environmental aspects in network design projects.

Course Coordinator: Prof. Dr. Rawya Yehia Rizk

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	HUU305		
Year/ Level	Third level – First semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical
	2	---	---

2. Course Aims:

No.	Aim
3	Work in and lead a heterogeneous team and display leadership qualities and examine the essence of leadership skills, specifically; the personal, interpersonal, group and contextual factors which affect formal and emergent leadership in groups and organizations.

3. Learning Outcomes (LOs):

A6-1	Identify leader and manager skills and values.
A6-2	Distinguish between different leadership theories (limitations and characteristics)
A6-3	Describe five key elements of leadership.
A6-4	Define the ten managerial roles based on their three categories.
A7-1	Discuss the advantages and disadvantages of working in teams
A7-2	Improve skills related to working in groups and teamwork through class activities and project.
A7-3	Discuss the role of strategic leadership in the strategic management process.
A8-1	Analyze leadership case studies.
A8-2	Prepare reports in accordance with the standard scientific guidelines for given topics.
A8-3	Present reports discussing the results and defending his/her ideas.
A9-1	Recommend methods to improve leadership skills in given case studies.
A9-2	Evaluate information through individual and group project work
A9-3	Practice decision making based on leadership theories in class activities and project.

4. Course Contents:

Week No.	Topic	Total Hours	Contact hrs		
			Lec.	Tut.	Lab.
Week-1	Introduction (leadership definition)	2	2	--	--
Week-2	Leader vs Manager	2	2	--	--
Week 3-4	Power the key to leadership	4	4	--	--
Week 5	Empowerment gains and threats	2	2	--	--
Week 6-7	Leadership theories and models	8	8	--	--
Week-8	Midterm	2	2	--	--
Week 9-10	Domains of leadership strengths	2	2	--	--
Week 11-13	The five practices and ten commitments of exemplary leadership	6	6	--	--
Week 14-15	Group projects presentation	4	4	--	--

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online-In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A6-1**	X			X	X			X							
	A6-2	X			X	X			X							
	A6-3	X			X	X			X							
	A6-4	X			X	X			X	X			X			
	A7-1	X			X	X			X							
	A7-2	X			X	X			X							
	A7-3	X			X	X			X							
	A8-1	X			X	X			X	X			X			
	A8-2	X			X	X			X	X			X			
	A8-3	X			X	X			X	X			X			
	A9-1	X			X	X			X	X			X			
	A9-2	X			X	X			X	X			X			
	A9-3	X			X	X			X	X			X			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and documentation.

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	In class activity and assignments	A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3
2	Group project presentation and discussion	A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3
3	Final Term Examination (written)	A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	In class activity and assignments	Throughout the semester
2	Group project presentation and discussion	Weeks 15
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	In class activity and assignments	25
2	Group project presentation and discussion	25
3	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	James Kouzes, and Barry Posner, “The Leadership Challenge”, Wiley, 6th edition, 2017, ISBN:0470651725.
2	Gareth Jones, and Jennifer George, "Contemporary Management", McGraw Hill, 11th edition 2017.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Introduction (leadership definition)	3	A6-1
2	Leader vs Manager	3	A6-1, A7-1, A7-2
3	Power the key to leadership	3	A6-3, A7-2, A7-3, A9-1,
4	Empowerment gains and threats	3	A6-3, A7-3, A8-1
5	Leadership theories and models	3	A6-2, A8-1, A9-3
6	Domains of leadership strengths	3	A7-2, A8-1, A9-1, A9-3
7	The five practices and ten commitments of exemplary leadership	3	A6-3, A6-4, A9-3
8	Group projects presentation	3	A6-1, A6-2, A6-3, A6-4, A7-1, A7-2, A7-3, A8-1, A8-2, A8-3, A9-1, A9-2, A9-3

Course: Leadership Skills	
Program LOs	**Course LOs**
A6- Plan, supervise and monitor implementation of engineering projects.	A6-1 Identify leader and manager skills and values. A6-2 Distinguish between different leadership theories (limitations and characteristics) A6-3 Describe five key elements of leadership. A6-4 Define the ten managerial roles based on their three categories.
A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Discuss the advantages and disadvantages of working in teams A7-2 Improve skills related to working in groups and teamwork through class activities and project. A7-3 Discuss the role of strategic leadership in the strategic management process.
A8- Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Analyze leadership case studies. A8-2 Prepare reports in accordance with the standard scientific guidelines for given topics. A8-3 Present reports discussing the results and defending his/her ideas.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Recommend methods to improve leadership skills in given case studies. A9-2 Evaluate information through individual and group project work A9-3 Practice decision making based on leadership theories in class activities and group project.

Course Coordinator: Dr. Mohamed Farouk Abdel-Kader

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE312		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
1	Apply knowledge of digital signal processing to solve problems, analyze and interpret data related to design and analysis of digital filters as well as properties and applications of Fast Fourier Transform (FFT)

3. Learning Outcomes (LOs):

A1.1	Utilize the appropriate system mathematical description for different system needs.
A1.2	Select the appropriate mathematical and numerical model for computing the frequency domain transform of discrete-time signals among (DTFT, DFT, FFT)
A2.1	Assess the characteristics and performance of digital filters to satisfy a certain function.
A6.1	Apply DSP in various signal analysis applications.
A10.1	Present new trends in Digital signal processing applications
B2.1	Realize discrete-time filters based on the specification.
B3.1	Design discrete-time signal processing systems using computer software and DSP hardware.
B4.1	Evaluate the performance effect of various sampling parameters.
C6.1	Use MATLAB programming tools to design discrete-time system.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Introduction to the applications and use cases of digital signal processing **Labs/Tutorials:** - Learn to use the corresponding MATLAB functions and Performing simple signal read/write, generation, and plot.	1
2	**Lectures:** - Review of the basic concepts of discrete-time Signals and systems. Signal classification, common discrete-time signals. System properties and classification. - Linear Time Invariant (LTI) systems. LTI system characterization. Impulse response, difference equation, Frequency response. - Discrete-time Fourier transform (DTFT). **Labs/Tutorials:** - Use MATLAB to evaluate and characterize discrete-time systems using the impulse response and frequency response. - Use MATLAB to plot the frequency response of signals using DTFT	٢-3
3	**Lectures:** - Definition of Z-transform, Properties of Z-transform, Z-transform and LTI system, Inverse Z-transform **Labs/Tutorials:** - Solve problems on computing the Z-transform and inverse z-transform.	4-5
4	**Lectures:** - Periodic sampling of continuous-time signals. Frequency domain representation of Sampling. Reconstruction of continuous-time signals. Discrete-time processing of continuous-time signals. **Labs/Tutorials:** - Practice problems on the sampling theorem. - Simulate periodic sampling of audio signals using MATLAB	6
5	**Lectures:** - Frequency response Analysis of LTI systems. Relationship between poles/zeros and frequency response. All-pass and minimum phase systems. **Labs/Tutorials:** - Use MATLAB to analyze digital filters. Plot poles/zeros diagram and frequency response and study the relationship between them.	7

6	Midterm	8
7	**Lectures:** • Block diagram and signal flow graph realization of LTI systems. Basic structure for IIR filters (Direct-cascade-parallel). Overview of finite-precision numerical effects. **Labs/Tutorials:** • Practice different realization of discrete-time systems	9-10
8	**Lectures:** • Design of discrete-time IIR filters from continuous-time filters using impulse invariance and bilinear transformation. Design of FIR filters by windowing **Labs/Tutorials:** • Practice IIR and FIR digital filter design from specification using MATLAB.	11-12
9	**Lectures:** • The Discrete-time Fourier (DFT) transform. Properties of DFT. Linear convolution using DFT. Efficient computation of the DFT using FFT. Decimation in time and Decimation in frequency FFT algorithms. **Labs/Tutorials:** • Use MATLAB to compute the DFT of discrete-time signals. Compare the DFT and DTFT transforms of signals. Compute the computational savings of FFT algorithms.	13-14
10	**General Revision and Project Submission and Discussion**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x	x				x	x							x	x
	A1.2	x		x			x								x	
	A2.1	x		x			x	x							x	x
	A6.1	x	x			x			x	x				x		
	A10.1		x	x	x	x						x	x			
B-Level	B2.1		x				x			x		x				
	B3.1	x								x					x	x
	B4.1						x			x				x	x	
C-Level	C6.1		x			x									x	x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, B4.1
2	Practical Examination	A6.1, B3.1, C6.1
3	Oral Examination	A1.1, A1.2, A6.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A1.2, A2.1, A6.1, A10.1, B2.1, B4.1 C6.1
5	Final Term Examination (written)	A1.1, A1.2, A2.1, A6.1, B2.1, B4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Alan, V. Oppenheim, W. Schafer Ronald, and R. B. John. "Discrete-time signal processing." 3rd edition, New Jersey, Printice Hall Inc (2010).
2	Allen B. Downey, Think DSP: Digital Signal Processing in Python, OREILLY, Aug 4, 2016
3	Proakis, John G; Manolakis, Dimitris G; “Digital Signal Processing: Principles, Algorithms, And Applications”, 4/E, Pearsons education (2007)

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No	Topics	aim	LO's
1	**Lectures:** • Introduction to the applications and use cases of digital signal processing **Labs/Tutorials:** • Learn to use the corresponding MATLAB functions and Performing simple signal read/write, generation, and plot.	1	A6.1, A10.1
2	**Lectures:** • Review of the basic concepts of discrete-time Signals and systems. Signal classification, common discrete-time signals. System properties and classification. • Linear Time Invariant (LTI) systems. LTI system characterization. Impulse response, difference equation, Frequency response. • Discrete-time Fourier transform (DTFT). **Labs/Tutorials:** • Use MATLAB to evaluate and characterize discrete-time systems using the impulse response and frequency response. • Use MATLAB to plot the frequency response of signals using DTFT	1	A1.1, A1.2, B3.1, C6.1
3	**Lectures:** • Definition of Z-transform, Properties of Z-transform, Z-transform and LTI system, Inverse Z-transform **Labs/Tutorials:** • Solve problems on computing the Z-transform and inverse z-transform.	1	A1.1,
4	**Lectures:** • Periodic sampling of continuous-time signals. Frequency domain representation of Sampling. Reconstruction of continuous-time signals. Discrete-	1	A2.1, B4.1, C6.1

	time processing of continuous-time signals. **Labs/Tutorials:** - Practice problems on the sampling theorem. - Simulate periodic sampling of audio signals using MATLAB		
5	**Lectures:** - Frequency response Analysis of LTI systems. Relationship between poles/zeros and frequency response. All-pass and minimum phase systems. **Labs/Tutorials:** - Use MATLAB to analyze digital filters. Plot poles/zeros diagram and frequency response and study the relationship between them.	1	A1.1, A1.2, A2.1, B2.1, B3.1, C6.1
6	- Midterm	1	
7	**Lectures:** - Block diagram and signal flow graph realization of LTI systems. Basic structure for IIR filters (Direct-cascade-parallel). Overview of finite-precision numerical effects. **Labs/Tutorials:** Practice different realization of discrete-time systems	1	A2.1, A6.1, B2.1, B3.1
8	**Lectures:** - Design of discrete-time IIR filters from continuous-time filters using impulse invariance and bilinear transformation. Design of FIR filters by windowing **Labs/Tutorials:** - Practice IIR and FIR digital filter design from specification using MATLAB.	1	A2.1, A6.1, B2.1, B3.1, C6.1
9	**Lectures:** - The Discrete-time Fourier (DFT) transform. Properties of DFT. Linear convolution using DFT. Efficient computation of the DFT using FFT. Decimation in time and Decimation in frequency FFT algorithms. **Labs/Tutorials:** - Use MATLAB to compute the DFT of discrete-time signals. Compare the DFT and DTFT transforms of signals. Compute the computational savings of FFT algorithms.	1	A1.2, A10.1, C6.1
10	**General Revision and Project Submission and Discussion**	1	A6.1, A10.1

Course: Digital Signal Processing	
Program LOs	**Course LOs**
A1- Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1.Utilize the appropriate system mathematical description for different system needs. A1.2. Select the appropriate mathematical and numerical model for computing the frequency domain transform of discrete-time signals among (DTFT, DFT, FFT)
A2- 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.	A2.1 Assess the characteristics and performance of digital filters to satisfy a certain function.
A6- Plan, supervise and monitor implementation of engineering projects.	A6.1. Apply DSP in various signal analysis applications.
A10- Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1. Present new trends in Digital signal processing applications
B2- Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1. Realize discrete-time filters based on the specification.
B3- Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Design discrete-time signal processing systems using computer software and DSP hardware.
B4- Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1. Evaluate the performance effect of various sampling parameters.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1. Use MATLAB programming tools to design discrete-time system.

Course Coordinator: Dr. Mohamed Farouk Abdelkader

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE313		
Year/ Level	Third year- Second term		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
9	Model, analyze, design and build photonic, microwave components, networks and systems.

3. Learning Outcomes (LOs):

A1-1	Identify the required knowledge and understanding of concepts and theories of mathematics and sciences, appropriate to Microwave engineering.
A1-2	Recognize concepts, principles and theories of microwave propagation modes in waveguides.
A6-1	Plan the principle of design of the components and devices that are used in microwave engineering.
A6-2	Monitor transverse electromagnetic transmission lines.
A6-3	Plan after description of the Scattering matrix formulation for Microwave circuits and power transmitted calculation in a coaxial line.
A10-1	Apply cavity resonators types in design .
A10-2	Practice power dividers and directional couplers in microwave networks.
B2-1	Model the appropriate mathematical functions as the suitable solution for cylindrical waveguides and Microwave Cavity Resonators.
B4-1	Measure the performance of integrated microwave components to build a microwave system.
C3-1	Design problem solving scenarios to raise the ability in the completion of their homework assignments and examinations related to microwave devices .
C3-2	Compare between the suitable modes for the different Microwave components and devices based on analysis.
C7-1	Use the communications laboratory equipment to demonstrate the characteristics of microwave components.
C7-2	Prepare technical reports about the physical description of microwave components.
C7-3	Use the WEB to get the desired information about modern microwave systems.
C7-4	Refer to Microwave Engineering handbooks.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Introduction to Microwave Engineering. - Transverse electric modes in Rectangular waveguides. **Labs:** • Demonstrate problem solving ability in the completion of their homework assignments.	1- 2
2	**Lectures:** - Transverse magnetic modes in rectangular waveguides. - Power in rectangular waveguides. **Labs/Tutorials:** • Introduction to microwave systems. • Demonstrate problem solving ability in the completion of their homework assignments.	3-4
3	**Lectures:** - Cylindrical waveguides. - Transverse electric and transverse magnetic cylindrical waveguides. **Labs/Tutorials:** • Microwave components. • Demonstrate problem solving ability in the completion of their homework assignments.	5-7
4	**Mid-Term Exam**	8
5	**Lectures:** - Transverse electromagnetic transmission lines. - Power transmitted in a coaxial line. - Scattering matrix formulation for Microwave circuits. **Labs/Tutorials:** • Microwave components. Demonstrate problem solving ability in the completion of their homework assignments.	9
6	- Scattering matrix formulation for Microwave circuits. **Tutorials:** • Demonstrate problem solving ability in the completion of their homework assignments.	10
7	**Lectures:** - Passive Microwave devices. - Transverse Electric Microwave Cavity Resonators. - Transverse Magnetic Microwave Cavity Resonators. **Labs/Tutorials:** • Microwave components. • Demonstrate problem solving ability in the completion of their homework assignments.	11- 13

8	**Lectures:** **- Power dividers.** **- Directional couplers.** **Labs/Tutorials:** **• Microwave components** **• Demonstrate problem solving ability in the completion of their homework assignments.** **Lab test.**	14- 15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture(online/ in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x	x				x	x								x
	A1-2	x	x			x			x	x						
	A6-1	x	x			x	x	x		x						
	A6-2															x
	A6-3	x	x			x			x	x						
	A10-1	x	x			x			x	x						
	A10-2															x
B-Level	**B2-1**		x				x			x		x				
	B4-1						x			x						x
C-Level	**C3-1**		x			x			x							
	C3-2		x							x						x
	C7-1		x							x						
	C7-2	x	x			x			x	x						
	C7-3	x	x			x			x	x						
	C7-4	x	x			x			x	x						

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, A1-2, C3-1, C7-2, C7-3, C7-4
2	Practical Examination	A10-1, A10-2, B2-1, B4-1, C7-1, C7-2, C7-3
3	Oral Examination	A6-1, A6-2, A6-3
4	Formative (quizzes- online quizzes- presentation - reports)	A6-1, A6-2, A6-3, B4-1, C7-1, C7-2
5	Final Term Examination (written)	A10-1, A10-2, C3-1, C3-2, C7-1, C7-2, C7-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	David M. Pozar, "Microwave Engineering", 4 th edition, Wiley, 2012.
2	Robert E. Collin, "Foundations for Microwave Engineering", 2nd edition, Wiley-IEEE Press, 2001.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** **- Introduction to Microwave Engineering.** **- Transverse electric modes in Rectangular waveguides.** **Labs:** **• Demonstrate problem solving ability in the completion of their homework assignments.**	9	A1-1, A1-2, B2-1,C3-2, C7-1,C7-4
2	**Lectures:** **- Transverse magnetic modes in rectangular waveguides.** **- Power in rectangular waveguides.** **Labs/Tutorials:** **• Introduction to microwave systems.** **• Demonstrate problem solving ability in the completion of their homework assignments**	9	A1-1, A1-2, B2-1,C3-1, C3-2, C7-1,C7-4
3	**Lectures:** **- Cylindrical waveguides.** **- Transverse electric and transverse magnetic cylindrical waveguides.** **Labs/Tutorials:** **• Microwave components.** **• Demonstrate problem solving ability in the completion of their homework assignments**	9	A1-1, A1-2, B2-1,C3-2, C7-1,C7-4

4	- **Mid-Term Exam**	9	C3-1, C7-2, C7-3, C7-4
5	**Lectures:** - **Transverse electromagnetic transmission lines.** - **Power transmitted in a coaxial line.** - **Scattering matrix formulation for Microwave circuits.** **Labs/Tutorials:** • **Microwave components.** • **Demonstrate problem solving ability in the completion of their homework assignments**	9	A6-1, A6-2, A6-3, B4-1, C7-1, C7-2
6	**Lectures:** - **Scattering matrix formulation for Microwave circuits.** **Tutorials:** • **Demonstrate problem solving ability in the completion of their homework assignments**	9	A6-1, A6-2, A6-3, B4-1
7	**Lectures:** - **Passive Microwave devices.** - **Transverse Electric Microwave Cavity Resonators.** - **Transverse Magnetic Microwave Cavity Resonators.** **Labs/Tutorials:** • **Microwave components.** **Demonstrate problem solving ability in the completion of their homework assignments**	9	A10-1, A10-2, C7-1, C7-2
8	**Lectures:** - **Power dividers.** - **Directional couplers.** **Labs/Tutorials:** • **Microwave components** • **Demonstrate problem solving ability in the completion of their homework assignments** • **Lab test.**	9	A10-1, A10-2, C7-1, C7-2, C7-3

Course: Microwave Engineering	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the required knowledge and understanding of concepts and theories of mathematics and sciences appropriate to Microwave engineering. A1.2 Recognize concepts, principles and theories of microwave propagation modes in waveguides.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6-1 Plan the principle of design of the components and devices that are used in microwave engineering. A6-2 Monitor transverse electromagnetic transmission lines. A6-3 Plan after description of the Scattering matrix formulation for Microwave circuits and power transmitted calculation in a coaxial line.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Apply cavity resonators types in design . A10-2 Practice power dividers and directional couplers in microwave networks.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Model the appropriate mathematical functions as the suitable solution for cylindrical waveguides and Microwave Cavity Resonators.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4-1 Measure the performance of integrated microwave components to build a microwave system.

C3. Design and compare between alternative components and systems in Electronics and Communications Engineering	C3-1 Design problem solving scenarios to raise the ability in the completion of their homework assignments and examinations related to microwave devices . C3-2 Compare between the suitable modes for the different Microwave components and devices based on analysis.
C7: Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems	C7-1 Use the communications laboratory equipment to demonstrate the characteristics of microwave components. C7-2 Prepare technical reports about the physical description of microwave components. C7-3 Use the WEB to get the desired information about modern microwave systems. C7-4 Refer to Microwave Engineering handbooks.

Course Coordinator: Dr. Heba Youssef Soliman

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE314		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
8	Design, operate and maintain digital and analog communication systems using different modulation techniques.

3. Learning Outcomes (LOs):

A1-1	Identify the concepts of digital radio, digital transmission, and the different types of modulation techniques.
A2-1	Conduct sufficient knowledge to analyze the performance of digital communication systems including bandwidth efficiency, the probability of error and bit error rate.
A6-1	Design project of different types of modulation techniques.
A10-1	Apply adaptive modulation in the new technology
B2-1	Design the suitable digital modulation technique according to the available bandwidth and bit rate and error detection and correction methods
B3-1	Analyze the performance of digital modulation techniques and matched filter and Multiple access techniques
B4-1	Estimate digital communication parameters in lab assignments.
C6-1	Carry out problem solving ability in the completion of their homework assignments and examinations related to digital modulators, demodulators and matched filters.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** **Digital communication systems** Introduction and comparison between analog and digital communication systems. Difference between digital radio and digital transmission, Digital modulation techniques, frequency shift keying (FSK), FSK transmitter and receiver, Bandwidth of FSK Advantages and disadvantages of FSK, Minimum shift keying (MSK) **Lab:** • Design FSK transmitter and receiver	1, 2
2	**Lecture:** **binary phase shift keying and M ARY :** binary phase shift keying (BPSK) transmitter and receiver, Bandwidth of BPSK - M ARY - transmitter and reciver of quadrature phase shift keying (QPSK), 8PSK and 16PSK, Constellation and Phasor diagrama, Advantages and disadvantages **Computer Lab / Lab** • Design BPSK, QPSK, 8PSK and 16PSK transmitter and receiver.	3, 4
3	**Lecture:** **Performance analysis of digital communication systems** QAM transmitter and receiver, 8QAM , 16 QAM ,bandwidth of them , Constellation and Phasor diagram, Bandwidth efficiency, probability of error and bit error rate, Clock Recovery . **Lab:** • Design QAM, 8QAM , 16QAM transmitter and receiver	5, 6
4	.Matched filters .Multiple access techniques.	7

5	Midterm	8
6	**Lecture:** **Line coding-multiplexer:** Inter-symbol interference (ISI) – Dynamic Range (DR), Coding Efficiency, Signal to Quantization Noise Ratio (SQR), Effect of Non-Linear Coding, Analog Companding, μ-law, A-law, digital Companding, Digital Compression Error **F scrambling - Digital reception and regenerative repeaters-Sampling theory** Quantization and encoding of a sampled signal Round-off error, Overload error, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Delta Modulation. **Lab:** Use the Analog Electronic kit and lab facilities to build blocks of pulse code modulation.	9-11
7	**Lecture:** **Detection of error and correction methods** Types of Errors, error detection, Error correction, Repetition schemes parity check, Longitudinal Redundancy Checks (LRC), Vertical Redundancy Checks (VRC), Checksum, Cyclic redundancy check CRC, Forward error correction Convolutional encoder, Reed-Solomon block-codes. **Electronic Lab:** • Use the Analog Electronic kit and lab facilities to build different error detection encoders.	12-14
8	**General Revision and Project Submission and Discussion.**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (In class / Online)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
	A1.1	x					x	x							x	x
	A2.1	x		x		x				x						
	A6.1	x		x												x
	A10.1	x		x		x	x	x		x						
	B2.1	x	x				x			x		x			x	x
	B3.1	x	x													
	B4.1	x	x				x			x					x	x
	C6.1	x			x	x										

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A2.1, A6.1, B4.1, C6.1
2	Practical Examination	B2.1, B3.1, B4.1, C6.1
3	Oral Examination	A1.1, A6.1
4	Formative (quizzes- online quizzes- presentation - reports)	A1.1, A2.1, A6.1, A10.1, B2.1, B3.1
5	Final Term Examination (written)	A1.1, A2.1, A6.1, A10.1, B2.1, B3.1, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Simon Haykin, "Communications Theory and Systems", 4th edition, Wiely, 2001.
2	Simon Haykin, Digital Communication Systems, John Wiley & Sons, 2013.
3	Marvin K. Simon and Mohamed-Slim Alouini, "Digital Communications over Fading channels", 2nd edition, Wiley-IEEE Press, Dec 2004.
4	Wayne Tomasi, Advanced Electronic Communications Systems, Sixth Edition, Pearson; , (April 20, 2003).

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Online Facilities
3	Lab Facilities
4	White Board
5	Data Show System
6	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** **Digital communication systems** Introduction and comparison between analog and digital communication systems. Difference between digital radio and digital transmission, Digital modulation techniques, frequency shift keying (FSK), FSK transmitter and receiver, Bandwidth of FSK Advantages and disadvantages of FSK, Minimum shift keying (MSK) **Lab:** - Design FSK transmitter and receiver	8	A1.1
2	**Lecture:** **binary phase shift keying and M ARY:** binary phase shift keying (BPSK) transmitter and receiver, Bandwidth of BPSK - M ARY - transmitter and reciver of quadrature phase shift keying (QPSK), 8PSK and 16PSK, Constellation and Phasor diagrama, Advantages and disadvantages **Computer Lab / Lab** - Design BPSK, QPSK, 8PSK and 16PSK transmitter and receiver.	8	A2.1
3	**Lecture:** **Performance analysis of digital communication systems** QAM transmitter and receiver, 8QAM , 16 QAM ,bandwidth of them , Constellation and Phasor diagram, Bandwidth efficiency, probability of error and bit error rate, Clock Recovery . **Lab:** - Design QAM, 8QAM , 16QAM transmitter and receiver	8	A6.1, B4.1, C6.1

4	.Matched filters .Multiple access techniques.	8	A10.1, B4.1, C6.1
5	- Midterm	8	A1.1, A2.1, A10.1, B4.1, C6.1
6	**Lecture:** **Line coding-multiplexer:** Inter-symbol interference (ISI) – Dynamic Range (DR), Coding Efficiency, Signal to Quantization Noise Ratio (SQR), Effect of Non-Linear Coding, Analog Companding, μ-law, A-law, digital Companding, Digital Compression Error **F scrambling - Digital reception and regenerative repeaters-Sampling theory** Quantization and encoding of a sampled signal Round-off error, Overload error, Pulse Amplitude Modulation, Pulse Width Modulation, Pulse Position Modulation, Pulse Code Modulation, Delta Modulation. **Lab:** • Use the Analog Electronic kit and lab facilities to build blocks of pulse code modulation .	8	A1.1, A2.1, B2.1, C6.1
7	**Lecture:** **Detection of error and correction methods** Types of Errors, error detection, Error correction, Repetition schemes parity check, Longitudinal Redundancy Checks (LRC), Vertical Redundancy Checks(VRC), Checksum, Cyclic redundancy check CRC, Forward error correction Convolutional encoder, Reed-Solomon block-codes. **Electronic Lab:** Use the Analog Electronic kit and lab facilities to build different error detection encoders.	8	A6.1, A10.1, B2.1, B3.1, C6.1
8	**General Revision and Project Submission and Discussion.**	8	B3.1, C6.1

Course: Digital Communications	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Identify the concepts of digital radio, digital transmission, and the different types of modulation techniques.
A2. 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.	A2.1 Conduct sufficient knowledge to analyze the performance of digital communication systems including bandwidth efficiency, the probability of error and bit error rate.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Design project of different types of modulation techniques.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply adaptive modulation in the new technology
B2. Design, model and analyze an electrical /electronic/ digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Design the suitable digital modulation technique according to the available bandwidth and bit rate and error detection and correction methods.
B3. Design and implement elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Analyze the performance of digital modulation techniques and matched filter and Multiple access techniques
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Estimate digital communication parameters in lab assignments.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed	C6.1 Carry out problem solving ability in the completion of their homework assignments and examinations related to digital modulators, demodulators and matched filters.

(embedded) systems.	

Course Coordinator: Dr. Heba M. Abdel-Atty

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE315		
Year/ Level	Third year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
8	Recognize and analyze different satellite communication and navigation systems.

3. Learning Outcomes (LOs):

A1.1	Demonstrate understanding of Kepler's law.
A1.2	Demonstrate understanding of satellite communication systems and models.
A1.3	Demonstrate knowledge of GNSSs and their operation
A3.1	Apply knowledge of satellite link budget analysis.
B2.1	Analyze the link budget of satellite communication systems.
B2.2	Analyze the performance of satellite communication systems.
C1.1	Analyze the problems concerning radio navigation systems using the appropriate mathematical tools.
C7.1	Demonstrate abilities related to analyzing GNSSs.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Introduction to satellite communication Systems - Kepler's laws - Satellite orbital patterns. **Tutorials:** - Practice problems on Kepler's laws - Satellite orbital patterns.	1-2
2	**Lectures:** - The Geo-stationary (GEO) orbit – Look angles - spacing and frequency allocation **Tutorials:** - Practice problems on The Geo-stationary (GEO) orbit – Look angles - spacing and frequency allocation	3-4
3	**Lectures:** - System noise – Bit-error-rate - link budget analysis. **Tutorials:** - Practice problems on System noise – Bit-error-rate - link budget analysis.	5-6
4	**Lectures:** - Spacecraft and satellite subsystems **Tutorials:** - Discuss Spacecraft and satellite subsystems	7
5	**Midterm**	8
6	**Lectures:** - Multiple access.	9
7	**Lectures:** - Introduction to radio navigation systems + Satellite Navigation Systems. **Tutorials:** - Discuss Satellite Navigation Systems	10-12
8	**Lectures:** - Pseudo-ranges, ranging, Dilution-of-precision. **Tutorials:** - Practice problems on Pseudo-ranges + Dilution-of-precision.	13-15

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	A1-2	x			x		x	x							x	
	A1-3	x			x		x	x							x	
	A3-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
C-Level	**C1-1**	x			x		x	x								
	C7-1	x			x		x	x		x		x				

6. Teaching and Learning Methods for Disabled Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, A1-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A1-2, A1-3, A3-1, B2-1, B2-2, C1-1, C7-1
3	Final Term Examination (written)	A1-1, A1-2, A1-3, B2-1, B2-2, C1-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Advanced Electronic Communications Systems (6th Edition) by Wayne Tomasi Publisher: Pearson; (April 20, 2003), ISBN-13: 978-0130453501
2	Global Positioning System: Signals, Measurements, and Performance, Revised Second Edition (2011), By Pratap Misra and Per Enge, ISBN 0-9709544-1-7

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Introduction to satellite communication Systems - Kepler's laws - Satellite orbital patterns. **Tutorials:** • Practice problems on Kepler's laws - Satellite orbital patterns.	8	A1.1, A1.2, B2.2,
2	**Lectures:** • The Geo-stationary (GEO) orbit – Look angles - spacing and frequency allocation **Tutorials:** • Practice problems on The Geo-stationary (GEO) orbit – Look angles - spacing and frequency allocation	8	A1.2, B2.2,
3	**Lectures:** • System noise – Bit-error-rate - link budget analysis. **Tutorials:** • Practice problems on System noise – Bit-error-rate - link budget analysis.	8	A3.1, B2.1, B2.2,
4	**Lectures:** • Spacecraft and satellite subsystems **Tutorials:** • Discuss Spacecraft and satellite subsystems	8	A1.2,
5	**Midterm**	8	A1-1, A1-2, B2-1, B2-2, C1-1
6	**Lectures:** • Multiple access.	8	A1.2,
7	**Lectures:** • Introduction to radio navigation systems + Satellite Navigation Systems. **Tutorials:** • Discuss Satellite Navigation Systems	8	A1.3,

8	**Lectures:** - Pseudo-ranges, ranging, Dilution-of-precision. **Tutorials:** - Practice problems on Pseudo-ranges + Dilution-of-precision.	8	A1.3, B2.1, C1.1, C7-1

Course: Satellite Communications and Navigation Systems	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Demonstrate understanding of Kepler's law. A1.2 Demonstrate understanding of satellite communication systems and models. A1.3 Demonstrate knowledge of GNSSs and their operation
A3. 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.	A3.1 Apply knowledge of satellite link budget analysis.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Analyze the link budget of satellite communication systems. B2.2 Analyze the performance of satellite communication systems.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1.1 Analyze the problems concerning radio navigation systems using the appropriate mathematical tools.
C7. Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks	C7.1 Demonstrate abilities related to analyzing GNSSs.

Course Coordinator: Dr. Sherif Abuelenin

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE316		
Year/ Level	Third year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	**Aim**
9	Model, analyze, design and build photonic devices, optical transmitter, receiver and amplifiers.

3. Learning Outcomes (LOs):

A1.1	Recognize the concepts and theories of mathematics and semiconductor physics necessary for understanding the photonic devices
A1.2	Describe the characteristics of the semiconductor materials used in optoelectronic devices.
A1.3	Describe the physics and the operation principles of operation and modeling of Heterojunction high intensity LEDs and laser.
A3.1	Select appropriate mathematical procedures to solve problems related to optoelectronics.
B2.1	Evaluate the characteristics and performance of LED and Laser devices
B2.2	Combine different ideas, views, and knowledge from a range of sources to design a certain optoelectronics application.
C1.1	Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve analysis and design problems related to Optoelectronics.
C7.1	Merge the engineering knowledge, understanding, and feedback to improve Optoelectronics system design.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - Photonic semiconductor devices physics - Stimulated and Emission phenomena - Wave and particle nature of light.	1-3
2	**Lectures:** - Physics, operation, materials, and modeling of semiconductor light emitting diodes - heterojunction high intensity LEDs.	4-5
3	**Lectures:** - Physics, operation, materials, and modeling of semiconductor Laser.	6-7
4	**Midterm**	8
5	**Lectures:** - Transmitter modules – photodetectors**.**	9-11
6	**Lectures:** - Photovoltaic devices – receiver units - semiconductor optical amplifier – fiber-doped amplifier.	12-14
7	- **General Revision and Project Submission and Discussion.**	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	A1-2	x			x		x	x							x	
	A1-3	x			x		x	x							x	
	A3-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
C-Level	**C1-1**	x			x		x	x								
	C7-1	x			x		x	x		x		x				

6. Teaching and Learning Methods for Disabled Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, A1-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A1-2, A1-3, A3-1, B2-1, B2-2, C1-1, C7-1
3	Final Term Examination (written)	A1-1, A1-2, A1-3, B2-1, B2-2, C1-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	R. Jaaniso and O. K. Tan, Semiconductor Gas Sensors, First Edition, Woodhead Publishing. 2013.
2	A. Yariv, Photonics: Optical Electronics in Modern Communications, Sixth Edition, OU, 2007.
3	J. M. Senior, Optical Fiber Communications: Principles and Practice, Prentice-Hall, Third Edition, 2009.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** • Photonic semiconductor devices physics - Stimulated and Emission phenomena - Wave and particle nature of light.	9	A1.1, A1.2, B2.2,
2	**Lectures:** • Physics, operation, materials, and modeling of semiconductor light emitting diodes - heterojunction high intensity LEDs.	9	A1.2, B2.2,
3	**Lectures:** • Physics, operation, materials, and modeling of semiconductor Laser.	9	A3.1, B2.1, B2.2,
4	**Midterm**	9	A1-1, A1-2, B2-1, B2-2, C1-1
5	**Lectures:** • Transmitter modules – photodetectors**.**	9	A1-1, A1-2, B2-1, B2-2, C1-1
6	**Lectures:** • Photovoltaic devices – receiver units - semiconductor optical amplifier – fiber-doped amplifier.	9	A1.1, A1.2, A1.3, B2.2
7	• **General Revision and Project Submission and Discussion.**	9	A1-1, A1-2, A1.3, B2-1, B2-2, C1-1, C7-1

Course: Optical Electronics	
Program Los	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Recognize the concepts and theories of mathematics and semiconductor physics necessary for understanding the photonic devices A1.2 Describe the characteristics of the semiconductor materials used in optoelectronic devices. A1.3 Describe the physics and the operation principles of operation and modeling of Heterojunction high intensity LEDs and laser.
A3. 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.	A3.1 Select appropriate mathematical procedures to solve problems related to optoelectronics.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Evaluate the characteristics and performance of LED and Laser devices B2.2 Combine different ideas, views, and knowledge from a range of sources to design a certain optoelectronics application.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1.1 Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve analysis and design problems related to

	Optoelectronics.
C7. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems.	C7.1 Merge the engineering knowledge, understanding, and feedback to improve Optoelectronics system design.

Course Coordinator: Dr. Rania Abdallah

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE317		
Year/ Level	Third year - Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
1	Apply knowledge of mathematics, basic sciences and engineering principles to solve, analysis, and interpret data related to Nanoelectronic devices.

3. Learning Outcomes (LOs):

A1.1	Demonstrate understanding of Nano devices.
A3-2	Describe the basic fabrication steps of the Nano devices.
A3-2	Identify the basic scaling issues of the conventional MOSFET transistor.
B2-1	Analyze circuits containing basic Nano devices.
B2-2	Discuss the limitations of the basic Nano devices.
C1-1	Analyze the problems concerning the basic limitations of the current CMOS technology.
C7-1	Evaluate the Nano devices according to the required application.

4. Course Contents:

No.	Topic	Week
1	Introduction to semiconductor device scaling and ultra-short channel effects in CMOS technology.	**Weeks 1-3**
2	Physics, modeling, and applications of resonant-tunneling diodes.	**Weeks 4-7**
3	Midterm	**Week 8**
4	Physics, modeling, and applications of single-electron transistors.	**Week 9-10**
5	Physics, modeling, and applications of quantum dots.	**Week 11-12**
6	Physics, modeling, and applications of memristors.	**Weeks 13- 15**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (class/online)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	x			x		x	x								
	A3-1	x			x		x	x								
	A3-2		x					x			x	x				
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
C-Level	**C1-1**	x			x		x	x								
	C7-1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A1-1, A3-1, A3-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A3-1, A3-2, B2-1, B2-2, C1-1, C7-1
3	Final Term Examination (written)	A1-1, A3-1, A3-2, B2-1, B2-2, C1-1, C7-1,

7.2 Assessment Schedule:

No.	**Assessment Method**	**Weeks**
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	16
2	Formative (quizzes- online quizzes- presentation - reports)	16
4	Final Term Examination (written)	68
Total		100%

8. List of References

No.	**Reference List**
1	Neil H. E. Weste, David Money Harris, CMOS VLSI Design: A Circuits and Systems Perspective, Fourth Edition, Addison-Wesley, Page: 75, 2011.
2	N. Arora, MOSFET Modeling for VLSI Simulation: Theory and Practice, World Scientific, 2007.
3	Thomas Dillinger, VLSI Design Methodology Development, Prentice Hall, 2019.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LOs
Weeks 1-3	Introduction to semiconductor device scaling and ultra-short channel effects in CMOS technology.	1	A1-1, A3-1, B2-1, B2-2
Weeks 4-7	Physics, modeling, and applications of resonant-tunneling diodes.	1	A1-1, A3-2, C1-1, C7-1
Week 8	Midterm Exam and starting of The project	A3-1, A3-2, B2-1, B2-2, C1-1, C7-1	
Week 9-10	Physics, modeling, and applications of single-electron transistors.	1	A1-1, A3-1, A3-2, B2-1, B2-2, C1-1
Week 11-12	Physics, modeling, and applications of quantum dots.	1	A1-1, A3-1, C1-1, C7-1
Weeks 13- 15	Physics, modeling, and applications of memristors.	1	B2-1, B2-2, C1-1, C7-1

Course: Nano Devices	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Demonstrate understanding of Nano devices.
A3. 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.	A3-1 Describe the basic fabrication steps of the Nano devices. A3-2 Identify the basic scaling issues of the conventional MOSFET transistor.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze circuits containing basic Nano devices. B2-2 Discuss the limitations of the basic Nano devices.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1-1 Analyze the problems concerning the basic limitations of the current CMOS technology.
C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7-1 Evaluate the Nano devices according to the required application.

Course Coordinator: Dr. Sherif M. Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE315		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	-	-	2

2. Course aims:

No.	aim
1	Apply knowledge of engineering concepts and analytical, critical, and abilities to deal with the fundamentals of Routing process in computer networks and their protocols, standards and applications.

3. Learning Outcomes (LOs):

A2.1	Evaluate the characteristics and performance of the computer network components.
A4.1	Apply safe systems at work and observe the appropriate steps to manage risk in computer networks.
A10.1	Apply knowledge of network to analyze the network performance
B4.1	Design innovative solutions for problems of advanced wireless network models.
B5.1	Design and perform simulation for different wireless network topologies.
C6.1	Integrate economic, social and environmental aspects in network design projects.

4. Course Contents:

No.	Topics	Week
1	**Labs/Tutorials:** - Identify the functions, types, and technical specifications of all network components (Server, client computers, cables, switches, routers, etc.) inside the lab and write a report - Anatomy of routers and its function as a routing device.	1-2
2	**Labs/Tutorials:** - Configuring a router with static and default routes topology using the key network routing protocols, and GUI and CLI.	3-4
3	**Labs/Tutorials:** - Use the basic characteristics of RIP routing protocol to configure a router with dynamic routing.	5-6
4	**Labs/Tutorials:** - Troubleshooting networks configured with RIP Routing Protocol.	7
5	Midterm	8
6	**Labs/Tutorials:** -Use the basic characteristics of EIGRP routing protocol to configure a router with dynamic routing - Troubleshooting networks configured with EIGRP Routing Protocol.	9-11
7	**Labs/Tutorials:** - Using a network simulator simulate and Evaluate different routing protocols on more complex network topologies.	12-13
8	**Labs/Tutorials:** - Apply the configuring dynamic routing with RIP on more complex network topologies.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1					X	X						X		X	X
	A4.1					X	X						X		X	X
	A10.1									X		X	X			X
B-Level	B4.1					X	X								X	X
	B5.1					X				X		X			X	X
C-Level	C6.1									X		x			X	X

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Practical Examination	A2.1, A4.1,A10.1, B4.1, B5.1,C6.1
2	Oral Examination	A4.1
3	Formative (Project- quizzes- online quizzes- reports)	A2.1, A4.1,A10.1, B4.1, B5.1,C6.1
4	Final Term Examination (written)	A2.1, A10.1, B4.1, B5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Practical/ Oral Examination	15
2	Formative (Project- quizzes- online quizzes-reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Practical/ Oral Examination	25
2	Formative (presentation, Projects, reports, discussions)	25
3	Final Term Examination (written)	50
Total		100%

8. List of References

No.	Reference List
1	Fayez Gebali, Analysis of Computer Networks 2nd ed. Springer International Publishing, 2015.
2	Todd Lammle, CCNA Electronic Book, 6th ed, Wiley Publishing, Inc., 2007.
3	**Web sites**: https://www.netacad.com

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lab with whiteboard and projection display facilities, and computational facilities.
2	Networking switches, routers, connecting cables, simulation software, high efficiency desktop computers, and network testing equipment.
3	Laboratory Usage.
4	Library Usage.

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Labs/Tutorials:** - Identify the functions, types, and technical specifications of all network components (Server, client computers, cables, switches, routers, etc.) inside the lab and write a report - Anatomy of routers and its function as a routing device.	1	A2.1
2	**Labs/Tutorials:** - Configuring a router with static and default routes topology using the key network routing protocols, and GUI and CLI.	1	A2.1, A4.1, A10.1, B5.1,C6.1
3	**Labs/Tutorials:** -Use the basic characteristics of RIP routing protocol to configure a router with dynamic routing.	1	A2.1, A4.1, B4.1,C6.1
4	**Labs/Tutorials:** - Troubleshooting networks configured with RIP Routing Protocol.	1	A2.1, B4.1, B5.1,C6.1,
5	Midterm	1	---------
6	**Labs/Tutorials:** - Use the basic characteristics of EIGRP routing protocol to configure a router with dynamic routing - Troubleshooting networks configured with EIGRP Routing Protocol.	1	A2.1,A4.1, B4.1, B5.1,C6.1
7	**Labs/Tutorials:** - Using a network simulator simulates and Evaluate different routing protocols on more complex network topologies.	1	A2.1,A10.1, B4.1, B5.1,C6.1
8	**Labs/Tutorials:** - Apply the configuring dynamic routing with RIP on more complex network topologies.	1	A2.1, B4.1, B5.1,C6.1
	Labs/Tutorials: • Project	1	A2.1, A4.1,A10.1, B4.1, B5.1,C6.1
	Labs/Tutorials: • Revision	1	A2.1, A4.1, B4.1, B5.1,C6.1

Course: Computer Networks Laboratory	
Program LOs	**Course LOs**
A2.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.	A2.1 Evaluate the characteristics and performance of the computer network components.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Apply safe systems at work and observe the appropriate steps to manage risk in computer networks.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply knowledge of network to analyze the network performance
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Design innovative solutions for problems of advanced wireless network models.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 Design and perform simulation for different wireless network topologies.
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Integrate economic, social and environmental aspects in network design projects.

Course Coordinator: Prof. Dr. Rawya Y. Rizk

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE318		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
7	Apply control theory, modeling of dynamic systems and analysis of control systems in time and frequency domains.

3. Learning Outcomes (LOs):

A1.1	Recognize the essential concepts and theorems of automatic control system and dynamic system components.
A1.2	Illustrate the essential concepts and theorems of the complex mathematics and theorems to analyze and model of control systems.
A1.3	Discuss transient and steady state of control time response of system first order, second order, and higher order systems.
A1.4	Illustrate the essential concepts to draw and analysis the frequency response of the control systems using Polar plot, Bode diagram and Nyquist stability criterion.
A2.1	Demonstrate the knowledge of electro-mechanical control systems modeling and position control as an application.
A2.2	Demonstrate the knowledge of using Routh-Hurwitz and Root locus plot stability criterion to analyze the stability of the control systems.
A2.3	Demonstrate the knowledge and understanding the principles of design including elements, process and systems related to control system.
A2.4	Select appropriate block diagram reduction rules to get the system overall transfer function.
A2.5	Select appropriate criterion to analyze the control system stability based on analytical thinking.
A4.1	Write technical reports and conduct presentation in the most recent automatic control systems topics.
B2.1	Apply the transfer function principle to model electrical, mechanical and electromechanical systems.
B2.2	Apply block diagram algebra and Mason's formula to get the T.F from block diagrams and signal flow graph respectively.
B2.3	Apply Laplace transformation and inverse Laplace transformation to assess the system T. F and transient response.

B2.4	Apply inverse Laplace transformation to discuss the transient response.
B4.1	Effectively manage tasks, time and resources during solving exams and quizzes.
C6.1	Apply MATLAB control toolboxes to analyze problems related to control systems.
C6.2	Use MATLAB toolboxes in modeling and analyzing control systems in time and frequency domains.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction to automatic control system theory: Feedback concept – systems classification– dynamic system components. **Labs/Tutorials:** • Install MATLAB Program	1
2	**Lectures:** • Definition and mathematical review of: Differential equations- Laplace transform - Transfer Function - Block diagram algebra - signal flow graph and Mason gain formula. **Labs/Tutorials:** • Overview of the MATLAB tool boxes related to control system analysis and design. • Solving problems related to lecture topics.	٢
3	**Lectures:** • Modeling of electro-mechanical systems - DC machine speed and position control as an application. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	3-4
4	**Lectures:** • Time response (Transient and Steady state) of control system: first order – second order – Time response of higher order systems - steady state error and system accuracy analysis. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	5-6
5	**Lectures:** • Control system stability: Definition and terminologies – Routh-Hurwitz stability criterion - Root locus plot drawing and analysis. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	7
6	**Midterm**	8

8	**Lectures:** • Control system frequency response: Definition and terminologies – Polar plot – Bode diagram – Nyquist stability criterion **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	9-12
9	**Lectures:** • Compensator design using different methods. **Labs/Tutorials:** • Solving problems related to compensator design using different methods and its verification using MATLAB. • Different control systems analysis and design using MATLAB.	13-14
10	**Practical/ Oral Examination**	15

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture (online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A1.1	x					x	x								
	A1.2	x					x	x								
	A1.3	x					x	x								
	A1.4	x					x	x								
	A2.1	x					x	x								
	A2.2	x					x	x								
	A2.3	x					x	x								
	A2.4	x					x	x								
	A2.5	x					x	x								
	A4.1				x							x				
B-Level	B2.1	x					x	x								
	B2.2	x					x	x								
	B2.3	x					x	x								
	B2.4	x					x	x								
	B4.1							x				x				
C-Level	C6.1														x	
	C6.2														x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A4.1, B2.1, B2.2, B2.3, B2.4, B4.1
2	Practical Examination	C6.1, C6.2
3	Oral Examination	A1.1, A4.1
3	Formative (quizzes- online quizzes- presentation – reports)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A4.1, B2.1, B2.2, B2.3, B2.4, B4.1
4	Final Term Examination (written)	A1.1, A1.2, A1.3, A1.4, A2.1, A2.2, A2.3, A2.4, A2.5, A4.1, B2.1, B2.2, B2.3, B2.4, B4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Katsuhiko Ogata, “Modern Control Engineering”, Prentice Hall, 5th Edition, 2010..
2	Farid Golnaragghi and Benjamin C. Kuo, “Automatic Control Systems”, 9th edition, John Wiley &Sons, 2010.
3	John J. D’Azzo, "Linear Control System Analysis and Design", Marceld Ekker Inc, 2003.
4	John J. D’Azzo, "Linear Control System Analysis and Design with Matlab ", Fifth Edition, Revised and Expanded, This edition published in The Taylor and Francis e-l -2009

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Introduction to automatic control system theory: Feedback concept – systems classification– dynamic system components. **Labs/Tutorials:** • Install MATLAB Program	7	A1.1, C6.1, B4.1
2	**Lectures:** • Definition and mathematical review of: Differential equations- Laplace transform - Transfer Function - Block diagram algebra - signal flow graph and Mason gain formula. **Labs/Tutorials:** • Overview of the MATLAB tool boxes related to control system analysis and design. • Solving problems related to lecture topics.	7	A1.2, B2.1, C6.1, A2.4, B2.2, A4.1
3	**Lectures:** • Modeling of electro-mechanical systems - DC machine speed and position control as an	7	A2.1, B2.1, C6.1, B2.2, B4.1

	application. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.		
4	**Lectures:** • Time response (Transient and Steady state) of control system: first order – second order – Time response of higher order systems - steady state error and system accuracy analysis. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	7	A1.3, B2.4, C6.1, A2.4, A2.5, B2.3,C6.2,A4.1
5	**Lectures:** • Control system stability: Definition and terminologies – Routh-Hurwitz stability criterion - Root locus plot drawing and analysis. **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	7	A2.2, B2.4, C6.1, A2.4, B2.3, C6.2, B4.1
6	**Midterm**	7	
8	**Lectures:** • Control system frequency response: Definition and terminologies – Polar plot – Bode diagram – Nyquist stability criterion **Labs/Tutorials:** • Solving problems related to lecture topics using mathematical methods and its verification using MATLAB.	7	A1.4, C6.1, A2.4, C6.2, A4.1
9	**Lectures:** • Compensator design using different methods. **Labs/Tutorials:** • Solving problems related to compensator design using different methods and its verification using MATLAB. • Different control systems analysis and design using MATLAB.	7	A2.3, B2.1, C6.1,A2.4, B2.2, B2.3, C6.2, B4.1, A4.1
10	**Practical/ Oral Examination**	7	

Course: Automatic Control	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1.1 Recognize the essential concepts and theorems of automatic control system and dynamic system components. A1.2 Illustrate the essential concepts and theorems of the complex mathematics and theorems to analyze and model of control systems. A1.3 Discuss transient and steady state of control time response of system first order, second order, and higher order systems. A1.4 Illustrate the essential concepts to draw and analysis the frequency response of the control systems using Polar plot, Bode diagram and Nyquist stability criterion.
A2. 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.	A2.1 Demonstrate the knowledge of electro-mechanical control systems modeling and position control as an application. A2.2 Demonstrate the knowledge of using Routh-Hurwitz and Root locus plot stability criterion to analyze the stability of the control systems. A2.3 Demonstrate the knowledge and understanding the principles of design including elements, process and systems related to control system.

	A2.4 Select appropriate block diagram reduction rules to get the system overall transfer function. A2.5 Select appropriate criterion to analyze the control system stability based on analytical thinking.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Write technical reports and conduct presentation in the most recent automatic control systems topics.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Apply the transfer function principle to model electrical, mechanical and electromechanical systems. B2.2 Apply block diagram algebra and Mason's formula to get the T.F from block diagrams and signal flow graph respectively. B2.3 Apply Laplace transformation and inverse Laplace transformation to assess the system T. F and transient response. B2.4 Apply inverse Laplace transformation to discuss the transient response.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Effectively manage tasks, time and resources during solving exams and quizzes.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital	C6.1 Apply MATLAB control toolboxes to analyze problems related

systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	to control systems. C6.2 Use MATLAB toolboxes in modeling and analyzing control systems in time and frequency domains.

Course Coordinator: Dr. Kamel Elserafi

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	HUF305		
Year/ Level	Third year- Second Semester		
Specialization	Minor		
Teaching Hours	Lectures	Tutorial	Practical
	2	-	-

2. Course aims:

No.	Aim
5	Communicate effectively using different modes, tools, and body language to improve presentation skills and achieve factors for successful presentation.

3. Learning Outcomes (LOs):

A7-1	Prepare an effective technical presentation.
A8-1	Communicate effectively with colleges to Prepare an effective presentation.
A9-1	Use creative thinking to introduce a novel ideas and contents in the presentation.
A10-1	Recognize the biggest body language blunders.
A10-2	Utilize the factors for successful presentation.
A10-3	Research for the latest finding in effective presentation skills.
A10-4	Recognize the different modern information technology tools for effective presentation.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** - **Presentation fundamentals:** Definition and elements of effective presentation. Main causes of presentation failure. Modern presentation tools and software.	1-2
2	**Lecture:** - **Presentation preparation:** Importance of identifying presentation objective. Effective objective characteristics. Presentation audience identification. Preparing an idea map for your presentation.	3-5
3	**Lecture:** - **Building your presentation** - Basic presentation elements. - Importance of developing a strong presentation opening. Various presentation body structure. Utilizing visual aids. Effective conclusion.	6-7
4	**Midterm**	8
5	**Lecture:** **Effective Presentation Delivery** - Presentation delivery methods and styles. Factors affecting delivery of presentation. Controlling presenter’s characteristics. Effective Slide format (Fonts-colors- Size- Background). Fundamentals of effective audience communication. - The biggest body language blunders	9-12
6	**Lecture:** - **Group Presentation Practice** - Practice presentation sessions. Each group prepares and presents an effective technical presentation. Peer evaluation and feedback is used for improving performance.	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online / in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
	A7-1	x	x		x	x				x		x	x			
	A8-1	x	x			x				x		x	x			
	A9-1	x	x		x	x						x	x			
	A10-1	x		x	x	x				x		x	x			
	A10-2	x		x	x	x				x			x			
	A10-3	x		x	x	x				x		x				
	A10-4	x		x		x				x		x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A7-1, A8-1, A9-1, A10-2, A10-3, A10-4
2	Formative (quizzes- online quizzes- presentation - reports)	A8-1, A9-1, A10-1, A10-2, A10-3, A10-4.

3	Final Term Examination (written)	A7-1, A8-1, A9-1, A10-1, A10-2, A10-3, A10-4.

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	80
Total		100%

8. List of References

No.	Reference List
1	Steele, William R. "Presentation Skills 201: How to Take It to the Next Level as a Confident, Engaging Presenter", 2009, Outskirt Press.
2	Carmine Gallo "Talk Like TED”, St. Martin’s press 2014

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Online facilities.
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** • **Presentation fundamentals:** • Definition and elements of effective presentation. Main causes of presentation failure. Modern presentation tools and software.	**5**	A7-1.
2	**Lecture:** • **Presentation preparation:** • Importance of identifying presentation objective. Effective objective characteristics. Presentation audience identification. Preparing an idea map for your presentation.	**5**	A7-1, A8-1
3	**Lecture:** • **Building your presentation** • Basic presentation elements. • Importance of developing a strong presentation opening. Various presentation body structure. Utilizing visual aids. Effective conclusion.	**5**	A9-1, A10-2, A10-3, A10-4.
4	**Midterm**	**5**	A7-1, A8-1, A9-1, A10-2, A10-3, A10-4.
5	**Lecture:** **Effective Presentation Delivery** • Presentation delivery methods and styles. Factors affecting delivery of presentation. Controlling presenter's characteristics. Effective Slide format (Fonts-colors- Size- Background). Fundamentals of effective audience communication. • The biggest body language blunders	**5**	A10-1, A10-2, A10-3, A10-4.
6	**Lecture:** • **Group Presentation Practice** • Practice presentation sessions. Each group prepares and presents an effective technical	**5**	A8-1, A9-1, A10-1, A10-2, A10-3, A10-4.

		presentation. Peer evaluation and feedback is used for improving performance.		

Course: Presentation skills	
Program LOs	**Course LOs**
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7-1 Prepare an effective technical presentation.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Communicate effectively with colleges to Prepare an effective presentation
A9. Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Use creative thinking to introduce a novel ideas and contents in the presentation
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Recognize the biggest body language blunders. A10-2 Utilize the Factors for successful presentation. A10-3 Research for the latest finding in effective presentation skills. A10-4 Recognize the different modern information technology tools for effective presentation.

Course Coordinator: Dr. Heba M. Abdel-Atty

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

Course Specifications

Fourth Year

For

B. Sc. in Electrical Engineering Program

(Specialization: Electronics and Communications Engineering)

Bylaw 2014

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE418		
Year/ Level	Fourth year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
9	Model, analyze, design and build microwave antennas and antenna arrays.

3. Learning Outcomes (LOs):

A3.1	Apply the knowledge and understanding of concepts, physical structure, operational principles, Radiation equations, Design and environmental considerations of different types of microwave antennas.
A5.1	Present technical reports about new trends in antenna design and reports about the practical lab experiments.
A6.1	Monitor the new trends in antenna design and reading about different propagation modeling.
B3.1	Design of different types of antennas and antenna arrays.
B4.1	Measure the directional characteristics of different types of antennas and comparing them with the theoretical knowledge.
C1.1	Understand of concepts, physical structure, and operational principles of the smart antenna and Reflector antennas systems.
C4.1	Demonstrate the operation principles of radiation properties of dipole and monopole antenna and their radiation properties.
C7.1	Demonstrate the knowledge and understanding of concepts, physical structure, and operational principles of the smart antenna and Reflector antennas systems.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Introduction to antennas and propagation**.** **Lab:** Dealing with the Antennas lab capabilities - Description of antennas available for this laboratory. Write a report on the description of antennas available for this laboratory.	1
2	**Lectures:** **Antenna parameters (1):**Radiation pattern – Field regions – Radiation intensity – Beam-width – Side lobe level – Directivity – efficiency – Gain **Antenna parameters (2):**Input impedance – Bandwidth – Polarization loss factor – Effective aperture – effective length – Friis equation**.** **Lab/Tutorials:** • Dealing with the software package simulator capabilities. • Using practical or/and simulation tool investigate the radiation properties of a given antenna: • Studying antenna parameters, Radiation pattern, Pattern beam width, Directivity, Gain, radiation efficiency.	٢, 3
3	**Lecture:** **Linear wire antennas:** Radiation from infinitesimal linear current element – Finite length dipole – Half-wave dipole – Linear current element above an infinite conducting plane – quarter-wave monopole **Lab/Tutorials:** Simulation or/and practical experimental investigation of radiation properties of dipole and monopole antenna: Studying dipole antenna parameters, Radiation pattern, Pattern beam width, Radiation intensity, Directivity, Gain, radiation efficiency. Using "Software Package" to plot radiation intensity, calculating directivity and half power beam widths.	4
4	**Lectures:** **Antenna arrays:** N-element linear array of uniform amplitude and spacing – Broadside and end-fire arrays – Phased array – Design procedure - Non uniform arrays – Binomial array – Dolph -Chebyscheve array.	5- 7

	Lab/Tutorials: • Using numerical or/and practical experimental investigate the radiation properties of radiation properties of a given array antennas. • Using “Software Package" to plot radiation intensity, calculating directivity and half power beam widths.	
5	Midterm	8
6	**Lectures:** **Microwave antennas:** **Aperture antennas:** Field equivalence principles – Radiation equations – Rectangular aperture with uniform and non-uniform field distribution – Design considerations. **Horn antennas** Quadratic phase error – E-plane sectoral horn – H-plane sectoral horn – Pyramidal horn – Conical horn –Corrugated horn **Microstrip antennas:** Types of microstrip antennas – Methods of feeding – Methods of analysis – Rectangular patch – Transmission line model – Cavity model **Labs/Tutorials:** Using simulation program investigation the radiation properties of a given microwave antenna. • Studying pyramidal horn or other antenna parameters, Radiation pattern, Pattern beam width, Radiation intensity, Directivity, Gain, radiation efficiency. • Using "Software Package" to design a pyramidal horn so that the gain is 17.05 dbi at f=11GHz. • Using "Software Package" investigate a microstrip antenna parameters.	9-10
7	**Lectures:** **Reflector antennas:** Types of reflector antennas – Parabolic reflector – Methods of analysis – Gain and efficiency	11

	Tutorials: - Write a report on Reflector antennas: Types and parameters. - Solving related problems.	
8	**Lectures:** **Radio wave propagation: Types and link mechanisms:** **Line of sight propagation:** Path gain factor – Line of sight range – Tropospheric refraction – Fresnel zones – Line of sight communication links. **Surface wave propagation:** Vertical dipole near the ground – surface wave attenuation – surface wave communication links **Sky wave propagation:** Structure of ionosphere – Ionospheric propagation – Ionospheric attenuation – Sky wave communication links **Lab:** Using simulation or/and practical experimental tests investigate the effect of parasitic elements on a given antenna to study the following: - Effect of distance on propagation. - Effect of angular separation on reception. Effect of different transmitting antennas on reception.	12- 14
9	**Lecture :** Smart Antenna Systems. **Lab:** •Write a report on smart antennas: Types, parameters, and applications. •Solving related problems. •Using "Software Package" investigate a smart antennas antenna parameters.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (In class/ Online)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	x					x	x								
	A5.1	x				x				x						x
	A6.1	x			x	x	x	x		x						x
B-Level	B3.1	x			x	x	x			x		x				x
	B4.1						x			x					x	
C-Level	C1.1	x				x										
	C4.1	x								x					x	
	C7.1	x								x					x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A5.1, A6.1, B3.1, C4.1, C7.1
2	Practical Examination	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1
3	Oral Examination	A6.1
4	Formative (quizzes- online quizzes- presentation - reports)	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1
5	Final Term Examination (written)	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	A. Balanis, ”Antenna Theory – Analysis and Design,” John Wiley & Sons, 2005.
2	A. Balanis, ”Antenna Theory – Analysis and Design,” John Wiley & Sons, 4th Edition, 2016.
3	W. L. Stutzman and G. A. Thiele, ” Antenna Theory and Design,” John Wiley & Sons, 1998.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Online facilities.
3	Lab Facilities
4	White Board
5	Data Show System
6	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Introduction to antennas and propagation. **Lab:** Dealing with the Antennas lab capabilities - Description of antennas available for this laboratory. • Write a report on the description of antennas available for this laboratory.	9	A3.1
2	**Lectures:** **Antenna parameters (1):**Radiation pattern – Field regions – Radiation intensity – Beam-width – Side lobe level – Directivity – efficiency – Gain Antenna parameters (2): Input impedance – Bandwidth – Polarization loss factor – Effective aperture – effective length – Friis equation. **Lab/Tutorials:** **Dealing with the software package simulator capabilities.** Using practical or/and simulation tool investigate the radiation properties of a given antenna: • Studying antenna parameters, Radiation pattern, Pattern beam width, Directivity, Gain, radiation efficiency.	9	A5.1, B4.1, C1.1, C4.1, C7.1
3	**Lecture:** **Linear wire antennas:** Radiation from infinitesimal linear current element – Finite length dipole – Half-wave dipole – Linear current element above an infinite conducting plane – quarter-wave monopole **Lab/Tutorials:** Simulation or/and practical experimental investigation of radiation properties of dipole and monopole antenna: Studying dipole antenna parameters, Radiation pattern, Pattern beam width, Radiation intensity, Directivity, Gain, radiation efficiency. • Using "Software Package" to plot radiation intensity, calculating directivity and half power beam widths.	9	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1
4	**Lectures:** **Antenna arrays:** N-element linear array of uniform amplitude and spacing – Broadside and end-fire arrays – Phased array – Design procedure - Non uniform arrays – Binomial array – Dolph -	9	A6.1, B3.1, B4.1, C1.1, C4.1, C7.1

	Chebyscheve array. **Lab/Tutorials:** Using numerical or/and practical experimental investigate the radiation properties of radiation properties of a given array antennas. Using " Software Package" to plot radiation intensity, calculating directivity and half power beam widths.		
5	• Midterm	9	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1
6	**Lectures:** **Microwave antennas:** Aperture antennas: Field equivalence principles – Radiation equations – Rectangular aperture with uniform and non-uniform field distribution – Design considerations. Horn antennas Quadratic phase error – E-plane sectoral horn – H-plane sectoral horn – Pyramidal horn – Conical horn –Corrugated horn Microstrip antennas: Types of microstrip antennas – Methods of feeding – Methods of analysis – Rectangular patch – Transmission line model – Cavity model **Labs/Tutorials:** Using simulation program investigation the radiation properties of a given microwave antenna. Studying pyramidal horn or other antenna parameters, Radiation pattern, Pattern beam width, Radiation intensity, Directivity, Gain, radiation efficiency. Using "Software Package" to design a pyramidal horn so that the gain is 17.05 dbi at f=11GHz. Using "Software Package" investigate a microstrip antenna parameters.	9	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1
7	**Lectures:** **Reflector antennas:** Types of reflector antennas – Parabolic reflector – Methods of analysis – Gain and efficiency	9	B4.1, C1.1, C4.1, C7.1

	Tutorials: - Write a report on Reflector antennas: Types and parameters. Solving related problems.		
8	**Lectures:** **Radio wave propagation: Types and link mechanisms:** Line of sight propagation: Path gain factor – Line of sight range – Tropospheric refraction – Fresnel zones – Line of sight communication links. Surface wave propagation: Vertical dipole near the ground – surface wave attenuation – surface wave communication links Sky wave propagation: Structure of ionosphere – Ionospheric propagation – Ionospheric attenuation – Sky wave communication links **Lab:** Using simulation or/and practical experimental tests investigate the effect of parasitic elements on a given antenna to study the following: Effect of distance on propagation. Effect of angular separation on reception. Effect of different transmitting antennas on reception.	9	A3.1B3.1, B4.1, C1.1, C4.1, C7.1
9	**Lecture :** Smart Antenna Systems. **Lab:** •Write a report on smart antennas: Types, parameters, and applications. •Solving related problems. - •Using "Software Package" investigate a smart antennas antenna parameters.	9	A3.1, A5.1, A6.1, B3.1, B4.1, C1.1, C4.1, C7.1

Course: Antennas and wave propagation	
Program LOs	**Course LOs**
A3. 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.	A3.1 Apply the knowledge and understanding of concepts, physical structure, operational principles, Radiation equations, Design and environmental considerations of different types of microwave antennas.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5.1 Present technical reports about new trends in antenna design and reports about the practical lab experiments.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Monitor the new trends in antenna design and reading about different propagation modeling.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Design of different types of antennas and antenna arrays.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Measure the directional characteristics of different types of antennas and comparing them with the theoretical knowledge.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1.1 Understand of concepts, physical structure, and operational principles of the smart antenna and Reflector antennas systems.
C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications	C4.1 Demonstrate the operation principles of radiation properties of dipole and monopole antenna and their radiation properties.

Engineering.	
C7. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems	C7.1 Demonstrate the knowledge and understanding of concepts, physical structure, and operational principles of the smart antenna and Reflector antennas systems.

Course Coordinator: Dr. Heba Y. Soliman.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE419		
Year/ Level	Fourth year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
6	Manipulate with the digital integrated circuits, all the way from the basic inverter characteristics to the analysis and design of combinational and sequential circuits using the BJT, MOS, and BiCMOS technologies.

3. Learning Outcomes (LOs):

A2-1	Assess the performance of the digital integrated circuits.
A2-2	Describe the various digital-IC technologies and the logic-circuit families.
A6-1	Describe the bipolar and CMOS circuits.
A10-1	Identify the performance metrics of the digital integrated circuits.
B2-1	Analyze a certain digital circuit.
B4-1	Discuss the various limitations of modern CMOS technologies.
C2-1	Design bipolar and CMOS digital circuits.
C3-1	Evaluate the performance of a certain digital circuit.
C7-1	Evaluate a certain CMOS technology.

4. Course Contents:

No.	Topic	Week
1	**Lecture:** **Introduction:** Digital Systems Definitions, digital integrated circuits terminologies and definitions. Quality Metrics of a Digital Circuit Design: Functionality and Robustness; Performance; Cost. **Computer Lab:** Review of Workbench simulator with examples.	**Week 1, 2**
2	**Lecture:** **Overview of ICs Fabrication processes:** **Fabrication Processes:** Crystal growth and wafer preparation, Deposition, Oxidation, Photolithography, Etching, Diffusion, Ion Implantation, Annealing, and Metallization. Overview the most current fabrication technologies of the digital integrated circuits. **Computer Lab:** View many ICs Fabrication processes related videos on the internet - Training on how to use layout Microwind Simulator	**Week 3, 4**
3	**Lecture:** **CMOS Digital Circuits Analysis and Design :** **Overview of NMOS Inverter - CMOS Inverter:** DC analysis, Layout and design rules, Static characteristics, Switch time (Transient) analysis: propagation delay time; Power delay product. **Simple CMOS logic circuits analysis and design**. CMOS **Dynamic Logic Circuits:** Introduction and definition, Basic Principles, Speed and Power Dissipation, Issues in Dynamic Logic Design. **Computer Lab /Tutorial:** Analysis and Design CMOS Inverter using Workbench and Microwind Simulators / Solving problems.	**Week 5-7**

4	**Midterm written examination** **Design project** is the activity to which this course is focused. The project improves the student ability to see the simplicity in a complex design problem, a skill that is not usually taught in engineering classes. The design project will require significant design effort, simulations and/or lab work, and a written report.	**Week 8**
5	**Lecture:** **CMOS dynamic digital circuits** Introduction to CMOS dynamic digital circuits analysis and design **Computer Lab /Tutorial:** Training on how to use the VHDL Simulator to analysis and design digital circuits / Solving problems.	**Week 9**
6	**Lecture:** **Semiconductor Memories:** Introduction and definition - Read-Only Memory (ROM) - Random Access Memory – Static memory cell – Dynamic memory cell – Sense amplifier – Address decoders. **Computer Lab/Tutorial:** Computer simulation of dynamic memory cell performance / Solving problems.	**Week 10-12**
7	**Lecture:** **Introduction to circuit design for VLSI:** Definition of: Gate arrays - standard cells - Custom design approach. Introduction to VLSI Logic Circuits Design Using FPGA. VDHL – Design simple Logic circuits using FPGA and layout editor. **Electronic Lab:** Uses the computer simulation with the electronic laboratory equipment to implement a practical experimental work related to digital integrated circuit on FPGA Kit and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.	**Week 13, 14**
8	**General Revision and Project Submission and Discussion.**	**Week 15**

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (class/online)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2-1**	x	x	x			x	x								
	A2-2	x	x			x			x	x				x		
	A6-1	x	x			x	x	x		x						
	A10-1					x				x	x					
B-Level	**B2-1**		x				x			x		x				
	B4-1						x			x				x	x	
C-Level	**C2-1**		x			x			x		x					
	C3-1		x		x					x				x	x	
	C7-1		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2-1, A2-2, B4-1, C1.1
2	Practical Examination	A2-1, A2-2, A10-1, A6.1, C2.1, C3.1, C7.1
3	Oral Examination	A6.1
4	Formative (quizzes- online quizzes- presentation - reports)	A2-1, A2-2, A10-1, B4-1, C1-1, C7.1
5	Final Term Examination (written)	A2-1, A2-2, A10-1, A6-1, C2-1, C3-1,

		C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Kang, Sung-Mo ; Leblebici, Yusuf ; Kim, Chulwoo, " CMOS Digital Integrated Circuits: Analysis & Design", New York, McGraw-Hill Higher Education, 4th Edition, 2014
2	John E. Ayers, "Digital Integrated Circuits: Analysis and Design," by CRC Press, Second Edition, October 5, 2009
3	David A. Hodges and Horace G. Jackson, "Analysis and Design of Digital Integrated Circuits," 3rd Edition 2004.
4	John P. Uyemura, "Fundamentals of MOS Digital Integrated Circuit," Addison-Wesley, 1988.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LOs
Week 1 + **Week 2**	**Lecture:** **Introduction:** Digital Systems Definitions, digital integrated circuits terminologies and definitions. Quality Metrics of a Digital Circuit Design: Functionality and Robustness; Performance; Cost. **Computer Lab:** Review of Workbench simulator with examples.	6	A2-1, C2-1
Week 3 + **Week 4**	**Lecture:** **Overview of ICs Fabrication processes:** **Fabrication Processes:** Crystal growth and wafer preparation, Deposition, Oxidation, Photolithography, Etching, Diffusion, Ion Implantation, Annealing, and Metallization. Overview the most current fabrication technologies of the digital integrated circuits. **Computer Lab:** View many ICs Fabrication processes related videos on the internet - Training on how to use layout Microwind Simulator	6	A6-1, A10-1, C2-1, C3-1, C7-1
Week 5 **To** **Week 7**	**Lecture:** **CMOS Digital Circuits Analysis and Design :** **Overview of NMOS Inverter - CMOS Inverter:** DC analysis, Layout and design rules, Static characteristics, Switch time (Transient) analysis: propagation delay time; Power delay product. **Simple CMOS logic circuits analysis and design**. CMOS **Dynamic Logic Circuits:** Introduction and definition, Basic Principles, Speed and Power Dissipation, Issues in Dynamic Logic Design. **Computer Lab /Tutorial:**	6	B2-1, B4-1, C2-1, C3-1, C7-1

	Analysis and Design CMOS Inverter using Workbench and Microwind Simulators / Solving problems.		
Week 8	**Midterm written examination**		
	Design project is the activity to which this course is focused. The project improves the student ability to see the simplicity in a complex design problem, a skill that is not usually taught in engineering classes. The design project will require significant design effort, simulations and/or lab work, and a written report.	From week 8 to week 14	A6-1, A10-1, C2-1, C3-1, C7-1
Week 9	**Lecture:** **CMOS dynamic digital circuits** Introduction to CMOS dynamic digital circuits analysis and design **Computer Lab /Tutorial:** Training on how to use the VHDL Simulator to analysis and design digital circuits / Solving problems.	6	B2-1, B4-1, C2-1, C3-1, C7-1
Week 10 **To** **Week 12**	**Lecture:** **Semiconductor Memories:** Introduction and definition - Read-Only Memory (ROM) - Random Access Memory – Static memory cell – Dynamic memory cell – Sense amplifier – Address decoders. **Computer Lab/Tutorial:** Computer simulation of dynamic memory cell performance / Solving problems.	6	B2-1, B4-1, C2-1, C3-1, C7-1
Week 13 **+** **Week 14**	**Lecture:** **Introduction to circuit design for VLSI:** Definition of: Gate arrays - standard cells - Custom design approach. Introduction to VLSI Logic Circuits Design Using FPGA. VDHL – Design simple Logic circuits using FPGA and layout editor. **Electronic Lab:**	6	A6-1, A10-1, C2-1, C3-1, C7-1

	Uses the computer simulation with the electronic laboratory equipment to implement a practical experimental work related to digital integrated circuit on FPGA Kit and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.		
Week 15	**General Revision and Project Submission and Discussion.**	6	

Course: Digital Integrated Circuits	
Program LOs	**Course LOs**
A2. 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.	A2-1 Assess the performance of the digital integrated circuits. A2-2 Describe the various digital-IC technologies and the logic-circuit families.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6-1 Describe the bipolar and CMOS circuits.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Identify the performance metrics of the digital integrated circuits.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze a certain digital circuit.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4-1 Discuss the various limitations of modern CMOS technologies.
C2. Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance.	C2-1 Design bipolar and CMOS digital circuits.
C3. Design and compare between alternative components and systems in Electronics and Communications Engineering	C3-1 Evaluate the performance of a certain digital circuit.
C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7-1 Evaluate a certain CMOS technology.

Course Coordinator: Dr. Sherif M. Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE420		
Year/ Level	Fourth year- First Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
1	Apply knowledge of wireless channel fundamentals and detection, in addition to a basic background of Code division multiple access (CDMA), Multiuser detection and Orthogonal frequency division multiplexing (OFDM).

3. Learning Outcomes (LOs):

A1-1	Solve communication problems by applying wireless fundamentals, channel modeling and mathematics.
A4-1	Discuss the contemporary wireless communication multiple access techniques.
A5-1	Search for communication information to engage in life-long self-learning discipline.
B2-1	Analyze different wireless channels for wireless communications.
B3-1	Design systems in digital communications using CDMA techniques.
C1-1	Apply the physical phenomena of the wireless channels in wireless communications.
C5-1	Demonstrate the knowledge about state of the art of OFDM technique.
C7-1	Demonstrate additional abilities to model, analyze and design communication systems.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** **Wireless channel fundamentals:** • Properties of wireless channel • multipath propagation • Fading **Tutorials:** • discuss and review examples related to wireless channel fundamentals (sheet 1)	1-2
2	**Lectures:** **Wireless channel fundamentals (cont.):** • Doppler effect • Diversity techniques **Tutorials:** • discuss and review examples related to Doppler effect and diversity techniques (sheet 2)	3-4
3	**Lectures:** **Physical modeling for wireless channels** • modeling for different channel types • Receiver channel equalization **Tutorials:** • Explain with examples channel modeling and equalization (sheets 3,4 and 5)	5-7
4	**Midterm**	8
5	**Lectures:** • Students present modern topics in wireless communications field. **Tutorials:** • Discuss the presented topics in students presentations	9
6	**Lectures:** **Spread spectrum techniques:** • Application of frequency/time hopping • Direct sequence spread spectrum • Modern practical DSSS-CDMA • Code division multiple access (CDMA) **Tutorials:** • Explain with examples different types of spread spectrum techniques (sheets 6, 7 and 8)	10-12
7	**Lectures:** **OFDM technique:** • OFDM properties • OFDM orthogonality • OFDM tranceiver	13-15

	- OFDM in wireless channel **Tutorials:** - Discuss OFDM systems and properties, also solving some problem examples (sheet 9, 10 and 11)	

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online /in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A1-1**	X	X			X	X	X	X							
	A4-1	X	X			X	X	X	X							
	A5-1	X	X	X	X	X	X		X		X	X	X			
B-Level	**B2-1**	X	X			X	X	X	X							
	B3-1	X	X			X	X	X	X							
C-Level	**C1-1**	X	X			X	X	X	X							
	C5-1	X	X			X	X	X	X							
	C7c-1	X	X	X		X	X	X	X							

6. Teaching and Learning Methods 0f Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A1-1, B2-1, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A1-1, A4-1, A5-1, B2-1, B3-1, C1-1,
3	Final Term Examination (written)	A1-1, A4-1, B2-1, B3-1, C1-1, C5-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Course Notes: Deliver during lectures.
2	G. M. Vitetta et al, "wireless communications", John Wiley and Sons., 2013.
3	D. Tse and P. Viswanath, "Fundamentals of Wireless Communications", Cambridge University Press., 2005.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** **Wireless channel fundamentals:** • Properties of wireless channel • multipath propagation • Fading **Tutorials:** • discuss and review examples related to wireless channel fundamentals (sheet 1)	1	A-1, C1-1
2	**Lectures:** **Wireless channel fundamentals (cont.):** • Doppler effect • Diversity techniques **Tutorials:** • discuss and review examples related to Doppler effect and diversity techniques (sheet 2)	1	A1-1, C1-1
3	**Lectures:** **Physical modeling for wireless channels** • modeling for different channel types • Receiver channel equalization **Tutorials:** • Explain with examples channel modeling and equalization (sheets 3,4 and 5)	1	A1-1, B2-1
4	**Midterm**	1	A1-1, B2-1, C1-1
5	**Lectures:** • Students present modern topics in wireless communications field. **Tutorials:** • Discuss the presented topics in students presentations	1	A5-1
6	**Lectures:** **Spread spectrum techniques:** • Application of frequency/time hopping	1	A4-1, B3-1

	• Direct sequence spread spectrum • Modern practical DSSS-CDMA • Code division multiple access (CDMA) **Tutorials:** • Explain with examples different types of spread spectrum techniques (sheets 6, 7 and 8)		
7	**Lectures:** **OFDM technique:** • OFDM properties • OFDM orthogonality • OFDM tranceiver • OFDM in wireless channel **Tutorials:** • Discuss OFDM systems and properties, also solving some problem examples (sheet 9, 10 and 11)	1	C5-1, C7-1

Course: wireless communications	
Program LOs	**Course LOs**
A1. Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science and mathematics.	A1-1 Solve communication problems by applying wireless fundamentals, channel modeling and mathematics.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4-1 Discuss the contemporary wireless communication multiple access techniques.
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5-1 Search for communication information to engage in life-long self-learning discipline.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 analyze different wireless channels for wireless communications.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/ digital engineering using technological and professional tools.	B3-1 Design systems in digital communications using CDMA techniques.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1-1 Apply the physical phenomena of the wireless channels in wireless communications.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate the knowledge about state of the art of OFDM technique.
C7. Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks.	C7-1 Demonstrate additional abilities to model, analyze and design communication systems.

Course Coordinator: Dr. Saly Saad Hassaneen

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: electronics and Communications Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE421		
Year/ Level	Fourth year- 1st semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	0	0	2

2. Course aims:

No.	aim
7	Apply control theory and measurement principals for communications lab experiments, including: Modulation circuits - Frequency measurements - Impedance measurements - Power measurements - digital signal analysis and processing.

3. Learning Outcomes (LOs):

A2.1	Assess the characteristics and performance of components in communication systems.
A2.2	Evaluate the characteristics and performance of components in signal processing systems
A7.1	Collaborate effectively within multidisciplinary team.
A10.1	Prepare technical presentations of specific training experiences.
B3.1	Use laboratory facilities to design experiments related to communication systems.
B4.1	Investigate failure of communication systems.
B4.2	Search for information about Smith Chart and its various applications.
C3.1	Investigate failure of microwave systems.
C4.1	Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline to design and analysis the required experiments.
C7.1	Think about design procedure of microwave system elements.

4. Course Contents:

No.	Topics	Week
1	**Modulation:** AM modulation and Demodulation, FM, PM, ASK, PSK	1-3
2	**Microwave measurements:** • Measurement of frequency and wavelength – Power detection and measurement.	4,5
3	**Microwave measurements** • Measurement of microwave components characteristics	6
4	**Microwave measurements** • VSWR measurement –Impedance measurement –Impedance matching	7
5	**Midterm written examination**	8
6	**Network analyzer:** Network analyzer basics – S - parameters measurements.	9, 10
7	**Antenna measurements**: Measurement of radiation pattern – Gain measurement – Antenna input impedance measurement.	11
8	**Real-time DSP Implementation** • Fixed-point and floating-point implementation, errors and noise,	12
9	• **DSP block realization for communication systems**	13, 14
10	**General Revision**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1		x	x				x								x
	A2.2		x			x			x	x				x		x
	A7.1		x			x		x		x						x
	A10.1		x							x		x				x
B-Level	B3.1									x				x	x	x
	B4.1		x			x			x		x					x
	B4.2		x		x					x				x	x	x
C-Level	C3.1		x		x					x				x	x	x
	C4.1		x			x	x	x		x						x
	C7.1		x		x					x				x	x	x

6. Teaching and Learning Methods of Disabled Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, A2.2, B4.1
2	Practical Examination	B3.1, B4.1, C4.1
3	Oral Examination	A7.1
4	Formative (quizzes- online quizzes- presentation – lab reports)	A7.1, A10.1, B4.2, C7.1
5	Final Term Examination (written)	A2.1, A2.2, B4.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - lab reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - lab reports.)	15
4	Final Term Examination (written)	٥٠
Total		100%

8. List of References

No.	Reference List
1	Richarad Collier and Doug Skinner, "Microwave Measurements (Materials, Circuits and Devices)" The Institution of Engineering and Technology, 3rd Edition, 2007.
2	B. Preetham Kumar, "Digital Signal Processing Laboratory", CRC Press/Taylor & Francis Press, Second Edition, 2013
3	Communication lab manuals.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Modulation circuits:** • AM modulation and Demodulation, FM, PM, ASK, PSK	7	A2.1, A2.2
2	**Microwave measurements:** • Measurement of frequency and wavelength – Power detection and measurement.	7	A2.1, A2.2
3	**Microwave measurements** • Measurement of microwave components characteristics	7	C3.1
4	**Microwave measurements** • VSWR measurement –Impedance measurement – Impedance matching	7	B3.1, C3.1
5	• Midterm written examination	7	A2.1, A2.2, B4.1
6	**Network analyzer:** • Network analyzer basics – S - parameters measurements.	7	C7.1
7	**Antenna measurements**: Measurement of radiation pattern – Gain measurement – Antenna input impedance measurement.	7	A7.1, B4.2
8	**Real-time DSP Implementation:** • Fixed-point and floating-point implementation, errors and noise,	7	A2.2, B4.1
9	**DSP block realization for communication systems**	7	C4.1, B4.1
10	**General Revision**	7	A2.1, A2.2, B4.1, C4.1, B4.1

Course: Communication and Signal Processing Lab	
Program LOs	**Course LOs**
A2. 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.	A2.1 Assess the characteristics and performance of components in communication systems. A2.2 Evaluate the characteristics and performance of components in signal processing systems.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1 Collaborate effectively within multidisciplinary team.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Prepare technical presentations of specific training experiences.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Use laboratory facilities to design experiments related to communication systems.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Investigate failure of microwave systems. B4.2 Search for information about Smith Chart and its various applications.
C3: Design and compare between alternative components and systems in Electronics and Communications Engineering	C3.1 Investigate failure of microwave systems.
C4: Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.	C4.1 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline to design and analysis the required experiments.
C7: Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks	C7.1 Think about design procedure of microwave system elements.

Course Coordinators: Dr. Sherif Abuelenin

Dr. Mohamed F. Abdelkader

Dr. Ahmad Abdalrazik

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE433		
Year/ Level	Fourth year - First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
4	Use current advanced techniques, skills, and tools necessary to demonstrate different concurrency principles to verify the fundamentals of communications in advanced computer networks.

3. Learning Outcomes (LOs):

A2.1	Analyze the most recent protocol related to advanced computer networks.
A3.1	Perform simulation for the performance evaluation of the advanced networks.
A10.1	Apply laboratory tools to test and analyze the network performance.
B3.1	Implement simulation for different advanced networks.
B4.1	Design solutions for the problem in advanced computer networks research topic.
C6.1	Integrate economic, social and environmental aspects in network design projects.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Introduction to advanced computer networks, their types and their Protocols (Ethernet, ATM). **Lab /Tutorial:** • Reviewing the simulation software in Lab.	1-2
2	**Lecture:** Wireless Sensor Networks (WSN); Components, limitations, applications, communications between nodes. **Lab /Tutorial:** • Connecting some nodes with a router wirelessly.	3-4
3	**Lecture:** Lect.: Wireless Sensor Networks (WSN); routing algorithms and some students' research. **Lab /Tutorial:** • Assess the wireless networks	5-7
4	Midterm	8
5	**Lecture:** Internet of Things (IoT); Applications and some students' research. **Lab /Tutorial:** • Assess the IoT Applications	9-10
6	**Lecture:** Cloud Computing; Fundamentals and applications, and some students' research. **Lab /Tutorial:** • Apply the concept of cloud computing in a network	11-12
7	**Lecture:** Lect.: Fog Computing; Fundamentals and applications, and some students' research. **Lab /Tutorial:** Problem solving related to scheduling in fog Network .	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A2.1**	x	x				x	x								
	A3.1	x		x			x	x		x		x			x	
	A10.1		x			x		x		x					x	
B-Level	**B3.1**						x			x		x	x		x	
	B4.1						x			x		x				
C-Level	**C6.1**		x			x			x	x			x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, B3.1, C6.1
2	Formative (quizzes- online quizzes- presentation)	A2.1, A10.1, B3.1, B4.1, C6.1
3	Oral Examination	A2.1, A3.1
4	Project and report assessment	A2.1, A10.1, B3.1, B4.1, C6.1
5	Final Examination	A2.1, A10.1, B3.1, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes-presentation)	Weakly
3	Project and report assessment	15th
4	Final Examination	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Formative (quizzes- online quizzes-presentation)	20
3	Project and report assessment	١٠
4	Final Examination	٦٠
Total		100%

8. List of References

No.	Reference List
1	Ibrahiem M.M.EI Emary and S. Ramakrishnan (Ed.), Wireless Sensor Networks: From Theory to Applications, CRC Press, Taylor & Francis Group, USA, August 2013.
2	E. Markakis, et. Al, Cloud and Fog Computing in 5G Mobile Networks: Emerging Advances and Applications, The Institution of Engineering and Technology, May 2017.
3	C. Bogdan, M. Gabriel-Miro, Advanced Network Programming Principles and Techniques, Springer, 2013.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Introduction to advanced computer networks, their types and their Protocols (Ethernet, ATM). **Lab /Tutorial:** - Reviewing the simulation software in Lab.	4	A2.1,A3.1
2	**Lecture:** Wireless Sensor Networks (WSN); Components, limitations, applications, communications between nodes. **Lab /Tutorial:** - Connecting some nodes with a router wirelessly.	4	A3.1, A10.1
3	**Lecture:** Lect.: Wireless Sensor Networks (WSN); routing algorithms and some students' research. **Lab /Tutorial:** - Assess the wireless networks	4	A2.1, B3.1, C6.1
4	- Midterm	4	A10.1, B3.1, C6.1
5	**Lecture:** Internet of Things (IoT); Applications and some students' research. **Lab /Tutorial:** - Assess the IoT Applications	4	A2.1, A10.1, B4.1, C6.1
6	**Lecture:** Cloud Computing; Fundamentals and applications, and some students' research. **Lab /Tutorial:** - Apply the concept of cloud computing in a network	4	A10.1, B3.1, C6.1
7	**Lecture:** Lect.: Fog Computing; Fundamentals and applications, and some students' research. **Lab /Tutorial:** Problem solving related to scheduling in fog Network .	4	A2.1, A10.1, B3.1, C6.1

Course: Advanced Computer Networking	
Program LOs	**Course LOs**
A2. 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.	A2.1 Analyze the most recent protocol related to advanced computer networks.
A3. 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	A3.1 Perform simulation for the performance evaluation of the networks
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply laboratory tools to test and analyze the network performance.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Implement simulation for different advanced networks.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Design solutions for the problem in advanced computer networks research topic.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1. Integrate economic, social and environmental aspects in network design projects.

Course Coordinator: Dr. Heba Nashaat El-Moafy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE423		
Year/ Level	Fourth year- First semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	Aim
7	Apply software, operating systems, interfacing for design and develops web applications with HTML, CSS, and JavaScript and the server-side with common Server Side Scripting languages.

3. Learning Outcomes (LOs):

A2.1	Investigate the performance of web applications using computational facilities and techniques
A3.1	Define the concepts of the programmed application servers on the Internet and the characteristics of the basic architectural elements of web sites and programs that produce content interactively.
A3.2	Describe the knowledge and understanding of XHTML to be able to use its most important capabilities to create web pages.
A3.3	Recognize basic knowledge of Cascading Style Sheets (CSS) to control the appearance of a website by creating style sheets.
A3.4	Recognize basic knowledge of JavaScript to design and implement dynamic client-side web applications integrated with the server-side services.
A10.1	Distinguish the different ideas, views, and knowledge from a range of sources to design and implement dynamic server-side web applications by programming the client-side with XHTML, CSS, and JavaScript and the server-side services.
B3.1	Design internet services and web application security by applying appropriate techniques and strategies based on analytical thinking.
B3.2	Incorporate the right programming languages, data base type and structure, techniques to access and process data, interact with the file system techniques, with essential resources to design, develop and deploy professional standard web applications using a variety of approaches to meet required objective.
B4.1	Evaluate a given web application to enhance its performance by merging the engineering knowledge, understanding, and feedback
C6.1	Assess variety of design decisions of web applications by analyzing a wide range of analytical tools, techniques, and develop required program.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** • Introduction: • Introduction to the Internet and the WEB • Basic Internet Protocol • Network Protocols for Web Browsers and Servers • Web Client and Web Server • Introduction to Web 2.0 • Client/Server Computing (how web browsers and web servers communicate with each other). **Labs/Tutorials:** • Practice the Microsoft Internet Explorer and Mozilla Firefox web browsers to understand their capabilities and how web browsers and web servers communicate with each other.	1-2
2	**Lectures:** • Introduction to XHTML **Labs/Tutorials:** • Use the most important XHTML capabilities to create web pages. • The student must demonstrate his capabilities to use all XHTML capabilities such as: Heading elements, Linking to other web pages, Hyperlinking to an E-Mail Address, Insert an Image in the document, Using Images as Hyperlinks, Displays text in an unordered list, Nested and ordered lists, Creates a table to display price information, Forms, Use Meta elements to provide keywords and a description of the page...etc.	3
3	**Lectures:** • Basic knowledge of Cascading Style Sheets (CSS): To control the appearance of a website by creating style sheets. **Labs/Tutorials:** • Control the appearance of the previous web page using the most import and CSS features such as: presents **inline styles** that declare an individual element's format using the XHTML attribute style, embed an entire CSS document in an XHTML document's head section using embedded style sheets, Inheritance in style sheets, Linking an external style sheet, Absolute and Relative positioning of elements, Adding background images and indentation, Element dimensions and text alignment, Borders of block-level elements, Building a CSS Drop-Down Menu, ….etc.	4
4	**Lectures:** • **JavaScript scripting language and its Features:** Introduction to Scripting: Data types and arithmetic and Logical Operators, Decision	5-7

	Making: Equality and Relational Operators, Control Statements: if Selection Statement, Functions, if…else Selection Statement, while Repetition Statement, Nested Control Statements, for Repetition Statement, switch Multiple-Selection Statement, do…while Repetition Statement, break and continue Statements. • **Functions:** definitions and types. • **Arrays:** Declaring and Allocating Arrays, Examples Using Arrays, Passing Arrays to Functions, Sorting and Searching Arrays. **Labs/Tutorials:** • Use JavaScript to practice the main programming skills of using variables, Arrays, Conditions, Loops and Functions.	
5	**Midterm**	8
6	**Lectures:** • Java Database Connectivity with MySQL (Connecting to MySQL Using the JDBC Driver Manager Interface) **Labs/Tutorials:** • Using JavaScript with connecting to MySQL using the JDBC Driver Manager Interface create web page(Write programs in java to access database) which will display the information from a database which includes the following, for an example: 1. Title of the book 2. Author Name 3. ISBN number 4. Publisher name 5. Edition 6. Price	9-10
7	**Lectures:** • Introduction to PHP:What is PHP - App-server installing -PHP:Basic Syntax, Hello World example, – Variables and Operators, Examples, Conditional Statements, Examples, Loop Statements, Examples, Array,Examples, Functions, Examples, Form, Examples, Security, Examples,How to connect to MYSQL database using PHP. **Labs/Tutorials:** 1. Implement the above examples using PHP. 2. How to connect to MYSQL database using PHP 3. The functions used to connect web form to the MYSQL database. 4. Display the data from MYSQL database in web form. 5. Insert the data into MYSQL database using web form. 6. Update the data present in MYSQL database using web form. 7. Delete the data from MYSQL database using web form.	11-13
8	**Lectures:** • Web Services - Document Object Model (DOM) - Cases Studies (Projects). **Labs/Tutorials:** • Discussing everything in students' projects during implementation.	14
9	**Practical Exam**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A2.1**	X	X	X		X		X							X	X
	A3.1	X	X		X		X			X						
	A3.2	X	X		X		X			X						
	A3.3	X	X		X		X			X						
	A3.4	X	X		X		X			X						
	A10.1	X	X			X	X			X		X	X		X	X
B-Level	**B3.1**	X	X	X		X				X		X			X	X
	B3.2	X	X	X		X				X		X			X	X
	B4.1	X	X	X		X				X		X			X	X
C-Level	**C6.1**		X			X			X	X	X	X	X		X	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.4,A2.1, A2.1, A10.1,B3.2
2	Practical Examination	A2.1, A3.1, A3.2, A3.3, A3.4, A10.1, B3.1, B3.2, B4.1, C6.1
3	Oral Examination	A2.1, A3.1, A3.2, A3.3, A3.4
4	Formative (quizzes- online quizzes- presentation - reports)	A2.1, A3.1, A3.2, A3.3, A3.4, A10.1, B3.1, B3.2, B4.1, C6.1
5	Final Term Examination (written)	A2.1, A3.1, A3.2, A3.3, A3.4, A10.1, B3.1, B3.2, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Harvey M. Deitel and Paul J Deite, "Internet & World Wide Web How to Program", fourth edition, Prentice Hall 2008, ISBN:0-13-175242-1
2	Jeffrey C. Jackson, " Web Technologies", Pearson Prentice Hall 2007, ISBN:0-13-185603-0

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Introduction: • Introduction to the Internet and the WEB • Basic Internet Protocol • Network Protocols for Web Browsers and Servers • Web Client and Web Server • Introduction to Web 2.0 • Client/Server Computing (how web browsers and web servers communicate with each other). **Labs/Tutorials:** • Practice the Microsoft Internet Explorer and Mozilla Firefox web browsers to understand their capabilities and how web browsers and web servers communicate with each other.	7	A3.1
2	**Lectures:** • Introduction to XHTML **Labs/Tutorials:** • Use the most important XHTML capabilities to create web pages. • The student must demonstrate his capabilities to use all XHTML capabilities such as: Heading elements, Linking to other web pages, Hyperlinking to an E-Mail Address, Insert an Image in the document, Using Images as Hyperlinks, Displays text in an unordered list, Nested and ordered lists, Creates a table to display price information, Forms, Use Meta elements to provide keywords and a description of the page...etc.	7	A3.2, A10.1
3	**Lectures:** • Basic knowledge of Cascading Style Sheets (CSS): To control the appearance of a website by creating style sheets.	7	A3.3, A10.1

	Labs/Tutorials: • Control the appearance of the previous web page using the most import and CSS features such as: presents **inline styles** that declare an individual element's format using the XHTML attribute style, embed an entire CSS document in an XHTML document's head section using embedded style sheets, Inheritance in style sheets, Linking an external style sheet, Absolute and Relative positioning of elements, Adding background images and indentation, Element dimensions and text alignment, Borders of block-level elements, Building a CSS Drop-Down Menu, ….etc.		
4	**Lectures:** • **JavaScript scripting language and its Features:** Introduction to Scripting: Data types and arithmetic and Logical Operators, Decision Making: Equality and Relational Operators, Control Statements: if Selection Statement, Functions, if…else Selection Statement, while Repetition Statement, Nested Control Statements, for Repetition Statement, switch Multiple-Selection Statement, do…while Repetition Statement, break and continue Statements. • **Functions:** definitions and types. • **Arrays:** Declaring and Allocating Arrays, Examples Using Arrays, Passing Arrays to Functions, Sorting and Searching Arrays. **Labs/Tutorials:** • Use JavaScript to practice the main programming skills of using variables, Arrays, Conditions, Loops and Functions.	7	A3.4, A2.1, A10.1,B3.2
5	**Midterm**	7	A3.4, A2.1, A10.1,B3.2
6	**Lectures:** • Java Database Connectivity with MySQL (Connecting to MySQL Using the JDBC Driver Manager Interface) **Labs/Tutorials:** • Using JavaScript with connecting to MySQL using the JDBC Driver Manager Interface create web page(Write programs in java to access database) which will display the information from a database which includes the following, for an example: 7. Title of the book 8. Author Name 9. ISBN number 10. Publisher name 11. Edition 12. Price	7	A3.4, A2.1, A10.1,B3.1,B 3.2,B4.1

7	**Lectures:** • Introduction to PHP:What is PHP - App-server installing - PHP:Basic Syntax, Hello World example, – Variables and Operators, Examples, Conditional Statements, Examples, Loop Statements, Examples, Array,Examples, Functions, Examples, Form, Examples, Security, Examples,How to connect to MYSQL database using PHP. **Labs/Tutorials:** 8. Implement the above examples using PHP. 9. How to connect to MYSQL database using PHP 10. The functions used to connect web form to the MYSQL database. 11. Display the data from MYSQL database in web form. 12. Insert the data into MYSQL database using web form. 13. Update the data present in MYSQL database using web form. 14. Delete the data from MYSQL database using web form.	7	A3.4, A2.1, A10.1,B3.1,B3.2,B4.1,C6.1
8	**Lectures:** • Web Services - Document Object Model (DOM) - Cases Studies (Projects). **Labs/Tutorials:** Discussing everything in students' projects during implementation.	7	A3.4, A2.1, A10.1,B3.1,B3.2,B4.1,C6.1
9	Final submission of the project	7	A2.1, A3.1, A3.2, A3.3, A3.4, A10.1, B3.1, B3.2, B4.1, C6.1,

Course: Design of Web Applications	
Program LOs	**Course LOs**
A2. 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.	A2.1 Investigate the performance of web applications using computational facilities and techniques
A3. 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.	A3.1 Define the concepts of the programmed application servers on the Internet and the characteristics of the basic architectural elements of web sites and programs that produce content interactively. A3.2 Describe the knowledge and understanding of XHTML to be able to use its most important capabilities to create web pages. A3.3 Recognize basic knowledge of Cascading Style Sheets (CSS) to control the appearance of a website by creating style sheets. A3.4 Recognize basic knowledge of JavaScript to design and implement dynamic client-side web applications integrated with the server-side services.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Distinguish the different ideas, views, and knowledge from a range of sources to design and implement dynamic server-side web applications by programming the client-side with

	XHTML, CSS, and JavaScript and the server-side services.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Design internet services and web application security by applying appropriate techniques and strategies based on analytical thinking. B3.2 Incorporate the right programming languages, data base type and structure, techniques to access and process data, interact with the file system techniques, with essential resources to design, develop and deploy professional standard web applications using a variety of approaches to meet required objective.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate a given web application to enhance its performance by merging the engineering knowledge, understanding, and feedback
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Assess variety of design decisions of web applications by analyzing a wide range of analytical tools, techniques, and develop required program.

Course Coordinator: Dr. Emad El Sayed

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE425		
Year/ Level	Third year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
7	Apply control theory and measurement principals to understand modern control systems and design suitable controller strategies using a variety of approaches to meet required control system specifications and deal with the computer software such as Matlab.

3. Learning Outcomes (LOs):

A2.1	Demonstrate the knowledge and understanding the principles of design including elements, process and systems related to digital control system
A3.1	Recognize the definition, concepts, properties, objectives, and advantages of digital control systems.
A10.1	Recognize the basic knowledge of digital control system design techniques.
B3.1	Use computational facilities and techniques, measuring instruments, and laboratory equipment to design and test a specific digital control system.
B4.1	Combine the engineering knowledge, understanding, and feedback to improve the performance of a given digital control system.
C6.1	Apply MATLAB control toolboxes to analyze problems related to digital control systems.

4. Contents Course:

No.	Topics	Week
1	**Lectures:** **Introduction:** • Definition, concepts, properties, objectives, and advantages of digital control systems. • Comparison between analog and digital control systems **Tutorial/Lab:** • Install MATLAB/SIMULINK software • Overview of the MATLAB tool boxes related to control system analysis and design.	1-2
2	**Lectures:** • Introduction to discrete time systems including, modeling, sampling, and reconstruction of the signal using A/D and D/A conversions. • Z-transform as applied to Discrete-time systems with transformation from the s-plane to the z-plane. **Tutorial/Lab:** • Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	3-4
3	**Lectures:** • Time and frequency responses analysis of the digital control systems. **Tutorial/Lab:** • Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	5-7
4	**Midterm**	8
5	**Lectures:** • Modeling of Digital Control Systems **Tutorial/Lab:** Solving problems related to lectures topics using analytical methods and its verification using MATLAB	9-11
6	**Lectures:** Stability analysis techniques of digital control systems.	12-14

	Tutorial/Lab: • Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	
7	**Practical/ Oral Examination**	15

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A2.1**	x			x		x	x								
	A3.1	x			x		x	x				x				
	A10.1	x			x	x	x	x								
B-Level	**B3.1**	x			x		x	x								
	B4.1	x			x	x	x	x								
C-Level	**C6.1**	x			x		x								x	

6. Teaching and Learning Methods of Disable Students:

No.	**Teaching Method**
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1,A3.1,A10.1,B3.1
2	Practical Examination	A2.1, C6.2
3	Oral Examination	A10.1
4	Formative (quizzes- online quizzes- presentation – reports)	A2.1,A3.1,A10.1,B3.1,B4.1,C6.1
5	Final Term Examination (written)	A2.1,A3.1,A10.1,B3.1,B4.1,C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	10
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	10
4	Final Term Examination (written)	60
Total		100%

8. List of References

No.	Reference List
1	Digital control engineering: analysis and design / M. Sami Fadali, Antonio Visioli, Second edition, 2013.
2	Katsuhiko Ogata, “Modern Control Engineering”, Prentice-Hall, 2002.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lectures:** • Definition, concepts, properties, objectives, and advantages of digital control systems. • Comparison between analog and digital control systems **Tutorial/Lab:** • Install MATLAB/SIMULINK software • Overview of the MATLAB tool boxes related to control system analysis and design.	7	A2.1
2	**Lectures:** • Introduction to discrete time systems including, modeling, sampling, and reconstruction of the signal using A/D and D/A conversions. • Z-transform as applied to Discrete-time systems with transformation from the s-plane to the z-plane. **Tutorial/Lab:** • Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	7	A2.1,A10.1,B3.1,C6.1
3	**Lectures:** • Time and frequency responses analysis of the digital control systems. **Tutorial/Lab:** • Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	7	A2.1,B3.1,C6.1
4	**Midterm**	7	A2.1,A3.1,A10.1,B3.1
5	**Lectures:** • Modeling of Digital Control Systems	7	A2.1,B3.1,B4.1,C6.1

	Tutorial/Lab: - Solving problems related to lectures topics using analytical methods and its verification using MATLAB		
6	**Lectures:** Stability analysis techniques of digital control systems. **Tutorial/Lab:** Solving problems related to lectures topics using analytical methods and its verification using MATLAB.	7	A2.1,B3.1,B4.1,C6.1
7	**Practical/ Oral Examination**	7	C6.1

Course: Control Systems	
Program LOs	**Course LOs**
A2. 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.	A2.1 Demonstrate the knowledge and understanding the principles of design including elements, process and systems related to digital control system.
A3. 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.	A3.1 Recognize the definition, concepts, properties, objectives, and advantages of digital control systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Recognize the basic knowledge of digital control system design techniques.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Use computational facilities and techniques, measuring instruments, and laboratory equipment to design and test a specific digital control system.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Combine the engineering knowledge, understanding, and feedback to improve the performance of a given digital control system.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Apply MATLAB control toolboxes to analyze problems related to digital control systems.

Course Coordinator: Shereen El-Shekheby

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE426		
Year/ Level	Fourth year- First term		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	2	-

2. Course aims:

No.	aim
8	Design, operate and maintain mobile communication systems and different generations of mobile systems, such as, GSM, GPRS, EDGE, CDMA, WCDMA, CDMA and LTE.

3. Learning Outcomes (LOs):

A3-1	Apply knowledge of the fundamental principles of 1st and 2nd generations of mobile cellular communication systems and their futures.
A3-2	Apply the concepts and theories of mathematics and sciences, appropriate to mobile cellular communication systems and its propagation channel
A3-3	Identify the limitations of 2.5G and 2.75G wireless mobile communication using design of 3G and beyond mobile communication systems.
A10-1	Apply knowledge of IS-95 CDMA mobile communication standard, and its architecture, logical channels
A10-2	Utilize the third generation 3G standard, architecture logical channels
B2-1	Create the suitable planning method and propagation model for designing a mobile system.
B2-2	Model research and contemporary engineering topics of mobile cellular communication systems such as WiMAX and LTE.
B3-1	Implement combination of time slots and frequency subcarriers to increase data rate.
B4-1	Evaluate the performance of physical layers for different generations of mobile communication
C1-1	Recognize the management of radio-frequency spectrum resources to utilize the limited frequency band as a key of mobile networks efficiency.
C5-1	Demonstrate knowledge of mathematics, information technology, and engineering practice to analyze the problems concerning mobile communications design.
C7-1	Demonstrate the design tools of second generation to 2.7G, 3G and 4G.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** - The basic principles of mobile communications.	1
2	**Lectures:** - 1st Generation system features: Introduction and comparison between fist generation of mobile systems - Second Generation cellular system, GSM network architecture, Mobile station (MS), The base station subsystem (BSS),The mobile switching center (MSC), HLR (Home location register), VLR (Visitor location register), AUC (Authentication Center),EIR (Equipment identity register) ,The Operation and maintenance center (OMC) - Physical layer of GSM: GSM Frequency bands, Speech coding, Encoding, Interleaving, GSM security, the modulation scheme of the GSM system. **Labs / Tutorials:** - Review on Second generation system features.	٢- 4
3	**Lectures:** - Planning of cell center according to traffic engineering: Design the network structure, Frequency Reuse, Co-channel distance, Criteria for Handover, Cell classification, Types of channels - Radio problems and Propagation models: Multipath fading, Rician fading, Rayleigh fading, delay spread, time delay, Co-channel Interference, Microscopic diversity and combining techniques, Delay equalizer, Timing advance. **Labs/Tutorials:** - Review on planning of cell center according to traffic engineering.	5, 6
4	**Lectures:** - CDMA IS-95: Properties of Spread Spectrum SS Signal, The Strengths of CDMA, the difference between spreading and scrambling, IS-95 downlink transmission from BS, Downlink reception by MS, Long code scrambling, Walsh symbol modulation, IS-95 uplink process (Transmission and Reception), IS-95 Logical Channels. **Labs/Tutorials:** - Review on CDMA IS-95 properties.	7
5	Midterm	8
6	**Lectures:** - 2.5G (GPRS)General Packet Radio Service: Circuit-switching, packet-switching, GPRS coding schemes, New software and hardware to upgrade existing GSM network to GPRS, Gateway GPRS support node, Serving GPRS support node - 2.75(EDGE) Enhanced Data Rates for GSM Evolution: Hardware upgrade to	9- 11

	the BSS, EDGE benefits. **Labs/Tutorials:** • Review on 2.5G (GPRS) and 2.7 EDGE	
7	**Lectures:** • 3G (UMTS) WCDMA Frame Structure: Universal mobile telecommunications system, UMTS services, UMTS FDD and TDD, UMTS Terrestrial Radio Access Network, Node B, the functions of the RNC, UMTS interfaces, Spreading process in WCDMA – WIMAX: Worldwide Interoperability for Microwave Access, WiMAX (802.16) Standard, WiMAX FOURM, WiMAX salient features, physical (PHY) layer of WiMAX – LTE: Intro to physical (PHY) layer of LTE. **Labs/Tutorials:** • Review on 3G frame structure and WiMAX	12- 14
8	General Revision and Discussion.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online /in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3-1**	x	x	x			x	x								
	A3-2	x	x			x			x	x				x		
	A3-3	x	x			x	x	x		x						
	A10-1	x	x			x			x	x				x		
	A10-2	x	x			x	x	x		x						
B-Level	**B2-1**	x	x				x			x		x				
	B2-2	x					x			x				x	x	
	B3-1	x	x				x			x		x				
	B4-1	x					x			x				x	x	
C-Level	**C1-1**	x	x			x			x		x					
	C5-1	x	x		x					x				x	x	
	C7-1	x	x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3-1, A3-2, A3-3, A10-2, C1-1, C5-1
2	Formative (quizzes- online quizzes- presentation - reports)	A3-1, A3-2, A3-3, A10-1, A10-2, B2-1, B2-2, B3-1, B4-1, C1-1, C5-1, C7-1
3	Final Term Examination (written)	A3-1, A3-2, A3-3, A10-1, A10-2, B2-1, B2-2, B3-1, B4-1, C1-1, C5-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15%
2	Formative (quizzes- online quizzes- presentation - reports)	15%
3	Final Term Examination (written)	70%
Total		100%

8. List of References

No.	Reference List
1	William C. Y. Lee, Wireless and Cellular Communications, Third Edition, McGRAW-HILL, 2006
2	Jochen Schiller, "Mobile Communications", Pearson, 2008.
3	Gordon L. Stüber, "Principles of Mobile Communication", fourth Edition, Springer, 2017.
4	Advanced Electronic Communications Systems, by Wayne Tomasi Sixth Edition, Published by Prentice Hall, 2004.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Online facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	The basic principles of mobile communications.	8	A3-1, A3-2
2	1st Generation system features: Introduction and comparison between fist generations of mobile systems - Second Generation cellular system: Global system for mobile communication (GSM),GSM network architecture, Mobile station (MS), The base station subsystem (BSS),The mobile switching center (MSC), HLR (Home location register), VLR (Visitor location register), AUC (Authentication Center),EIR (Equipment identity register) ,The Operation and maintenance center (OMC) - Physical layer of GSM: GSM Frequency bands, Speech coding, Encoding, Interleaving, GSM security, the modulation scheme of the GSM system.	8	A3-1, A3-3.
3	Planning of cell center according to traffic engineering: Design the network structure, Frequency Reuse, Co-channel distance, Criteria for Handover, Cell classification, Types of channels - Radio problems and Propagation models: Multipath fading, Rician fading, Rayleigh fading, delay spread, time delay, Co-channel Interference, Microscopic diversity and combining techniques, Delay equalizer, Timing advance.	8	A3-2 B2-1, C1-1, C5-1 C7-1
4	CDMA IS-95: Properties of Spread Spectrum SS Signal, The Strengths of CDMA, the difference between spreading and scrambling, IS-95 downlink transmission from BS, Downlink reception by MS, Long code scrambling, Walsh symbol modulation, IS-95 uplink process (Transmission and Reception), IS-95 Logical Channels	8	A10-1, B2-1
5		8	A3-1, A3-2, A3-3,

	Midterm		A3-4, A10-2, C1-1, C5-1
6	2.5G (GPRS)General Packet Radio Service: Circuit-switching, packet-switching, GPRS coding schemes, New software and hardware to upgrade existing GSM network to GPRS, Gateway GPRS support node, Serving GPRS support node - 2.75(EDGE)Enhanced Data Rates for GSM Evolution: Hardware upgrade to the BSS, EDGE benefits.	8	A3-2, B3-1, C5-1, C7-1
7	3G (UMTS) WCDMA Frame Structure: Universal mobile telecommunications system, UMTS services, UMTS FDD and TDD, UMTS Terrestrial Radio Access Network, Node B, the functions of the RNC, UMTS interfaces, Spreading process in WCDMA – WIMAX: Worldwide Interoperability for Microwave Access, WiMAX (802.16) Standard, WiMAX FOURM, WiMAX salient features, physical (PHY) layer of WiMAX – LTE: Intro to physical (PHY) layer of LTE.	8	A3-1, B2-2, B3-1, B4-1, C7-1
8	General Revision and Discussion.	8	

Course: Mobile Communications	
Program LOs	**Course LOs**
A3. 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.	A3-1 Apply knowledge of the fundamental principles of 1^{st} and 2^{nd} generations of mobile cellular communication systems and their futures. A3-2 Apply the concepts and theories of mathematics and sciences, appropriate to mobile cellular communication systems. A3-3 Identify the limitations of 2.5G and 2.75G wireless mobile communication using design of 3G and beyond mobile communication systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Apply knowledge of IS-95 CDMA mobile communication standard, and its architecture, logical .channels A10-2 Utilize the third generation 3G standard, architecture, logical channels,
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Create the suitable planning method and propagation model for .designing a mobile system B2-2 Model research and contemporary engineering topics of mobile cellular communication systems such as WiMAX and LTE.
B3. Design and implement elements, modules, sub-systems or systems in electrical/electronic/digital engineering using	B3-1 Implement combination of time slots and frequency subcarriers to increase data rate.

technological and professional tools.	
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	B4-1 Evaluate the performance of physical layers for different generations of mobile communication
C1: Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1-1 Recognize the management of radio-frequency spectrum resources to utilize the limited frequency band as a key of mobile networks efficiency.
C5: Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate knowledge of mathematics, information technology, and engineering practice to analyze the problems concerning mobile communications design.
C7: Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks	C7-1 Demonstrate the design tools of second generation to 2.7G, 3Gand 4G.

Course Coordinator: Dr. Heba Abd El Atty

Department Coordinator: Dr. Rania Abdalla

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE427		
Year/ Level	Fourth year- First Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	**Aim**
9	Model, analyze, design and build photonic devices, optical transmitter, receiver, amplifiers splices, connectors, and the problems encountered in optical fiber communications systems.

3. Learning Outcomes (LOs):

A3-1	Describe the problem of attenuation and dispersion along with their causes and remedies in order to design high data rate fiber cable.
A3-2	Demonstrate knowledge of optical waveguides, step index fibers and graded index fibers.
A10.1	Search for information related to advances in fiber optics and networks.
B2-1	Analyze the optical signal phenomena using both the ray-theory and electromagnetic theory to solve propagation problems.
B2-2	Identify the suitable tools required to optimize the optical signal propagation.
B3.1	Apply knowledge of mathematics, science, and engineering knowledge and practice integrally to solve realistic engineering problems related to optical communications systems.
B4.1	Evaluate the characteristics and performance of optical components and systems.
C1-1	Apply the physical phenomena of the wavelength characteristics to solve the optical signal propagation problems.
C5-1	Demonstrate the knowledge about state of the art of optical link budget.
C7-1	Demonstrate additional abilities related to model and analyze results of optoelectronic component models to assess their limitations.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Introduction to telecommunications and fiber optics - Physics of light (ray theory, electromagnetic-wave theory, and quantum theory).	1-2
2	**Lecture:** Optical waveguides - Step index fibers and graded index fibers.	3-4
3	**Lecture:** Attenuation and dispersion problems.	5-7
4	**Midterm written examination**	8
5	**Lecture:** Optical fiber cables characteristics, installation and test - Optical fiber measurements - Optical sources	9-10
6	**Lecture:** Optical Detectors and Fiber optic Receivers.	11-12
7	**Lecture:** Introduction to fiber optic networks and its components.	13-14
8	**General Revision and Discussion.**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A3-1**	x			x		x	x								
	A3-2	x			x		x	x								
	A10-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
	B3-1	x	x	x	x		x		x			x				
	B4-1	x			x		x									
C-Level	**C1-1**	x			x		x	x								
	C5-1	x			x	x	x	x				x				
	C7-1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3-1, A3-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A3-1, A3-2, A10-1, B2-1, B2-2, C1-1, C5-1, C7-1
3	Final Term Examination (written)	A3-1, A3-2, A10-1, B2-1, B2-2, C1-1, C5-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Gupta, S. C. Textbook on optical fiber communication and its applications. PHI Learning Pvt. Ltd., 2018
2	J. M. Senior, Optical Fiber Communications: Principles and Practice, Prentice-Hall, Third Edition, 2009.
3	R. Jaaniso and O. K. Tan, Semiconductor Gas Sensors, First Edition, Woodhead Publishing. 2013.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** Introduction to telecommunications and fiber optics - Physics of light (ray theory, electromagnetic-wave theory, and quantum theory).	9	A3-1, C1-1
2	**Lecture:** Optical waveguides - Step index fibers and graded index fibers.	9	A3-1, A3-2, B2-1,C1-1, C5-1
3	**Lecture:** Attenuation and dispersion problems.	9	A3-1, A3-2, C5-1
4	**Midterm written examination**	9	A3-2, B2-1, B2-2, C1-1
5	**Lecture:** Optical fiber cables characteristics, installation and test - Optical fiber measurements - Optical sources	9	A3-1, A3-2, B2-1, B2-2, C1-1
6	**Lecture:** Optical Detectors and Fiber optic Receivers.	9	A1-3, B2-1, B2-2, C5-1
7	**Lecture:** Introduction to fiber optic networks and its components.	9	A3-2,A10-1, B2-1, B2-2, C1-1, C5-1, C7-1
8	**General Revision and Discussion.**	9	A3-1, A3-2, A10-1 B2-1, B2-2, C1-1, , C5-1, C7-1

Course: Optical Communications	
Program LOs	**Course LOs**
A3. 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.	A3-1 Describe the problem of attenuation and dispersion along with their causes and remedies in order to design high data rate fiber cable. A3-2 Demonstrate knowledge of optical waveguides, step index fibers and graded index fibers.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Search for information related to advances in fiber optics and networks.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze the optical signal phenomena using both the ray-theory and electromagnetic theory to solve propagation problems. B2-2 Identify the suitable tools required to optimize the optical signal propagation.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Apply knowledge of mathematics, science, and engineering knowledge and practice integrally to solve realistic engineering problems related to optical communications systems.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Evaluate the characteristics and performance of optical components and systems.
C1. Understand the underlying physical phenomena and limitations of the performance	C1-1 Apply the physical phenomena of the wavelength characteristics to solve the

of components and systems in Electronics and Communications Engineering.	optical signal propagation problems.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate the knowledge about state of the art of optical link budget.
C7: Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems.	C7-1 Demonstrate additional abilities related to model and analyze results of optoelectronic component models to assess their limitations.

Course Coordinator: Dr. Islam E. Shaalan

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE428		
Year/ Level	Fourth year- First Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
4	Use contemporary engineering tools, and techniques in the field of electronics engineering that deals with new trends theoretical and practical.

3. Learning Outcomes (LOs):

A3.1	Recognize principles of advanced electronic devices design including elements, processes and systems.
A10.1	Investigate fabrication procedure related to advance Electronics such as Nano devices and VLSI.
B2.1	Practice knowledge of electronics theories to design advanced electronic systems.
B3.1	Assess the characteristics and performance of electronic components, systems and processes.
B4.1	Discuss the simulated and measured results of advanced electronic systems.
C1.1	Combine the engineering knowledge, understanding, and feedback to improve design, products and/or services.
C5.1	Identify the physical limitations involved with different electronic processes.
C7.1	Conduct recent literature surveys that is related to advanced electronics.

4. Course Contents:

No.	Topics	Week
1	• Introduction to advanced electronic systems	1
2	• Recognizability of the different aspects of advanced contemporary topics in nano- devices and VLSI circuits.	2-3
3	• Definition of: Gate arrays - standard cells - Custom design approach. Introduction to VLSI Logic Circuits Design Using FPGA. • Deals with new trends theoretical and practical in the field of electronics engineering.	4-5
4	• Synthesize and integrate advanced electronic systems for certain specific function using the right most recent components, building blocks and/or equipment.	6-7
5	Midterm	8
6	• Investigate different techniques of realizing electronic microstrip filters	9-10
7	• CMOS dynamic digital circuits analysis and design	11-12
8	• Introduction and definition - Read-Only Memory (ROM) - Random Access Memory – Static memory cell – Dynamic memory cell – Sense amplifier – Address decoders.	13-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	**A1-1**	x			x		x	x								
	A10-1	x	x		x	x	x	x				x	x			
B-Level	**B2-1**	x			x		x	x								
	B3-2	x			x		x	x								
	B3-4	x	x		x	x	x	x				x	x			
C-Level	**C1-1**	x			x		x	x								
	C5-1	x			x		x	x				x				
	C7-1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A10.1
2	Formative (quizzes- online quizzes- presentation - reports)	A3.1, A10.1, C1.1, C5.1, C7.1, B4.1, B3.1, B2.1
3	Final Term Examination (written)	A3.1, A10.1, C.1.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	16
2	Formative (quizzes- online quizzes- presentation - reports)	16
3	Final Term Examination (written)	68
Total		100%

8. List of References

No.	Reference List
1	Adel S. Sedra, and Kenneth C. Smith. *Microelectronic circuits*. New York: Oxford University Press, 2007.
2	Razavi, Behzad. *Fundamentals of microelectronics*. John Wiley & Sons, 2013.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	• Introduction to advanced electronic systems	4	A3.1
2	• Recognizability of the different aspects of advanced contemporary topics in nano- devices and VLSI circuits.	4	A10.1, B3.1
3	• Definition of: Gate arrays - standard cells - Custom design approach. Introduction to VLSI Logic Circuits Design Using FPGA. • Deals with new trends theoretical and practical in the field of electronics engineering.	4	A10.1, B2.1
4	• Synthesize and integrate advanced electronic systems for certain specific function using the right most recent components, building blocks and/or equipment.	4	B4.1, C1.1
5	Midterm	4	A3.1, A10.1, B3.1
6	• Investigate different techniques of realizing electronic microstrip filters	4	C1.1, C5.1
7	• CMOS dynamic digital circuits analysis and design	4	B4.1, C7.1
8	• Introduction and definition - Read-Only Memory (ROM) - Random Access Memory – Static memory cell – Dynamic memory cell – Sense amplifier – Address decoders.	4	A3.1, C1.1

Course: Selected Topics in Electronics	
Program LOs	**Course LOs**
A3. 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.	A3.1 Recognize principles of advanced electronic devices design including elements, processes and systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Investigate fabrication procedure related to advanced Electronics such as Nano devices and VLSI.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Practice knowledge of electronics theories to design advanced electronic systems.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Assess the characteristics and performance of electronic components, systems and processes.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Discuss the simulated and measured results of advanced electronic systems.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1.1 Combine the engineering knowledge, understanding, and feedback to improve design, products and/or services.

C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5.1 Identify the physical limitations involved with different electronic processes.
C7: Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7.1 Conduct recent literature surveys that is related to advanced electronics.

Course Coordinator: Dr. Sherif Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">HUD405</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Fourth level - First semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Minor</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical</td></tr>
<tr><td>2</td><td>---</td><td>---</td></tr>
</table>

2. Course Aims:

No.	**Aim**
3	Work in and lead a heterogeneous group of engineers and technicians in different specialties and how to think in an innovative way or as an entrepreneur with emphasis to business plans, how a private business is initiated, planned, and reserved in an innovative way.

3. Learning Outcomes (LOs):

A4-1	Define the terms: "entrepreneur" and "small business manager".
A4-2	Describe the essential facts and knowledge to manage and operate a small business or incorporation successfully.
A4-3	Recognize the meaning, origins, and tools of innovative engineering and entrepreneurship
A4-4	Recognize the steps required to construct business plan and to initiate a small business.
A7-1	Use basic organizational and project management skills for creating business plan according to your project type.
A7-2	Use knowledge and skills with engineering community and industry for constructing a business plan for an industrial project with balance sheet and cash flow.
A7-3	Manage tasks, time and resources when dealing with new business entrepreneurship.
A9-1	Use creative and innovative thinking to find out the business that suits your skills.
A9-2	Create systematic and methodical approaches when dealing with new business entrepreneurship to be good entrepreneur and how you find out your innovative skills.
A9-3	Acquire entrepreneurial skills such as innovative thinking "out of the box".

4. Course Contents:

No.	*Topic*	Week
1	1. Innovation and Entrepreneurship	Week-1
2	2. Small project and entrepreneur	Week-2
3	3. Business entrepreneurship	Week 3
4	4. The entrepreneur	Week 4
5	5. How to be an entrepreneur	Week 5-6
6	6. How to find a good innovative business idea	Week 7
7	7. Midterm	Week 8
8	8. Exam How to manage a small business or incorporation.	Week 9
9	9. How to operate a small business.	Week 10
10	10. Steps required to initiate a small business	Week 11-12
11	11. Construct business plan.	Week 13-14
12	12. Review	Week 15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/In class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	A4-1	X				X			X							
	A4-2	X		X		X			X							
	A4-3	X		X		X			X							
	A4-4	X				X			X			X	X			
	A7-1	X				X		X	X			X				
	A7-2	X				X			X			X				
	A7-3	X				X			X			X				
	A9-1	X	X		X	X			X	X			X			
	A9-2	X	X		X	X			X	X			X			
	A9-3	X	X		X	X			X	X			X			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and documentation.

7. Student assessment:

7.1 Student Assessment Methods:

No.	**Assessment Method**	**LOs**
1	Mid Term Examination (written/ online)	A4-1, A4-2, A7-1, A7-2, A7-3, A9-1, A9-2, A9-3
2	Formative (quizzes- online quizzes-reports)	A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3
3	Presentation and Monitoring assessment	A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A9-1, A9-2, A9-3
4	Final Term Examination (written)	A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A9-1, A9-2, A9-3

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8th week
2	Formative (quizzes- online quizzes- reports)	weekly
3	Presentation and Monitoring assessment	15th week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	**Assessment Method**	**Weights**
1	Mid Term Examination (written/ online)	5
2	Formative (quizzes- online quizzes - reports)	10
3	Presentation and Monitoring assessment	5
4	Final Term Examination (written)	80
Total		100%

8. List of References

No.	**Reference List**
1	By staff of entrepreneur Media Inc. business, “Entrepreneur voices on emotional intelligence.”, online book, 2018.
2	Butler, John, E; Butler, John E,, “Opportunity identification and entrepreneurial behavior”, Research in entrepreneurship and management Opportunity identification and entrepreneurial behavior, 2004

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Sound System Facility
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	Innovation and Entrepreneurship	3	A4-1, A4-3
2	Small project and entrepreneur	3	
3	Business entrepreneurship	3	A7-1, A7-3, A9-1, A9-2
4	The entrepreneur	3	
5	How to be an entrepreneur	3	A7-1, A7-2, A7-3, A9-1, A9-2, A9-3
6	How to find a good innovative business idea	3	
7	Midterm Exam	3	A4-1, A4-2, A7-1, A7-2, A7-3, A9-1, A9-2, A9-3
8	How to manage a small business or incorporation.	3	A7-1, A7-2, A7-3, A9-1, A9-2, A9-3
9	How to operate a small business.	3	A4-3, A4-4, A9-1, A9-2, A7-1, A7-2, A7-3, A9-3
10	Steps required to initiate a small business	3	
11	Construct business plan.	3	
12	Review	3	A4-1, A4-2, A4-3, A4-4, A7-1, A7-2, A7-3, A9-1, A9-2, A9-3

Course: Innovation and Entrepreneurship	
Program LOs	Course LOs
A4- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.	A4-1 Define the terms: "entrepreneur" and "small business manager". A4-2 Describe the essential facts and knowledge to manage and operate a small business or incorporation successfully. A4-3 Recognize the meaning, origins, and tools of innovative engineering and entrepreneurship A4-4 Recognize the steps required to construct business plan and to initiate a small business.
A7- Function efficiently as an individual and as a member of multi-disciplinary and multi-cultural teams.	A7-1 Use basic organizational and project management skills for creating business plan according to your project type. A7-2 Use knowledge and skills with engineering community and industry for constructing a business plan for an industrial project with balance sheet and cash flow. A7-3 Manage tasks, time and resources when dealing with new business entrepreneurship.
A9- Use creative, innovative, and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Use creative and innovative thinking to find out the business that suits your skills A9-2 Create systematic and methodical approaches when dealing with new business entrepreneurship to be good entrepreneur and how you find out your innovative skills. A9-3 Acquire entrepreneurial skills such as innovative thinking "out of the box".

Course Coordinator: Dr. Ahmed Daoud

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE423		
Year/ Level	Fourth year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
1	Apply knowledge of mathematics, basic sciences and engineering principles to recognize basic building blocks of communication systems, and the design of radio-frequency circuits such as single-tuned and staggered-tuned circuits, oscillators using negative-resistance devices, phase-locked loops, RF amplifiers, video amplifiers, frequency converters, mixers, AM circuits, FM circuits, PM circuits, AM detectors, FM detectors, PM detectors, AGC systems, transmitter and receiver circuits, and low-noise amplifiers.

3. Learning Outcomes (LOs):

A3.1	Describe the basic building blocks of a communication system, and the circuits required for their realizations.
A10.1	Select appropriate mathematical and computer-based methods for modeling and analyzing problems related to radio frequency communication systems.
B2-1	Evaluate the performance of super heterodyne receiver building blocks.
B3.1	Classify different AM, FM, and PM modulators and demodulators circuits.
B4.1	Determine the suitable building block that used in the design of a super heterodyne receiver to meet a certain requirements.
C3.1	Evaluate a variety of communication electronic circuits to meet specific requirements.
C5.1	Utilize the knowledge of Microwave Devices.
C7.1	Practice the concepts and theories related to the tuned radio-frequency circuits analysis and design

4. Course Contents:

No.	Topics	Week
1	• Introduction to communication electronics -Description the basic building blocks of a communication system, and the circuits required for their realizations.	1-2
2	• Concepts and theories related to radio-frequency circuits - Analysis and design of tuned circuits and amplifiers – Low noise amplifier	3-4
3	• Analysis and design of oscillator circuits using negative resistance devices- Frequency multipliers and Mixers.	5-7
4	• Midterm Exam	8
5	• AM, FM, and PM modulators and demodulators circuits.	9-10
6	• Phase-locked loops: analysis and design - Automatic gain control circuits: Analysis and Design.	11-12
7	• Super heterodyne receivers: Analysis and Design	13-14
8	• Introduction to Microwave Devices.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3.1	x			x		x	x								
	A10.1	x			x		x	x							x	
B-Level	B2.1	x			x		x	x								
	B3.1	x			x		x	x						x		
	B4.1	x			x		x	x				x				
C-Level	C3.1	x			x		x	x						x		
	C5.1	x			x		x	x				x				
	C7.1	x			x		x	x				x			x	

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A10.1, B2.1
2	Formative (quizzes- online quizzes- presentation - reports)	A3.1, A10.1, B2.1, B3.1, C3.1, C5.1, C7.1
3	Final Term Examination (written)	A3.1, A10.1, B2.1, B.1, C5.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	16
2	Formative (quizzes- online quizzes- presentation - reports)	16
4	Final Term Examination (written)	68
Total		100%

8. List of References

No.	Reference List
1	B. Razavi, Fundamentals of Microelectronics, Second Edition, Wiley, USA, 2014.
2	S. Sedra and K. C. Smith, Microlectrnmic Circuits, Oxford, Seventh Edition, New York, 2015.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	• Introduction to communication electronics - Description the basic building blocks of a communication system, and the circuits required for their realizations.	1	A3.1, A10.1
2	• Concepts and theories related to radio-frequency circuits - Analysis and design of tuned circuits and amplifiers – Low noise amplifier	1	A3.1, B2.1
3	• Analysis and design of oscillator circuits using negative resistance devices- Frequency multipliers and Mixers.	1	A3.1, A10.1, B2.1
4	• Midterm Exam	1	A3.1, A10.1, B2.1
5	• AM, FM, and PM modulators and demodulators circuits.	1	A3.1, B2.1, C7.1, B3.1
6	• Phase-locked loops: analysis and design - Automatic gain control circuits: Analysis and Design.	1	A3.1, B4.1, C3.1
7	• Super heterodyne receivers: Analysis and Design	1	A3.1, A10.1, B4.1
8	• Introduction to Microwave Devices.	1	C5.1

Course: Communications Electronics	
Program LOs	**Course LOs**
A3. 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.	A3.1 Describe the basic building blocks of a communication system, and the circuits required for their realizations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Select appropriate mathematical and computer-based methods for modeling and analyzing problems related to radio frequency communication systems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Evaluate the performance of super heterodyne receiver building blocks.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Classify different AM, FM, and PM modulators and demodulators circuits.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Determine the suitable building block that used in the design of a super heterodyne receiver to meet a certain requirements.
C3: Design and compare between alternative components and systems in Electronics and Communications Engineering	C3.1 Evaluate a variety of communication electronic circuits to meet specific requirements.

C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5.1 Utilize the knowledge of Microwave Devices.
C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7.1 Practice the concepts and theories related to the tuned radio-frequency circuits analysis and design

Course Coordinator: Dr. Sherif Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE424		
Year/ Level	Fourth year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
1	Apply knowledge of different communication systems, their specifications, and application of communications theory.

3. Learning Outcomes (LOs):

A3-1	Recognize the principles of design including elements, process and systems related to TV systems.
A3-2	Recognize the principles of design including elements, process and systems related to radar systems.
A10-1	Search for new knowledge and practice self, lifelong about different modern communications systems.
B2-1	Analyze different wide band transmission systems.
B3-1	Analyze cognitive radio systems.
C2-1	Design digital communication systems using SDR
C5-1	Demonstrate the knowledge about state of the art of communication systems.
C7c-1	Demonstrate additional abilities to model, analyze and design communication systems.

4. Course Contents:

No.	Topics	Week
1	**Lectures:** Television system**:** - basic TV system - Picture tube and camera tube - color TV **Tutorials:** - discuss and review examples related to TV systems (sheet 1, 2 and 3)	1-4
2	**Lectures:** Radar system**:** - Radar fundamental - scanning resolution **Tutorials:** - discuss and review examples related to radar systems (sheet 4, 5 and 6)	5-7
4	**Midterm**	8
5	**Lectures:** - Students present modern topics in communication systems. **Tutorials:** - Discuss the presented topics in students presentations	9
6	**Lectures:** - Introduction to cognitive radio systems**:** **Tutorials:** - Explain with examples properties of cognitive radio systems (sheets 7 and 8)	10-11
7	**Lectures:** - Introduction to soft defined radio. **Tutorials:** - Explain with examples soft defined radio **(**sheet 9)	12-13
8	**Lectures:** - Wide band transmission in 4G and 5G. **Tutorials:** Explain with examples properties of Wide band transmission (sheet 10).	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online /in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3-1**	X	X			X	X	X	X							
	A3-2	X	X			X	X	X	X							
	A10-1	X	X	X	X	X	X		X		X	X	X			
B-Level	**B2-1**	X	X			X	X	X	X							
	B3-1	X	X			X	X	X	X							
C-Level	**C2-1**	X	X			X	X	X	X							
	C5-1	X	X	X	X	X	X		X		X	X	X			
	C7c-1	X	X			X	X	X	X							

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3-1, A3-2, C7c-1
2	Formative (quizzes- online quizzes- presentation - reports)	A3-1, A3-2, A10-1, B2-1, B3-1, C5-1, C7c-1
3	Final Term Examination (written)	A3-1, A3-2, B2-1, B3-1, C5-1, C7c-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	Course Notes: Deliver during lectures.
2	L. E. Frenzel, "Principles of Electronic Communication Systems", Mc Graw-Hill Education. 2016.
3	R. L. Freeman, "Fundamentals of Telecommunications", John Wiley and Sons. 2nd edition, 2005.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lectures:** Television system**:** • basic TV system • Picture tube and camera tube • color TV **Tutorials:** • discuss and review examples related to TV systems (sheet 1, 2 and 3)	1	A3-1, C7c-1
2	**Lectures:** Radar system**:** • Radar fundamental • scanning resolution **Tutorials:** • discuss and review examples related to radar systems (sheet 4, 5 and 6)	1	A3-2, C7c-1
3	**Midterm**	1	A3-1, A3-2, C7c-1
4	**Lectures:** • Students present modern topics in communication systems. **Tutorials:** • Discuss the presented topics in students presentations	1	A10-1, C5-1
5	**Lectures:** • Introduction to cognitive radio systems**:** **Tutorials:** • Explain with examples properties of cognitive radio systems (sheets 7 and 8)	1	B3-1, C5-1, C7c-1
6	**Lectures:** • Introduction to soft defined radio. **Tutorials:** • Explain with examples soft defined radio **(**sheet 9)	1	C2-1, C5-1, C7c-1

7	**Lectures:** - Wide band transmission in 4G and 5G. **Tutorials:** Explain with examples properties of Wide band transmission (sheet 10).	1	B2-1, C5-1, C7c-1

Course: Communication Systems	
Program LOs	**Course LOs**
A3. 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.	A3-1 Recognize the principles of design including elements, process and systems related to TV systems. A3-2 Recognize the principles of design including elements, process and systems related to radar systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Search for new knowledge and practice self, lifelong about different modern communications systems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze different wide band transmission systems.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/ digital engineering using technological and professional tools.	B3-1 Analyze cognitive radio systems.
C2: Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance	C2-1 Design digital communication systems using SDR
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate the knowledge about state of the art of communication systems.
C7c. Demonstrate additional abilities to model, analyze, design and build communication engineering systems and networks.	C7c-1 Demonstrate additional abilities to model, analyze and design communication systems.

Course Coordinator: Dr. Saly Saad Hassaneen

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">ECE425</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Fourth year- Second semester</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>2</td><td>1</td><td>1</td></tr>
</table>

2. Course aims:

No.	**aim**
6	Manipulate with the analog integrated circuits, all the way from the basic building blocks to the analysis and design of completer operational-amplifier circuits.

3. Learning Outcomes (LOs):

A5-1	Describe the basic operation of the basic building blocks of analog integrated circuits.
A5-2	State the performance metrics of typical amplifier.
A8-1	Describe the main fabrication steps of analog integrated circuits.
A8-2	Select the appropriate topology for the analog integrated circuit according to the application.
B2-1	Analyze a certain cascaded amplifier.
B2-2	Design a typical operational amplifier.
B3-1	Implement a typical cascaded amplifier with discrete elements.
B4-1	Discuss the various limitations of modern CMOS technologies.
C3-1	Illustrate the basic limitations of typical amplifiers.
C4-1	Identify the appropriate amplifier topology.
C7-1	Evaluate a certain CMOS technology.

4. Course Contents:

No.	Topic	Week
1	**Lecture:** **1- Overview of Integrated Circuits Terminologies, Definitions and Fabrication:** Overview of Integrated Circuits Definition and Fabrication Processes. **Lab/Tutorial:** Review of Workbench simulator with examples.	**Week** **1**
2	**Lecture:** **2- Integrated Passive and Active Elements Characterization:** Integrated Resistors, Integrated Capacitors, Review of Integrated semiconductor devices Models. **3- CMOS Fabrication Technologies and Layout of Integrated Passive and Active Elements**. **Lab/Tutorial:** Study the effects of different MOS and Bipolar transistors models on the performance of a simple common emitter amplifier circuit using Workbench. Then, summit a report.	**Week** **2, 3**
3	**Lecture:** **4- Analog Integrated Circuit Building Blocks:** **4-1 Introduction**: Basic Amplifier Stages **4-2 Biasing Stage: Current Mirror**: Simple current source; Base current compensated current mirror. Cascode Current Source; Wilson Current Source; Resistor-Ratioed Current Source; Widlar Current Source. **Lab/Tutorial:** Training on how to use the electronic laboratory equipment/ Use computational facilities and techniques to analyze the above biasing stages and interpret results/ Use the electronic laboratory equipment to implement the related practical experimental work and analyze its results correctly/ Solving problems.	**Week** **4-6**
4	**Lecture:** **5-3 Voltage References**: Simple BJT and MOS voltage reference;	**Week** **7**

	Power supply independent voltage reference; Concept of a band gap voltage reference. **5-4 DC-Level Shift Stages**: V_{BE} voltage shift stage; Cascade emitter flower level shift stage; Composite npn-pnp level shift stage. **Lab/Tutorial:** Uses the electronic laboratory equipment to implement the practical experimental work related to the above biasing stages and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.	
5	**Midterm written examination & Project Starting** **Design project** is the activity to which this course is focused. The project improves the student ability to see the simplicity in a complex design problem, a skill that is not usually taught in engineering classes. The design project will require significant design effort, simulations and/or lab work, and a written report (From week 8 to week 14).	**Week 8**
6	**Lecture:** **5-5 Gain Stages:** Concepts of inverting amplifier. Differential Amplifier: internal structure of BJT and MOS Differential amplifier; DC analysis and AC analysis. **Lab/Tutorial:** Solving problems.	**Week 9, 10**
7	**Lecture:** **5-6 Output Stages (Power Amplifier): Introduction:** Design requirements, Classes Classification, and Features and Metrics**.** Class A Power Amplifier. **Lab/Tutorial:** Computer and practical Labs to design Class A power amplifier	**Week ١1, 12**
8	**Lecture:** **5-6 Output Stages (Power Amplifier): Class B, Class AB and Class C power amplifiers.** **Lab/Tutorial:** Uses the electronic laboratory equipment to implement the practical experimental work related to Output Stages and analyze its results correctly. Then summit a report. Solving problems.	**Week 13**

9	**Lecture:** **7- A/D and D/A converters:** Concepts, Types, analysis and design. **Lab/Tutorial:** Uses the electronic laboratory equipment to implement the practical experimental work related to IC Voltage Regulator and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.	**Week 14**
10	Review and project discussion	**Week 15**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (online/in class)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A5-1**	x	x	x			x	x								
	A5-2			x			x				x					
	A8-1	x	x			x			x	x				x		
	A8-2	x	x			x	x	x		x						
B-Level	**B2-1**		x				x			x		x		x		
	B2-2			x						x				x		
	B3-1				x					x			x			
	B4-1						x			x				x	x	
C-Level	**C3-1**		x			x			x		x					
	C4-1		x		x					x				x	x	
	C7-1		x		x					x				x	x	

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A5-1, A5-2, A8-1, A8-2, B2-1, B2-2, B3-1, B4-1, C3-1, C4-1, C7-1
2	Practical Examination	A5-1, A5-2, A8-1, A8-2, B2-1, B2-2, B3-1, B4-1
3	Oral Examination	A8-1, A8-2
4	Formative (quizzes- online quizzes- presentation - reports)	A5-1, A8-2, B4-1, C1-1, C7-1
5	Final Term Examination (written)	A5-1, A5-2, A8-1, A8-2, B2-1, B2-2, B3-1, B4-1, C3-1, C4-1, C7-1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Practical/ Oral Examination	20
3	Formative (quizzes- online quizzes- presentation - reports)	1٠
4	Final Term Examination (written)	6٠
Total		100%

8. List of References

No.	Reference List
1	Paul R. Gray , Paul J. Hurst , Stephen H. Lewis , Robert G. Meyer, " Analysis and Design of Analog Integrated Circuits,", John Wiley and Sons Ltd, 5th Edition, 2009.
2	Tony Chan Carusone, David Johns, Kenneth W. Martin," Analog Integrated Circuits Design", John Wiley and Sons, 2nd Edition, 2012.
3	Behzad Razavi, " Design of Analog CMOS Integrated Circuits,", McGraw-Hill Education, 20 Jan 2016.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LOs
1	**Lecture:** **1- Overview of Integrated Circuits Terminologies, Definitions and Fabrication:** Overview of Integrated Circuits Definition and Fabrication Processes. **Lab/Tutorial** Review of Workbench simulator with examples.	6	A5-1 , A8-1, C3-1, C4-1
2	**Lecture:** **2- Integrated Passive and Active Elements Characterization:** Integrated Resistors, Integrated Capacitors, Review of Integrated semiconductor devices Models. **3- CMOS Fabrication Technologies and Layout of Integrated Passive and Active Elements**. **Lab/Tutorial** Study the effects of different MOS and Bipolar transistors models on the performance of a simple common emitter amplifier circuit using Workbench.	6	A5-1, A5-2, A8-1, A8-2, B2-1, B3-1, B4-1

	Then, summit a report.		
3	**Lecture:** **4- Analog Integrated Circuit Building Blocks:** **4-1 Introduction**: Basic Amplifier Stages **4-2 Biasing Stage: Current Mirror**: Simple current source; Base current compensated current mirror. Cascode Current Source; Wilson Current Source; Resistor-Ratioed Current Source; Widlar Current Source. **Lab/Tutorial:** Training on how to use the electronic laboratory equipment/ Use computational facilities and techniques to analyze the above biasing stages and interpret results/ Use the electronic laboratory equipment to implement the related practical experimental work and analyze its results correctly/ Solving problems.	6	A5-1, A5-2, A8-1, A8-2, B2-2, C3-1, C4-1, C7-1
4	**Lecture:** **5-3 Voltage References**: Simple BJT and MOS voltage reference**;** Power supply independent voltage reference; Concept of a band gap voltage reference. **5-4 DC-Level Shift Stages**: V_{BE} voltage shift stage; Cascade emitter flower level shift stage; Composite npn-pnp level shift stage. **Lab/Tutorial** Uses the electronic laboratory equipment to implement the practical experimental work related to the above biasing stages and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.	6	A5-1, A5-2, A8-1, A8-2, B2-1, B3-1, B4-1
	Midterm written examination & Project Starting	A5-1, A5-2, A8-1, A8-2, B2-1, B2-2, B3-1, B4-1, C3-1, C4-1, C7-1	
	Design project is the activity to which this course is focused. The project improves the student ability to see the simplicity in a complex design problem, a skill that is not usually taught in engineering classes. The design project will require significant design effort, simulations and/or lab work, and a written report.	From week 8 to week 14	B2-1, B2-2, B3-1, B4-1, C3-1, C4-1

5	**Lecture:** **5-5 Gain Stages:** Concepts of inverting amplifier. Differential Amplifier: internal structure of BJT and MOS Differential amplifier; DC analysis and AC analysis. **Tutorial:** Solving problems.	6	A5-1, A5-2, A8-1, A8-2, B2-1
6	**Lecture:** **5-6 Output Stages (Power Amplifier): Introduction:** Design requirements, Classes Classification, and Features and Metrics**.** Class A Power Amplifier. **Lab/Tutorial:** Computer and practical Lab**s** to design Class A power amplifier	6	B2-1, B2-2, B3-1, C4-1, C7-1
7	**Lecture:** **5-6 Output Stages (Power Amplifier) : Class B , Class AB and Class C power amplifiers.** **Lab/Tutorial:** Uses the electronic laboratory equipment to implement the practical experimental work related to Output Stages and analyze its results correctly. Then summit a report. Solving problems.	6	B2-1, B2-2, B3-1, B4-1, C3-1, C4-1, C7-1
8	**Lecture:** **7- A/D and D/A converters:** Concepts, Types, analysis and design. **Lab/Tutorial** Uses the electronic laboratory equipment to implement the practical experimental work related to IC Voltage Regulator and analyze its results correctly, and cheek it using the workbench simulation. Then summit a report.	6	C3-1, C4-1, C7-1
	Review and project discussion		

Course: Analog Integrated Circuits	
Program LOs	**Course LOs**
A5. Practice research techniques and methods of investigation as an inherent part of learning.	A5-1 Describe the basic operation of the basic building blocks of analog integrated circuits. A5-2 State the performance metrics of typical amplifier.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8-1 Describe the main fabrication steps of analog integrated circuits. A8-2 Select the appropriate topology for the analog integrated circuit according to the application.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2-1 Analyze a certain cascaded amplifier. B2-2 Design a typical operational amplifier.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3-1 Implement a typical cascaded amplifier with discrete elements.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4-1 Discuss the various limitations of modern CMOS technologies.
C3. Design and compare between alternative components and systems in Electronics and Communications Engineering	C3-1 Illustrate the basic limitations of typical amplifiers.
C4. Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.	C4-1 Identify the appropriate amplifier topology.

C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7-1 Evaluate a certain CMOS technology.

Course Coordinator: Dr. Sherif M. Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE428		
Year/ Level	Fourth year - Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
1	Apply knowledge of engineering concepts and analytical, critical, and abilities to deal with the wireless communications systems and the wireless network architectures, protocols, standards and applications.

3. Learning Outcomes (LOs):

A2.1	Develop the schemes that are used for wireless data communication.
A2.2	Conduct the elements used in the wireless computer networks.
A4.1	Perform simulation for different wireless network topologies.
A10.1	Apply knowledge of network to analyze the network performance.
B2.1	Apply knowledge of mathematics, science, design, and engineering practice integrally to solve engineering problems relevant wireless networks.
B3.1	Implement simulation for different wireless network topologies.
B4.1	Design innovative solutions for problems of advanced wireless network models.
C6.1	Integrate economic, social and environmental aspects in network design projects.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Overview of wireless communications **Lab /Tutorial:** • Installation of network simulation package.	1
2	**Lecture:** Wireless wireline interworking **Lab /Tutorial:** • Create wireless topology on network simulation package. For this go to the wireless devices and select suitable wireless networking strategy.	٢
3	**Lecture:** Cellular wireless networks **Lab /Tutorial:** • Simulate mobile cellular networks to evaluate networks performance.	3
4	**Lecture:** 2G, 2.5G, 3G and 4G cellular networks **Tutorial:** • Problem solving related to cellular Network generations.	4
5	**Lecture:** Mobility management **Lab /Tutorial:** • Simulate scenarios for mobility models that represent the movement of mobile user, and how their location, velocity and acceleration change over time.	5
6	**Lecture:** Handoff management **Lab /Tutorial:** Simulate Handoff management schemes.	6
7	**Lecture:** Mobile IP schemes **Tutorial:** Problem solving related to evaluation for Mobile IP schemes.	7
8	Midterm	8
9	**Lecture:** Mobile ad hoc networks (MANET)	9

	Tutorial: - Problem solving related to evaluation for ad hoc networks.	
10	**Lecture:** Application of different mobility scheme. Assessment of the effect of handoff in Mobile IP and ad hoc networks **Tutorial:** - Problem solving related to evaluation for Mobile IP and ad hoc networks	10
11	**Lecture:** Network mobility **Tutorial:** Problem solving related to network mobility evaluation.	11
12	**Lecture:** Assessment of the effect of system parameter s in network mobility. Tutorial: Problem solving related to evaluation for network parameters.	12
13	**Lecture:** Wireless local area networks (Wi-Fi) **Lab /Tutorial:** Simulate wireless local area network using Wi-Fi devices	13
14	**Lecture:** Wireless personal area networks (Bluetooth) **Tutorial:** Problem solving related to evaluation for Bluetooth protocol.	14
15	**Lecture:** Recognize the problems concerning wireless systems.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1	x	x				x	x								
	A2.2	x	x			x			x	x						
	A4.1	x	x	x			x	x				x			x	
	A10.1	x	x			x	x	x		x					x	
B-Level	B2.1						x			x		x				
	B3.1						x			x					x	
	B4.1						x			x		x				
C-Level	C6.1		x			x			x				x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.2, A2.1,B2.1, B3.1, C6.1
2	Formative (quizzes- online quizzes- presentation)	A2.1, A2.2, A4.1, B2.1, B3.1, B4.1, C6.1
3	Project and report assessment	A2.1, A2.2, A4.1, B2.1 B3.1, B4.1, C6.1
4	Oral Examination	A4.1
5	Final Examination	A2.1, A2.2, A4.1, B2.1 B3.1, B4.1, C6.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation)	Weakly
3	Project, oral and report assessment	15th
4	Final Examination	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Formative (quizzes- online quizzes- presentation)	20
3	Project , oral and report assessment	١٠
4	Final Examination	٦٠
Total		100%

8. List of References

No.	Reference List
1	U. Dalal,Wireless Communication and Networks. Oxford University Press. 2015.
2	Gordon L.,Stüber , Principles of Mobile Communications ,Fourth Edition,Springer, 2017.
3	David Clark, et. Al , Wireless Networking, Morgan Kaufmann Series inNetworking,2016.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Overview of wireless communications **Lab /Tutorial:** • Installation of network simulation package.	1	A2.1
2	**Lecture:** Wireless wireline interworking **Lab /Tutorial:** • Create wireless topology on network simulation package. For this go to the wireless devices and select suitable wireless networking strategy.	1	A2.1
3	**Lecture:** Cellular wireless networks **Lab /Tutorial:** • Simulate mobile cellular networks to evaluate networks performance.	1	A2.٢, B2.1, C6.1
4	**Lecture:** 2G, 2.5G, 3G and 4G cellular networks **Tutorial:** • Problem solving related to cellular Network generations.	1	A4.1, B3.1, C6.1
5	**Lecture:** Mobility management **Lab /Tutorial:** • Simulate scenarios for mobility models that represent the movement of mobile user, and how their location, velocity and acceleration change over time.	1	A2.1, A2.2, B4.1, C6.1
6	**Lecture:** Handoff management **Lab /Tutorial:** Simulate Handoff management schemes. •	1	A2.1, A2.2, B3.1, C6.1
7	**Lecture:** Mobile IP schemes **Tutorial:**	1	A2.2, A4.1, B3.1, C6.1

	Problem solving related to evaluation for Mobile IP schemes.		
8	**Midterm**	1	A2.2, A2.1,B2.1, B3.1, C6.1
9	**Lecture:** Mobile ad hoc networks (MANET) **Tutorial:** - Problem solving related to evaluation for ad hoc networks.	1	A2.1, A2.2, A10.1,B4.1, C6.1
10	**Lecture:** Application of different mobility scheme. Assessment of the effect of handoff in Mobile IP and ad hoc networks **Tutorial:** Problem solving related to evaluation for Mobile IP and ad hoc networks	1	A2.2, A4.1,A10.1, B4.1, C6.1
11	**Lecture:** Network mobility **Tutorial:** Problem solving related to network mobility evaluation.	1	A2.1, A2.2, B4.1, C6.1
12	**Lecture:** Assessment of the effect of system parameter s in network mobility. **Tutorial:** Problem solving related to evaluation for network parameters.		A4.1, A10.1, B4.1, C1.1
13	**Lecture:** Wireless local area networks (Wi-Fi) **Lab /Tutorial:** Simulate wireless local area network using Wi-Fi devices	1	A10.١, B2.1, C6.1
14	**Lecture:** Wireless personal area networks (Bluetooth) **Tutorial:** Problem solving related to evaluation for Bluetooth protocol.	١	A4.1, B2.1, C6.1
15	**Lecture:** Recognize the problems concerning wireless systems.	١	A1.2, A4.1,A10.1, B4.1

Course: Wireless Computer Networks	
Program LOs	**Course LOs**
A2. 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.	A2.1 Develop the schemes that are used for wireless data communication. A2.2 Conduct the elements used in the wireless computer networks.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Perform simulation for different wireless network topologies.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply knowledge of network to analyze the network performance.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Apply knowledge of mathematics, science, design, and engineering practice integrally to solve engineering problems relevant wireless networks.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Implement simulation for different wireless network topologies.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Design innovative solutions for problems of advanced wireless network models.
C6: Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1. Integrate economic, social and environmental aspects in network design projects.

Course Coordinator: Dr. Heba Nashaat El-Moafy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	CCE436		
Year/ Level	Fourth year – Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	aim
8	Design and manage applications related to mobile devices.

3. Learning Outcomes (LOs):

A2.1	Select the suitable modern mobile development tools for either the Android or iOS platforms.
A4.1	Utilize the popular mobile platform and their capabilities and limitations
A10.1	Apply programing tools for various platforms, including small communication devices (smart phones) and larger MIDs (mobile Internet devices).
B2.1	Design and develop programs on a popular mobile platform.
B3.1	Design programs on a popular mobile platform for mobile applications.
B4.1	Design solutions for the problem in mobile applications.
C6.1	Integrate economic, social and environmental aspects to design mobile applications.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** Overview of phases of mobile project development. **Lab /Tutorial:** Installation of mobile development tool.	1
2	**Lecture:** Activities and intents in mobile and tablet application. **Lab /Tutorial:** • Design mobile applications	2
3	**Lecture:** Resources and content providers in mobile and tablets application. **Lab /Tutorial:** • Implement mobile applications	3
4	**Lecture:** User Interface Layout and Events **Lab /Tutorial:** Develop applications that combine mobile device capabilities.	4
5	**Lecture:** Multimedia Techniques **Lab /Tutorial:** • Program multimedia applications in mobile platforms.	5
6	**Lecture:** Threads in mobile applications. **Lab /Tutorial:** • Develop threads in mobile platforms.	6
7	**Lecture:** Services in mobile applications. **Tutorial:** Problem solving related to services in mobile applications.	7
8	Midterm Examination	8
9	**Lecture:** Hardware Interface **Tutorial:** Problem solving related to hardware interface in mobile applications.	9

10	**Lecture:** Application of different services in mobiles and tablets. **Tutorial:** Problem solving related to evaluation for mobiles and tablets applications.	10
11	**Lecture:** Networking in mobile applications **Tutorial:** Problem solving related to network mobility evaluation.	11
12	**Lecture:** Databases in mobile applications **Lab /Tutorial:** Develop database application in mobile platforms.	12
13	**Lecture:** Application publishing and business models **Lab /Tutorial:** Publish a simple mobile application	13
14	**Lecture:** Evaluation mobile applications **Tutorial:** Problem solving related to evaluation for mobile applications.	14
15	**Lecture:** Recognize the problems concerning modern mobile platform. **Tutorial:** Problem solving related to modern mobile platform.	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/ in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1	x	x				x	x								
	A4.1	x		x			x	x		x		x			x	
	A10.1		x			x		x		x					x	
B-Level	B2.1					x			x		x	x				
	B3.1						x			x		x	x		x	
	B4.1						x			x		x				
C-Level	C6.1		x			x			x	x			x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A2.1, A4.1, B3.1
2	Semester work	A2.1, A4.1, A10.1, B2.1, B3.1, B4.1, C6.1
3	Oral Examination	A4.1
4	Project and report assessment	A2.1, A10.1, B2.1, B3.1, B4.1, C6.1
5	Final Examination	A2.1, A4.1, A10.1, B2.1, B3.1, B4.1,

		C6.1, Cb7.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Semester work	Weakly
3	Project, oral and report assessment	15th
4	Final Examination	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	١٠
2	Semester work	10
3	Project, oral and report assessment	٢٠
4	Final Examination	٦٠
Total		100%

8. List of References

No.	Reference List
1	Wei-Meng Lee, Beginning Android™ 4 Application Development, Wiley & Sons, Inc., Indianapolis, Indiana, 2012
2	James Steele, Nelson , The Android Developer's Cookbook: Building Applications with the Android SDK: Building Applications with the Android SDK, Addison-Wesley Professional; 1 st edition 2010.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	aim	LO's
1	**Lecture:** Overview of phases of mobile project development. **Lab /Tutorial:** • Installation of mobile development tool.	8	A2.1,A4.1
2	**Lecture:** Activities and intents in mobile and tablet application. **Lab /Tutorial:** • Design mobile applications	8	A2.1, A4.1, A10.1
3	**Lecture:** Resources and content providers in mobile and tablets application. **Lab /Tutorial:** • Implement mobile applications	8	A2.1,B2.1, B3.1, C6.1
4	**Lecture:** User Interface Layout and Events **Lab /Tutorial:** • Develop applications that combine mobile device capabilities.	8	A2.1, A10.1, B2.1 B3.1, C6.1
5	**Lecture:** Multimedia Techniques **Lab /Tutorial:** • Program multimedia applications in mobile platforms.	8	A2.1, A10.1, C6.1
6	**Lecture:** Threads in mobile applications. **Lab /Tutorial:** • Develop threads in mobile platforms.	8	A2.1, A10.1
7	**Lecture:** Services in mobile applications. **Tutorial:** Problem solving related to services in mobile applications.	8	A2.1, A10.1
8	Midterm Examination	8	A2.1, A4.1, B3.1
9	**Lecture:** Hardware Interface	8	A4.1, A10.1

	Tutorial: Problem solving related to hardware interface in mobile applications.		
10	**Lecture:** Application of different services in mobiles and tablets. **Tutorial:** Problem solving related to evaluation for mobiles and tablets applications.	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1
11	**Lecture:** Networking in mobile applications **Tutorial:** Problem solving related to network mobility evaluation.	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1
12	**Lecture:** Databases in mobile applications **Lab /Tutorial:** Develop database application in mobile platforms.	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1
13	**Lecture:** Application publishing and business models **Lab /Tutorial:** Publish a simple mobile application	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1
14	**Lecture:** Evaluation mobile applications **Tutorial:** Problem solving related to evaluation for mobile applications.	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1
15	**Lecture:** Recognize the problems concerning modern mobile platform. **Tutorial:** Problem solving related to modern mobile platform.	8	A2.1, A10.1, B2.1, B3.1, B4.1,C6.1

Course: Portable computer programming	
Program LOs	**Course LOs**
A2. 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.	A2.1 Select the suitable modern mobile development tools for either the Android or iOS platforms.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Utilize the popular mobile platform and their capabilities and limitations.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Apply programing tools for various platforms, including small communication devices (smart phones) and larger MIDs (mobile Internet devices).
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Design and develop programs on a popular mobile platform.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Design programs on a popular mobile platform for mobile applications.
B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Design solutions for the problem in mobile applications.
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1. Integrate economic, social and environmental aspects to design mobile applications.

Course Coordinator: Dr. Heba Nashaat El-Moafy

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	EPM435		
Year/ Level	Fourth year- Second semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical/Lab.
	2	1	1

2. Course aims:

No.	**aim**
7	Apply control theory and measurement principals for industrial variables, signal conversion, conditioning, processing and operation of PLC's

3. Learning Outcomes (LOs):

A2.1	Recognize the different types of transducers, instruments parameters, interface signal condition
A4-1	Describe knowledge of contemporary, current, and advanced engineering issues related to industrial process
A10.1	Identify the PLC controller and its advantages.
B2.1	Select computer software package to design, simulate and evaluate the closed loop control system.
B3.1	Use a programming language of PLC (LADDER) to implement process control system
B4.1	Assess and evaluate the characteristics and performance of different types of transducers.
C6.1	Use MATLAB software package, including the SIMULINK block-diagram simulation environment. .

4. Course Contents:

No.	Topics	Week
1	**Lecture:** 1. **Overview of industrial process control system**. Control systems types, the essential components of automated controlled system and their functions. 2. **Instrument construction and characteristics** (static and dynamic): *accuracy range Precision Sensitivity Offset Drift Hysteresis* **Tutorial /Lab.:** **1.** Learn to use the corresponding MATLAB functions and Performing some transfer functions of different controlled systems. **2.** Carry-out experiments to realize the characteristics of instruments.	1-2
2	**Lecture:** **Study the construction, operation, and analysis the different types of transducers:** temperature transducers, position transducers, force transducers; motion transducers; fluid transducers. **Tutorial /Lab.:** **1.** Use MATLAB SIMULINK to Performing transfer functions of different transducers. **2.** Solve problems on transducers to realize the characteristics, and performance.	3-4
3	**Lecture:** 1. **Classification of industrial controllers:** identify, formulate, operation, characteristics, and tunning of P, I, PI, PD, and PID controllers. 2. **Analog implementation of PID controller.** **Tutorial /Lab.:** **1.** Implement he analog circuit of P, I, and PID controllers. **2.** Use MATLAB SIMULINK to Performing transfer functions and performance of different PID controllers.	5-7
4	**Midterm written examination**	8
5	**Lecture:** **Modeling and simulation** of open loop control and closed loop control	9

	systems for different types of industrial process. **Tutorial /Lab.:** **1.** Compute the transfer function of closed-loop industrial process control systems to evaluate performance. **2.** Use MATLAB SIMULINK to Performing transfer functions and performance of different industrial process control.	
6	**Lecture:** **1. Programmable Logic Controller:** Main Components of PLC, types of PLCs, and PLC Programming Language with computer. Advantages of a PLC Control System, **2. Construct** different simple control system with PLC. **Tutorial /Lab.:** Implement in PLC lab., some experiments (simple) to understand how using PLC in automated control systems.	10-11
7	**Lecture:** **1.** Examples of industrial processes control: temperature control, pressure control, flow control and level control by using PLCs. **2.** Analysis and design of typical industrial control system. **Tutorial /Lab.:** **1.** Implement in PLC Lab., advancing experiments to understand how using PLC in automated control systems. **2.** Design and analysis a typical simple industrial control system by using MATLAB SIMULINK.	12-14
8	**General revision and practical submission and discussion.**	15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online-In class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A2.1	x	x	x			x	x								x
	A4.1	x	x			x		x	x					x		
	A10.1	x	x			x	x									
B-Level	B2.1		x				x	x				x				
	B3.1		x				x	x						x	x	
	B4.1		x		x		x	x								
C-Level	C6.1		x			x	x	x	x		x					x

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	Los
1	Mid Term Examination (written/ online)	A2.1, A4.1, B4.1, B2.1
2	Practical Examination	A2.1, B4.1, C6.1
3	Oral Examination	A4.1
4	Formative (quizzes- online quizzes- presentation - reports)	A2.1, , A4.1, B4.1, B2.1, , C6.1, A10.1, B3.1
5	Final Term Examination (written)	A2.1, A4.1, B4.1, B2.1,., B3.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Practical/ Oral Examination	15
3	Formative (quizzes- online quizzes- presentation - reports)	Every week
4	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Final Exam.	60
2	Midterm. Exam.	12
3	Class Work	8
4	Practical Project& lab.	20
Total		100%

8. List of References

No.	Reference List
1	William C. Dunn, "Fundamental of Industrial Instrumentation and Process Control", McGraw-Hill, 2009
2	J. Wilkie, M. Johnson, and R. Katebi, "Control engineering; An introductory course", ISBN 0–333–77129–X, PALGRAVE, 2006
3	C. A. Smith, A. B. Corripio," Principles and Practical of Automatic Process Control", John Wiley & Sons, 2004.
4	W. Bollton, "Instrumintation and control systems", ISBN: 0750664320, Elsevier Science & Technology Books, 2006

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topics	Aim	LO's
1	**Lecture:** **3. Overview of industrial process control system**. Control systems types, the essential components of automated controlled system and their functions. **4. Instrument construction and characteristics** (static and dynamic): accuracy range Precision Sensitivity Offset Drift Hysteresis **Tutorial /Lab.:** **1.**Learn to use the corresponding MATLAB functions and Performing some transfer functions of different controlled systems. **2.**Carry-out experiments to realize the characteristics of instruments.	7	**A2-1, A4-1,** **A10-1, B3-1,** **B4-1, c6-1**
2	**Lecture:** **Study the construction, operation, and analysis the different types of transducers:** temperature transducers, position transducers, force transducers; motion transducers; fluid transducers. **Tutorial /Lab.:** **1.** Use MATLAB SIMULINK to Performing transfer functions of different transducers. **2.** Solve problems on transducers to realize the characteristics, and performance.	7	**A3-1,A10-1, B3-1, B4-1,** **C6-1**
3	**Lecture:** **3. Classification of industrial controllers:** identify, formulate, operation, characteristics, and tunning of P, I, PI, PD, and PID controllers. **4. Analog implementation of PID controller.**	7	**A2-1, A10-1, B2-1, B4-1, C6-1**

	Tutorial /Lab.: **2.** Implement he analog circuit of P, I, and PID controllers. **2.** Use MATLAB SIMULINK to Performing transfer functions and performance of different PID controllers.		
4	**Midterm written examination**	7	**A2.1, A4.1, B4.1, B2.1**
	Lecture: **Modeling and simulation** of open loop control and closed loop control systems for different types of industrial process. **Tutorial /Lab.:** **2.** Compute the transfer function of closed-loop industrial process control systems to evaluate performance. **2.** Use MATLAB SIMULINK to Performing transfer functions and performance of different industrial process control.	7	**A2-1, A4-1,** **A10-2, B2-1, B3-1, B4-1, C6-1**
	Lecture: **3. Programmable Logic Controller:** Main Components of PLC, types of PLCs, and PLC Programming Language with computer. Advantages of a PLC Control System, **4. Construct** different simple control system with PLC. **Tutorial /Lab.:** Implement in PLC lab., some experiments (simple) to understand how using PLC in automated control systems.	7	**A2-2, A4-1, A10-2, B3-1, C6-1,**
5	**Lecture:** **3.** Examples of industrial processes control: temperature control, pressure control, flow control and level control by using PLCs. **4.** Analysis and design of typical industrial control system.	7	**A10-1,c6-1**

	Tutorial /Lab.: **3.** Implement in PLC lab., advancing experiments to understand how using PLC in automated control systems. **4.** Design and analysis a typical simple industrial control system by using MATLAB SIMULINK.		
7	**General revision and practical submission and discussion.**	7	**A2-2, A4-1, A10-2, B3-1**

Course: Industrial Processes Control

Program LOs	Course LOs
A2. 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.	A2.1 Identify the methods of prediction of electric power loads. A2.2 Investigate the power flow methods.
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Describe the principle of the economic operation of electric power system.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Recognize the rules and principals of technical writing and the technical words problems.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Combine knowledge of mathematics, science information to solve the problems related to Prediction of power loads, power flow, economic operation of power system unit commitment, power dispatch and security
B4 Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Discuss the economic operation requirement of electric power stations. B4.2 Demonstrate the appropriate devices that are used for security.
C6. Carry out design, development, testing, debugging, operation and maintenance of digital systems/services such as computer systems, circuit boards, software systems, and mixed (embedded) systems.	C6.1 Solve the economic operation for power system using MATLAB.

Course Coordinator: Dr. Eng. Attia El-Saadawi.

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE429		
Year/ Level	Fourth year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
9	Model, analyze, design and build photonic devices, optical transmitter, receiver, amplifiers and the problems encountered in optical fiber communications such as attenuation and dispersion.

3. Learning Outcomes (LOs):

A3-1	Select appropriate mathematical procedures to solve problems related to optoelectronics.
A3-2	Combine different ideas, views, and knowledge from a range of sources to design a certain optical communication systems.
A9.1	Demonstrate advanced in depth information and current engineering topics of optical communication systems.
A10.1	Search for information to engage in life-long self learning discipline of opto-devices.
B2.1	Analyze the characteristics and performance of optical components and systems.
B3.1	Explain the principles, modeling, and techniques of optical fibers and systems
C1.1	Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve analysis and design problems related to Optoelectronics.
C5.1	Search for information related to advances in fiber optics and wireless optics.
C7.1	Merge the engineering knowledge, understanding, and feedback to improve design of optical systems.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** **Introduction** Photonic semiconductor devices physics - Wave and particle nature of light.	1-2
2	**Lecture:** **Optoelectronic devices** Physics, operation, materials, and modeling of semiconductor light emitting diodes, Laser and photodetectors.	3-4
3	**Lecture:** **Fiber Optics** Fiber optics - Physics of light (ray theory, electromagnetic-wave theory, and quantum theory)- Optical waveguides - Step index fibers and graded index fibers.	5-7
4	**Midterm**	8
5	**Lecture:** **Fiber Optics** Attenuation and dispersion problems.	9-10
6	**Lecture:** **Fiber Optics** Optical fiber cables characteristics, installation and test - Optical fiber measurements -	11-13
7	**Lecture:** **Advanced topics in optical communications** Fiber Bragg gratings- Wireless optical communications	14-15

5. Teaching and Learning Methods:

LO’s		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3-1	x			x		x	x								
	A3-2	x			x		x	x								
	A9.1	x			x		x	x								
	A10.1	x	x		x	x	x	x				x	x			
B-Level	B2.1	x			x		x	x								
	B3.1	x			x		x	x								
C-Level	C1.1	x			x		x	x								
	C5.1	x			x		x	x				x				
	C7.1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, C1.1, C7.1
2	Formative (quizzes- online quizzes- presentation – reports)	A3.1, A3.2, B2.1, B3.1, C1.1, C5.1, C7.1
3	Final Term Examination (written)	A3.1, A3.2, B2.1, B3.1, C1.1, C5.1, C7.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	J. M. Senior, Optical Fiber Communications: Principles and Practice, Prentice-Hall, Third Edition, 2009
2	Rongqing Hui: Introduction to Fiber-Optic Communications, 1st Edition, Academic Press, 2019
3	D. K. Mynbaev and L. L. Scheiner, Fiber-Optic Communications Technology, Prentice Hall, 2001.
4	A. Yariv, Photonics: Optical Electronics in Modern Communications, Sixth Edition, OU, 2007..

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** **Introduction** Photonic semiconductor devices physics - Wave and particle nature of light.	9	A3.1, A3.2, C1.1
2	**Lecture:** **Optoelectronic devices** Physics, operation, materials, and modeling of semiconductor light emitting diodes, Laser and photodetectors.	9	A3.1, A3.2, C1.1
3	**Lecture:** **Fiber Optics** Fiber optics - Physics of light (ray theory, electromagnetic-wave theory, and quantum theory)- Optical waveguides - Step index fibers and graded index fibers.	9	A3.1, A3.2, C1.1, C7.1
4	**Midterm**	9	A3.1, A3.2, C1.1, C7.1
5	**Lecture:** **Fiber Optics** Attenuation and dispersion problems.	9	A9.1,A10.1, B2.1, B3.1, C1.1, C5.1
6	**Lecture:** **Fiber Optics** Optical fiber cables characteristics, installation and test - Optical fiber measurements -	9	A10.1, A9.1, C1.1, C5.1
7	**Lecture:** **Advanced topics in optical communications** Fiber Bragg gratings- Wireless optical communications	9	A10.1, B2.1, B3.1, C1.1, C5.1

Course: Selected Topics in Communications (Electronics and optical communications)	
Program LOs	**Course LOs**
A3. 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.	A3-1 Select appropriate mathematical procedures to solve problems related to optoelectronics. A3-2 Combine different ideas, views, and knowledge from a range of sources to design a certain optical communication systems.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Demonstrate advanced in depth information and current engineering topics of optical communication systems.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Search for information to engage in life-long self learning discipline of opto-devices.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design	B2.1 Analyze the characteristics and performance of optical components and systems.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Explain the principles, modeling, and techniques of optical fibers and systems
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering	C1.1 Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve analysis and design problems related to

	Optoelectronics.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5.1 Search for information related to advances in fiber optics and wireless optics.
C7. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems	C7.1 Merge the engineering knowledge, understanding, and feedback to improve design of optical systems.

Course Coordinator: Dr. Islam Shaalan

Dr. Rania Abdallah

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE430		
Year/ Level	Fourth year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
9	Model, analyze, design and build different sound systems and solve acoustic problems and its engineering applications.

3. Learning Outcomes (LOs):

A3-1	Recognize the concepts and theories of mathematics appropriate to analysis simple and forced oscillations to calculate acoustic spectrum and its mechanical resistance.
A3-2	Recognize the concepts and theories of science appropriate to explain acoustic wave fundamentals and parameters.
A9.1	Analyze application circuits containing electroacoustic transducers and components in a creative and innovative way.
A10.1	Search for information to engage in life-long self-learning discipline of acoustic analysis and design.
B2.1	Discuss the principles of designing acoustic system.
B3.1	Explain the principles, modeling, and techniques of under-water acoustics and its measurements.
C1.1	Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve, analysis to design problems related to acoustic engineering.
C5.1	Combine different ideas, views, and knowledge from a range of sources to design a certain acoustic systems.
C7.1	Describe the reflection and transmission of acoustic waves in different media and identify electroacoustic transducers types, such as, Loudspeakers and Microphones.

4. Course Contents:

No.	Topics	Week
1	**Lecture:** **Introduction:** Simple and forced oscillations – wave types – Acoustic spectrum – Mechanical Resistance	1
2	**Lecture:** **Acoustic wave fundamentals:** Acoustic wave basics – Plane acoustic wave – Spherical acoustic wave. **Acoustic parameters:** Acoustic pressure – Acoustic intensity – Sound energy density – Specific acoustic impedance	2-4
3	**Lecture:** **Reflection and transmission of acoustic waves:** Reflection and transmission by an interface between two media - Reflection and transmission by a slab - Standing waves – Echo – Beats.	5-7
4	**Midterm**	8
5	**Lecture:** **Introduction to Electroacoustic:** Electroacoustic analogy - Acoustic filters analysis and design.	9-10
6	**Lecture:** **Electroacoustic transducers:** Introduction – Types of electroacoustic transducers - Loudspeakers – Microphones - Basic room acoustic treatments.	11-13
7	**Lecture:** **Under-water acoustics:** Principles – Modeling – Techniques and measurements - illustrative example.	14-15

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture(online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A3-1	x			x		x	x								
	A3-2	x			x		x	x								
	A9.1	x			x		x	x								
	A10.1	x	x		x	x	x	x				x	x			
B-Level	B2.1	x			x		x	x								
	B3.1	x			x		x	x								
C-Level	C1.1	x			x		x	x								
	C5.1	x			x		x	x				x				
	C7.1	x			x		x	x				x				

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3.1, A3.2, C1.1, C7.1
2	Formative (quizzes- online quizzes- presentation - reports)	A3.1, A3.2, B2.1, B3.1, C1.1, C5.1, C7.1
3	Final Term Examination (written)	A3.1, A3.2, B2.1, B3.1, C1.1, C5.1, C7.1

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	15
2	Formative (quizzes- online quizzes- presentation - reports)	15
3	Final Term Examination (written)	70
Total		100%

8. List of References

No.	Reference List
1	F. A. Everest and K. C. Pohlmann, Master Handbook of Acoustics, Sixth Edition, McGraw-Hill Education TAB, 2014.
2	L. L. Beranek and T. Mellow, Acoustics: Sound Fields and Transducers, First Edition, Academic Press, 2012.
3	P. C. Etter, "Underwater Acoustic Modeling: Principles, Techniques and Applications", E &FN Spon, 1996.
4	L. E. Kinsler and A. R. Frey, "Fundamentals of Acoustics", Wiley, 1982.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LO's
1	**Lecture:** **Introduction:** Simple and forced oscillations – wave types – Acoustic spectrum – Mechanical Resistance	9	A3.1, A3.2, C1.1
2	**Lecture:** **Acoustic wave fundamentals:** Acoustic wave basics – Plane acoustic wave – Spherical acoustic wave. **Acoustic parameters:** Acoustic pressure – Acoustic intensity – Sound energy density – Specific acoustic impedance	9	A3.1, A3.2, C1.1
3	**Lecture:** **Reflection and transmission of acoustic waves:** Reflection and transmission by an interface between two media - Reflection and transmission by a slab - Standing waves – Echo – Beats.	9	A3.1, A3.2, C1.1, C7.1
4	**Midterm**	9	A3.1, A3.2, C1.1, C7.1
5	**Lecture:** **Introduction to Electroacoustic:** Electroacoustic analogy - Acoustic filters analysis and design.	9	A9.1,A10.1, B2.1, B3.1, C1.1, C5.1
6	**Lecture:** **Electroacoustic transducers:** Introduction – Types of electroacoustic transducers - Loudspeakers – Microphones - Basic room acoustic	9	A10.1, A9.1, C1.1, C5.1

	treatments**.**		
7	**Lecture:** **Under-water acoustics:** Principles – Modeling – Techniques and measurements - illustrative example.	9	A10.1, B2.1, B3.1, C1.1, C5.1

Course: Acoustics	
Program LOs	**Course LOs**
A3. 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.	A3-1 Recognize the concepts and theories of mathematics appropriate to analysis simple and forced oscillations to calculate acoustic spectrum and its mechanical resistance. A3-2 Recognize the concepts and theories of science appropriate to explain acoustic wave fundamentals and parameters.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Analyze application circuits containing electroacoustic transducers and components in a creative and innovative way.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Search for information to engage in life-long self-learning discipline of acoustic analysis and design.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design	B2.1 Discuss the principles of designing acoustic system.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Explain the principles, modeling, and techniques of under-water acoustics and its measurements.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and	C1.1 Apply knowledge of mathematics, science, information technology, design, and engineering knowledge to solve,

Communications Engineering	analysis to design problems related to acoustic engineering.
C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5.1 Combine different ideas, views, and knowledge from a range of sources to design a certain acoustic systems.
C7. Demonstrate additional abilities related to model, analyze, design and build photonic and microwave components and systems	C7.1 Describe the reflection and transmission of acoustic waves in different media and identify electroacoustic transducers types, such as, Loudspeakers and Microphones.

Course Coordinator: Dr. Rania Abdallah

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

Program Title	B.Sc. In Electrical Engineering (Specialization: Electronics and Communication Engineering)		
Department offering the Program	Electrical Engineering		
Department Responsible for the Course	Electrical Engineering		
Course Code	ECE431		
Year/ Level	Fourth year- Second Semester		
Specialization	Major		
Teaching Hours	Lectures	Tutorial	Practical
	2	2	-

2. Course aims:

No.	Aim
6	Manipulate with the VLSI systems and circuits, all the way from the basic fabrication steps to the analysis and design of complex combinational and sequential circuits using CMOS technology.

3. Learning Outcomes (LOs):

A3-1	Describe the basic fabrication steps of integrated circuits.
A3-2	Identify the basic scaling issues of MOSFET transistor.
A9-1	Describe the RC model for evaluating the delay.
A9-2	Identify the linear and logical effort models.
A10-1	Identify the short-channel effects.
A10-2	Identify the power consumption sources in integrated circuits.
B2-1	Analyze the low-power architectures.
B2-2	Discuss the interconnection issues.
B3.1	Design low-power CMOS circuits.
B3-2	Implement the digital integrated circuits using CMOS technology.
C1-1	Understand the basic limitations of the current CMOS technology.
C5-1	Demonstrate the low-power CMOS systems.
C7-1	Design the digital logic circuits using the CMOS technology.
C7-2	Evaluate the current CMOS technology compared with other technologies.

4. Course Contents:

No	Topic	Week
1	Advanced topics in microelectronic fabrication.	**Weeks 1, 2**
2	Advanced topics in MOS transistor scaling issues.	**Weeks 3, 4**
3	Delay in integrated circuits: RC delay model, Linear delay model, Logical effort of paths, Timing analysis delay models	**Weeks 5, 6**
4	Power consumption in integrated circuits: Static and dynamic power, Energy-delay optimization.	**Week 7**
5	Midterm	**Week 8**
6	Analysis and design of low-power VLSI architectures.	**Weeks 9, 10**
7	Interconnect modeling in VLSI circuits	**Weeks 11, 12**
8	Simulating VLSI circuits using the computer.	**Weeks 13, 15**

5. Teaching and Learning Methods:

LO's		**Teaching and Learning Method**														
		Lecture (class/online)	**Interactive lectures**	**Flipped Classroom**	**Presentation**	**Discussion**	**Tutorial**	**Problem-solving**	**Brain storming**	**Projects**	**Site visits**	**Self-learning**	**Cooperative**	**Drawing Studio**	**Computer Simulation**	**Practical Experiments**
A-Level	**A3-1**	x			x		x	x								
	A3-2	x			x		x	x								
	A9-1	x			x		x	x								
	A9-2	x	x		x	x	x	x				x	x			
	A10-1		x				x			x						
	A10-2		x			x										
B-Level	**B2-1**	x			x		x	x								
	B2-2	x			x		x	x								
	B3-1		x			x						x				
	B3-2					x				x				x		
C-Level	**C1-1**	x			x		x	x								
	C5-1	x			x		x	x				x				
	C7-1	x			x		x	x				x				
	C7-2		x			x										

6. Teaching and Learning Methods 0f Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Mid Term Examination (written/ online)	A3-1, A3-2, B2-1, B2-2, C1-1
2	Formative (quizzes- online quizzes- presentation - reports)	A3-1, A3-2, A9-1, A10-1, B2-1, B2-2, C1-1, C5-1, C7-1
3	Final Term Examination (written)	A10-1, A10-2, B3-1, B3-2, C7-1, C7-2

7.2 Assessment Schedule:

No.	Assessment Method	Weeks
1	Mid Term Examination (written/ online)	8
2	Formative (quizzes- online quizzes- presentation - reports)	Every week
3	Final Term Examination (written)	Decided by Faculty Council

7.3 Weighting of Assessments:

No.	Assessment Method	Weights
1	Mid Term Examination (written/ online)	16
2	Formative (quizzes- online quizzes- presentation - reports)	16
3	Final Term Examination (written)	68
Total		100%

8. List of References

No.	Reference List
1	Neil H. E. Weste, David Money Harris, CMOS VLSI Design: A Circuits and Systems Perspective, Fourth Edition, Addison-Wesley, Page: 75, 2011.
2	N. Arora, MOSFET Modeling for VLSI Simulation: Theory and Practice, World Scientific, 2007.
3	Thomas Dillinger, VLSI Design Methodology Development, Prentice Hall, 2019.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	White Board
3	Data Show System
4	Presenter

10. Matrix of Knowledge and Skills of the Course:

No.	Topic	Aim	LOs
Weeks 1, 2	Advanced topics in microelectronic fabrication.	6	A3-1, A3-2, A9-1, A9-2
Weeks 3, 4	Advanced topics in MOS transistor scaling issues.	6	A10-1, A10-2, C1-1
Weeks 5, 6	Delay in integrated circuits: RC delay model, Linear delay model, Logical effort of paths, Timing analysis delay models	6	C1-1, C5-1
Week 7	Power consumption in integrated circuits: Static and dynamic power, Energy-delay optimization.	6	C7-1, C7-2
Week 8	Midterm Exam and starting of The project	6	A3-1, A3-2, A9-1, A9-2, A10-1, A10-2, C1-1, C5-1
Week 9, 10	Analysis and design of low-power VLSI architectures.	6	A10-1, A10-2, C1-1
Weeks 11, 12	Interconnect modeling in VLSI circuits	6	A3-2, A9-1, A9-2
Weeks 13, 15	Simulating VLSI circuits using the computer.	6	C1-1, C5-1

Course: : VLSI Circuits	
Program LOs	**Course LOs**
A3. 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.	A3-1 Describe the basic fabrication steps of integrated circuits. A3-2 Identify the basic scaling issues of MOSFET transistor.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9-1 Describe the RC model for evaluating the delay. A9-2 Identify the linear and logical effort models.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10-1 Identify the short-channel effects. A10-2 Identify the power consumption sources in integrated circuits.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design	B2-1 Analyze the low-power architectures. B2-2 Discuss the interconnection issues.
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3-1 Design low-power CMOS circuits. B3-2 Implement the digital integrated circuits using CMOS technology.
C1. Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering	C1-1 Understand the basic limitations of the current CMOS technology.

C5. Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5-1 Demonstrate the low-power CMOS systems.
C7. Demonstrate additional abilities to model, analyze, design and build electronic circuits and systems.	C7-1 Design the digital logic circuits using the CMOS technology. C7-2 Evaluate the current CMOS technology compared with other technologies.

Course Coordinator: Dr. Sherif M. Sharroush

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Yehia Rizk

Date of Approval: 28/03/2021

1. Basic Information

<table>
<tr><td>Program Title</td><td colspan="3">B. Sc. in Electrical Engineering (Specialization: Electronics and Communication Engineering)</td></tr>
<tr><td>Department offering the Program</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Department Responsible for the Course</td><td colspan="3">Electrical Engineering</td></tr>
<tr><td>Course Code</td><td colspan="3">ECE422</td></tr>
<tr><td>Year/ Level</td><td colspan="3">Fourth year- First term & Second term</td></tr>
<tr><td>Specialization</td><td colspan="3">Major</td></tr>
<tr><td rowspan="2">Teaching Hours</td><td>Lectures</td><td>Tutorial</td><td>Practical/Lab.</td></tr>
<tr><td>-</td><td>-</td><td>6 hours</td></tr>
</table>

2. Course aims:

No.	aims
2	Behave professionally and adhere to engineering standards and work to develop the profession and the community under realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
3	Work in and lead a heterogeneous group of engineers and technicians in different specialties and display leadership qualities, business administration, and entrepreneurial skills.
4	Use contemporary engineering tools, techniques, and skills for engineering practice and project management.
5	Master self-learning and life-long learning strategies and communicate effectively using different modes, tools, and languages to engage in research studies and deal with challenges in the contemporary engineering issues.

3. Learning Outcomes (LOs):

A4.1	Apply quality assurance procedures and follow codes and standards during the design and test phases of the project.
A6.1	Improve communication skills of the students.
A7.1	Demonstrate significantly enhanced group working abilities to implement a certain project.
A8.1	Use student’s capability in technical report writing and presentation in engineering problems.
A9.1	Practice good teamwork skills including communication, leadership, and collaboration with showing respect for each team member’s opinions, experience, and gender.
A10.1	Acquire journal and standards books to do literature surveys and develop references outside class for the applications of semiconductor devices in electronic and communication field.
B2.1	Assess the characteristics and performance of components, systems and processes that related to a specific project topic
B3.1	Use the computer aided analysis and design software capabilities to analysis and design a variety of engineering problems.
B4.1	Carry out specialized engineering designs to achieve certain objects and measuring the performance of a specific project.

B5.1	Exchange knowledge and skills with engineering community and industry to select and execute the project problem.
C1.1	Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services of a specific project topic.
C2.1	Apply numerical modeling methods to engineering problems related to electronics and communications displaine.
C3.1	Integrate electronic systems for certain specific project objectives using the right equipment.
C4.1	Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline to develop required computer programs to achieve certain objects of a specific project topic.
C5.1	Search for optimized solution of practical industrial problems, often on the basis of limited and possibly contradicting information.
C7.1	Combine different ideas, views, and knowledge from a range of sources, especially with engineering community and industry

4. Course Contents:

Project Description and implémentation Procédures	**Total Horus**	**Lecture Horus**	**Practical /Tutorial Horus**
❖ **Project Description:** Various projects are offered by the department in the electronic and communication engineering specialization areas. Students are encouraged to team up and work on projects together. The projects that are offered are selected to be realistic problems with reasonable difficulty. Students are guided by their advisors to do literature search in the area of the problem and to learn about different approaches and solutions. The second semester is dedicated to detailed design and implementation of the project. The design should be test, debugged and documented. An oral presentation about the project in given at the end of the second semester. In the presentation all members of the team should be ready to explain design detail and answer equations raised by the judgment committee. ❖ **Project Implementation Procedures:** 1. All project topics are announced from department in the beginning of the first term. 2. Projects are distributed on student groups, taking into account students' wishes, if possible. Each project group consists of at	84	0	84

least two students and maximum 6 students, can be increased to 7 students after the approval of the department council in case of necessity.

3. A detailed project proposal not exceeding 5 double-spaced pages submitted from each group to the department within two weeks of the start of the project course. This proposal will be reviewed and evaluated by the concern supervisor.
4. Arranging Meetings: in order to accomplish assigned tasks from proposal, all group members should visit their supervisor weekly. Also each students group should decide the meeting day and time with their supervisor in the first week
5. Frequently progress report not exceeding 10 double-spaced pages shall be submitted at least three times per semester. An oral presentation will take place for each report.
6. Four weeks after the end of the exam of the second semester will be dictated for completing the project (practical implementation and final report writing).
7. Final report will be submitted, reviewed and evaluated by the project supervisor.
8. Evaluation Committee Members are elected by department. This group consists of three professors, including project supervisor.
9. An oral presentation of the final report to be conducted and the team should be ready to explain design detail and answer equations raised by the judgment committee (at least one external examiner).

❖ **Brief list of topics to be covered :**

Topic 1:	Choose a project and write a proposal.
Topic 2:	Initial student presentations: project title, description, motivation and aims.
Topic 3:	Project planning, process, management activities, work breakdown, time estimation, milestones, activity sequencing, activity network, scheduling, Gantt charts and re-planning.
Topic 4:	Literature survey: search and review, tracing the information, critical evaluation, writing literature review, ethics and responsibilities.
Topic 5:	Project development.
Topic 6:	Assistance in writing the progress report. Student presentations: project proposal: problem definition, objectives, justification, and approach
Topic 7:	Final presentation and final report (committee)

Total	84	0	84

5. Teaching and Learning Methods:

LO's		Teaching and Learning Method														
		Lecture (online/in class)	Interactive lectures	Flipped Classroom	Presentation	Discussion	Tutorial	Problem-solving	Brain storming	Projects	Site visits	Self-learning	Cooperative	Drawing Studio	Computer Simulation	Practical Experiments
A-Level	A4.1		x	x		x							x			
	A6.1		x	x		x				x			x			
	A7.1		x	x		x				x			x			
	A8.1		x	x	x	x				x			x			
	A9.1		x	x	x	x				x		x	x			
	A10.1		x	x		x				x			x			
B-Level	B2.1		x	x		x							x			
	B3.1		x	x		x							x		x	
	B4.1		x	x		x							x			
	B5.1		x	x		x							x			
C-Level	C1.1		x	x		x							x			
	C2.1		x	x		x							x		x	
	C3.1		x	x		x							x			
	C4.1		x	x		x							x		x	
	C5.1		x	x		x						x	x			
	C7.1		x	x		x						x	x			

6. Teaching and Learning Methods of Disable Students:

No.	Teaching Method
1	Additional Tutorials
2	Online lectures and assignments

7. Student assessment:

7.1 Student Assessment Methods:

No.	Assessment Method	LOs
1	Meeting Attendance Level	To assess discipline, dedication to the project.
2	Seminars	To assess presentation skills, and student creativity.
3	Reports.	To assess ability to gather information, perform computation, problem solving and do technical writing.
4	Activities during project implementation.	To assess ability to work in group, communication skills, apply analytical and creative thinking and ability to construct circuits on breadboards and perform electrical measurements and test them with meters and oscilloscopes, and the ability to handle real circuit simulators.
5	Final Oral examination and seminar	To assess presentation skills, student understanding of the project and student creativity and innovations and different aspects of the concerning ILO's.

7.2 Weighting of Assessments:

Assessment Method	Percentage
Committee Evaluation	60
Supervisors assessment during the project development **1.** Students ability of communication (report and presentation). **2.** Team work (professionalism, cooperation and ethical behavior). **3.** The scientific and technical aspects and achievements.	40
Total	100%

7.3 Committee Evaluation Criteria:

In principle, the evaluators will assess a student's overall achievements by:

1. Examining the **report** they submit,
2. Observing the **presentation and demonstration** they make,
3. Asking questions and requesting for further clarifications as appropriate.

Evaluation Areas: There are two main areas of evaluation:

No.	Evaluation Areas	Percentage
1	**Discussion of the Study** 1. The students' understanding of the background of the project and the analysis that related to the work. 2. There is clear evidence that the student understands the methodology of study and the details (Tools and Techniques) of project implementation conforming to the project objectives. 3. There is clear evidence that indicates the student understands the results.	30%
2	**Total Project Quality** 1. The extent to which the project topic is: recent, professional, and appropriate for undergraduate level work. 2. The overall quality of the project writing is sufficient in length to discuss all aspects of results and relates results back to previous studies (review of literature). 3. The results are adequately organized, well written, will discussed. 4. All of the references are recent and complete. 5. The quality of the presentation	30%

8. List of References

No.	Reference List
1	**Essential Books (Text Books):** Depend on the project.
2	**Recommended Books:** Depend on the project.

9. Facilities Required for Teaching and Learning:

No.	Facility
1	Lecture Classroom
2	Lab Facilities
3	White Board
4	Data Show System
5	Presenter

Course: Project	
Program LOs	**Course LOs**
A4. Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues and risk management principles.	A4.1 Apply quality assurance procedures and follow codes and standards during the design and test phases of the project.
A6. Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.	A6.1 Improve communication skills of the students.
A7. Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.	A7.1 Demonstrate significantly enhanced group working abilities to implement a certain project.
A8. Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.	A8.1 Use students capability in technical report writing and presentation in engineering problems.
A9. Use creative, innovative and flexible thinking and acquire entrepreneurial and leadership skills to anticipate and respond to new situations.	A9.1 Practices good teamwork skills including communication, leadership, and collaboration with showing respect for each team member's opinions, experience, and gender.
A10. Acquire and apply new knowledge; and practice self, lifelong and other learning strategies.	A10.1 Acquire journal and standards books to do literature surveys and develop references outside class for the applications of semiconductor devices in electronic and communication field.
B2. Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	B2.1 Assess the characteristics and performance of components, systems and processes that related to a specific project topic
B3. Design and implement: elements, modules, sub-systems or systems in electrical/electronic/digital engineering using technological and professional tools.	B3.1 Use the computer aided analysis and design software capabilities to analysis and design a variety of engineering problems.

B4. Estimate and measure the performance of an electrical/electronic/digital system and circuit under specific input excitation, and evaluate its suitability for a specific application.	B4.1 Carry out specialized engineering designs to acheive certain objects and measuring the performance of a specific project.
B5. Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic/digital equipment, systems and services.	B5.1 Exchange knowledge and skills with engineering community and industry to select and execute the project problem.
C1 Understand the underlying physical phenomena and limitations of the performance of components and systems in Electronics and Communications Engineering.	C1.1 Merge the engineering knowledge, understanding, and feedback to improve design, products and/or services of a specific project topic.
C2 Demonstrate the ability to model and analyze components and systems in Electronics and Communication Engineering and identify the software tools required to optimize their performance	C2.1 Apply numerical modeling methods to engineering problems related to electronics and communications displaine.
C3 Design and compare between alternative components and systems in Electronics and Communications Engineering	C3.1 Integrate electronic systems for certain specific project objectives using the right equipment.
C4 Demonstrate the knowledge about measurement equipment and demonstrate the ability to use them to characterize components and systems in Electronics and Communications Engineering.	C4.1 Use a wide range of analytical tools, techniques, equipment, and software packages pertaining to the discipline to develop required computer programs to acheive certain objects of of a specific project topic.
C5 Demonstrate the knowledge about state of the art of components and systems in Electronics and Communications Engineering.	C5.1 Search for optimized solution of practical industrial problems, often on the basis of limited and possibly contradicting information.

C7 Demonstrate additional abilities related to the field of the concentration within Electronics and Communications Engineering.	C7.1 Combine different ideas, views, and knowledge from a range of sources, especially with engineering community and industry

Program Coordinator: Dr. Rania Abdallah

Head of Department: Prof. Dr. Rawya Y. Rezk

Date of Approval: 28/03/2021