Course Specification

Course Code: ECE 4101 **Course Title:** Electronic Measurements & Testing 3

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4101			
Prerequisite	----			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Prerequired Course	**----**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	4	4

2. Course Aims

No.	Aim
1	Design and conduct experiments as well as analyze and interpret data. Work effectively within multi-disciplinary teams in the experiments of: Fiber optics transmission and receiver systems, PSK/QPSK modulation/demodulation experiment. (AM4)

3. Learning Outcomes (LOs)

CLO.31	Use the appropriate tools and equipment to measure system performance
CLO.32	analyze the system performance's results correctly

4. Course Contents

Topics	Week
Explain Light and fiber optics interaction Experiment	1
Light and fiber optics interaction Experiment	2
Explain Fiber optics transmitter Experiment	3
Fiber optics transmitter Experiment	4
Explain Fiber optics Receiver Experiment	5
Fiber optics Receiver Experiment	6
Explain PSK data transmission Experiment	7
PSK/QPSK data transmission Experiment	8
Midterm Exam	9
Explain QPSK data transmission Experiment	10
PSK data transmission Experiment	11
Explain Microwave power measurement Experiment	12
Microwave power measurement Experiment	13
Explain Gun Oscillator Experiment	14
Gun Oscillator Experiment	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion

CLO.31			√									√
CLO.32			√									√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	CLO.32
2	Oral exams	CLO.31, CLO.32
3	Practical	CLO.31, CLO.32

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	
4	Mid-term Exam	
5	Oral/ Practical Exam	15
6	Final Exam	16

	Assessment Method	Weights%	Weights
Practical / Oral	Practical Attendance	10%	10
	Attendance	10%	10
	Quiz 1 / Quiz 2	10%	10
	Final oral / practical exam	30%	30
Final Exam		40%	40
Total		100%	100

8. List of References

[1] Laboratory manual.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Explain Light and fiber optics interaction Experiment	1	CLO.31
2	Light and fiber optics interaction Experiment	1	CLO.31
3	Explain Fiber optics transmitter Experiment	1	CLO.31
4	Fiber optics transmitter Experiment	1	CLO.31
5	Explain Fiber optics Receiver Experiment	1	CLO.31
6	Fiber optics Receiver Experiment	1	CLO.31
7	Explain PSK data transmission Experiment	1	CLO.31
8	PSK/QPSK data transmission Experiment	1	CLO.31
9	Explain QPSK data transmission Experiment	1	CLO.31
10	PSK data transmission Experiment	1	CLO.31
11	Explain Microwave power measurement Experiment	1	CLO.31, CLO.32
12	Microwave power measurement Experiment	1	CLO.31, CLO.32
13	Explain Gun Oscillator Experiment	1	CLO.31
14	Gun Oscillator Experiment	1	CLO.31

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL18	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and	CL.31	Use the appropriate tools and equipment to measure system performance

	objective engineering judgment to draw conclusions for Fiber Optics systems, and PSK/QSK Communication systems.		
PL18	Use the appropriate tools and equipment to measure fiber optics system performance, PSK/QPSK and analyze the results correctly.	CLO.32	analyze the system performance's results correctly

Title	Name	Signature
Course coordinator	**Dr. Osama Elmowafy**	Osama Elmowafy
Program coordinator	**Associate Prof. Dr. Osama El-Ghandour**	
Head of Department	**Associate Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/9/2022**	

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Course Specification

Course Code: ECE 4102 **Course Title: Electronic Microwave Engineering**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	**ECE 4102**			
Prerequisite	**ECE 3103**			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Combine scientific research skills with continuous development through self-learning and acquiring additional skills and knowledge (AM2)
2	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)

3. Learning Outcomes (LOs)

CLO.25	Estimate the performance of an electrical system and circuit under specific input excitation and evaluate its suitability for a specific application.
CLO.26	Measure the performance of an electrical system and circuit under specific input excitation and evaluate its suitability for a specific application.
CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

4. Course Contents

Topics	Week
Transmission waveguides	1
Microwave resonator	2
Directional coupler	3
Microwave network analysis	4
Impedance matching and tuning	5
Travelling wave tube amplifier	6
Klystron Amplifier	7
Reflax Klystron Oscilitor	8
Mid Term Exam	9
Tunnel Diode	10
Gunn Diode.	11
Shoktty Doiode	12
Research discussion	13
Research discussion	14
Practical exam	15
Final exam	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.25	√	√			√		√				√	√
CLO.26	√	√			√	√	√				√	√
CLO.30			√	√		√			√	√	√	√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	CLOS
1	Written exam	CLO.25,CLO.26
2	Assignments	CLO.25,CLO.26
3	Research discussion	CLO.30

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Sheets	Bi-weekly
3	Quizzes	5&11
4	Mid-term Exam	9
5	Research discussion	15
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	sheets	%40	40	5%	5
	Attendance			5%	5
	Quizzes			5%	5
	Mid-term exam			20%	20
	Research discussion			5%	5
Practical / Oral	Practical Attendance				
	Lab. Reports				
	Lab. Activities / Projects				
	Final oral / practical exam			10%	10
Final Exam				60%	60
Total				100%	100

8. List of References

[1] D. M. Pozar; Microwave Engineering, 3rd Ed.; John Wiley & Sons Inc.
[2] Lehpamer, H; Microwave Transmission Network; McGraw-Hill Professional,2010
[3] Cameron, Richard J and Kudsia, Chandra M and Mansour; Microwave filters for communication systems; John Wiley \& Sons
[4] Merill Skolnik; Introduction to Radar Systems, 3rd Edition; Tata McGraw Hill
[5] East, Peter W; Microwave System Design Tools and EW Applications; Artech House;2008
[6] Saber. M. Aly, Microwave Engineering, 2015.
[7] Micheal steer, Microwave and RF Design Transmission Lines, NC State University,2019

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Transmission waveguides	2	CLO.25, CLO.26
2	Microwave resonator	2	CLO.25, CLO.26
3	Directional coupler	2	CLO.25, CLO.26
4	Microwave network analysis	2	CLO.25, CLO.26
5	Impedance matching and tuning	2	CLO.25, CLO.26
6	Travelling wave tube amplifier	1	CLO.25, CLO.26
7	Klystron Amplifier	1	CLO.25, CLO.26
8	Reflax Klystron Oscilitor	1	CLO.25, CLO.26
9	Mid Term Exam	2,1	CLO.25, CLO.26
10	Tunnel Diode	1	CLO.25, CLO.26
11	Gunn Diode.	1	CLO.25, CLO.26
12	Shoktty Doiode	1	CLO.25, CLO.26
13	Research discussion	1	CLO.30
14	Research discussion		CLO.30
15	Practical exam		
16	Final exam		CLO.25, CLO.26

11. Matrix of Program LOs with Course Los

Program Los		Course Los	
PL.14	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.	CLO.25	Estimate the performance of an electrical system and circuit under specific input excitation and evaluate its suitability for a specific application.
		CLO.26	Measure the performance of an electrical system and circuit under specific input excitation and evaluate its suitability for a specific application.
PL.17	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems	CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

Title	Name	Signature
Course coordinator	**Dr. Ahmed Magdy**	
Head of Department	**Prof. Dr. Osama.ElGhandour**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE4103 **Course Title:** Communication system (3)

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4103			
Prerequisite	ECE3201			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	4	2	0	6

2. Course Aims

No.	Aim
1	Identify, analyse, and solve practical problems, making use of appropriate engineering tools, programs and techniques (AM.3)

3. Learning Outcomes (LOs)

CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application

4. Course content

Topics	Week
Basic principles review of signal and systems,	1
convolution theory fundamental and calculation	2
Orthogonality principle and orthonormal basis set, design of orthogonal codes	3
Elements of a digital communication system, optimum receiver design for communication systems	4
Matched filter and coherent detector design	5
Description of binary ASK, FSK, PSK digital modulation techniques	6
M-arry signaling schemes quadrature phase shift keying technique (QPSK)	7
Minimum shift keying (MSK) and differential phase shift keying (DQPSK).	8
Midterm exam	9
Comparison of digital modulation schemes from band width and power efficiency requirements	10
Power spectral density and energy spectral density Calculation.	11
Auto correlation functions calculation for different modulation techniques	12
Random processes, definition and notation, wide sense stationarity (WSS) and time averages and ergodicity terminology	13
Bit error rate performance for different modulation techniques.	14
Practical Exam	15
Final Exam	16

5. Teaching and Learning methods

Course learning Outcomes (CLOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.25	√	√										

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Reports / Sheets	CLO.25
3	Quizzes	CLO.25
4	Mid-term Exam	CLO.25
5	Final Exam	CLO25

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Sheets	11.13
3	Quizzes	10
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	sheets	40%	40	15%	
	Quiz 1 / Quiz 2			5%	
	Mid-term exam			20%	
Practical / Oral	Practical Attendance				
	Lab. Reports				
	Lab. Activities / Projects				
	Final oral / practical exam				
Final Exam				60%	
Total				100%	

8. List of References

- B.P. Lathi, Modern Digital and Analog communication systems, 2018.
- LEON W. COUCH II , Digital And Analog Communication systems, 2017

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Basic principles review of signal and systems,	1	CLO.25
2	convolution theory fundamental and calculation	1	CLO.25
3	Orthogonality principle and orthonormal basis set, design of orthogonal codes	1	CLO.25
4	Elements of a digital communication system, optimum receiver design for communication systems	1	CLO.25
5	Matched filter and coherent detector design	1	CLO.25
6	Description of binary ASK, FSK, PSK digital modulation techniques	1	ClO.25
8	M-ary signaling schemes quadrature phase shift keying technique (QPSK)	1	CLO.25
9	Mid Term Exam	1	CLO.25
10	Comparison of digital modulation schemes from band width and power efficiency requirements	1	CLO.25
11	Power spectral density and energy spectral density Calculation.	1	CLO.25
12	Auto correlation functions calculation for different modulation techniques	1	CLO.25
13	Random processes, definition and notation, wide sense stationarity (WSS) and time averages and ergodicity terminology	1	CLO.25
14	Bit error rate performance for different modulation techniques. Using different simulation packages for digital communication systems	1	CLO.25
15	Practical Exam		
16	Final Exam		

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PLO.14	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application	CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application

Title	Name	Signature
Course coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE 4104 **Course Title:** Integrated Circuits

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4104			
prerequisite	-----			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Prerequired Course	**----**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	4	2	0	6

2. Course Aims

No.	Aim
1	Identifying, formulate, and solve complex Integration circuit engineering problems, by applying engineering fundamentals, basic science and mathematics (AM1)
2	Use appropriate mathematical and analytical methods for modelling and analyzing Design and Fabrication methods of Logic CMOS Integrated Circuit. (AM1)

3. Course Learning Outcomes (LOs)

CLO.1	Identify, complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.

4. Course Contents

Topics	Week
Implementation of integrated circuits, advantage of IC, and its applications	1
Classification of IC and its economics of implementation, design rules, reflective metal / oxide / semiconductor negative as the basic unit build digital circuits	2
Brief, IC Chip fabrication processes (crystal growth, oxidation, lithography pattering, etching pattering, diffusion, Isolation, Metallization, and packing	3
Crystal growth process and crystal structure planes.	4
Oxidation process types, why, layer thickness calculation.	5
lithography pattering process.	6
Etching pattering process.	7
Epitaxial growth types (hetero, homo),	8
Midterm Exam	9
Limitation, etching, and cleaning	10
Diffusion process	11
Ion implementation Process	12
Active and passive elements IC fabrication	13
Basic elements design using NMOS in comparison with CMOS	14
The time of propagation delay, power consumption	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.1	√	√		√								
CLO23	√	√		√								√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	CLO.1, CLO.23
2	Quizzes and reports	CLO.1, CLO.23
3	Project applied on a practical field problem	CLO.1, CLO.23

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quizzes	Weekly
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments					
	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	%10	40	%10	10
	Attendance	%10		%10	10
	Quiz 1 / Quiz 2	%10		%10	10
	Mid-term exam	%10		%10	10
Final Exam		%60	60		60
Total		%100	100		100

8. List of References

[1] Peter Shepherd, "Integrated Circuit Design, Fabrication, and Test", 1996.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show

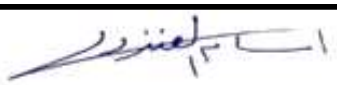
10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Implementation of integrated circuits, advantage of IC, and its applications	1	CLO.1
2	Classification of IC and its economics of implementation, design rules, reflective metal / oxide / semiconductor negative as the basic unit build digital circuits	1	CLO.1
3	Brief, IC Chip fabrication processes (crystal growth, oxidation, lithography pattering, etching pattering, diffusion, Isolation, Metallization, and packing	1	CLO.1
4	Crystal growth process and crystal structure planes.	1	CLO.1
5	Oxidation process types, why, layer thickness calculation.	1	CLO.1

6	lithography pattering process.	1	CLO.1
7	Etching pattering process.	1	CLO.1
8	Epitaxial growth types (hetero, homo),	1	CLO.1
9	Limitation, etching, and cleaning	1	CLO.1
10	Diffusion process	1	CLO.1
11	Ion implementation Process	1	CLO.1
12	Active and passive elements IC fabrication	1	CLO.1, CLO.23
13	Basic elements design using NMOS in comparison with CMOS	1	CLO.1, CLO.23
14	The time of propagation delay, power consumption	1	CLO 1

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PLO1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	CLO 1	Identify the main principles, characteristics, and methodologies of Integrated Circuit manufactured process by applying electronic engineering fundamental, electronic basic science, and mathematics.
		CLO 2	Formulate, modeling, and solve, the different types of integrated circuit families by applying electronic engineering fundamental, electronic basic science, and mathematics.
PLO13	Design and implement elements, modules, sub-systems or systems using technological and professional tools	CLO 3	Use appropriate mathematical and analytical methods for modelling and analyzing Design and Fabrication methods of Logic CMOS Integrated Circuit.

Title	Name	Signature
Course coordinator	**Dr. Osama Elmowafy**	
Program coordinator	**Associate Prof. Dr. Osama El-Ghandour**	
Head of Department	**Associate Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/9/2022**	

Course Specification

Course Code: ECE 4161 **Course Title: specialized elective course (2)**

Electronic measurement instrumentation

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4161			
Prerequisites	--------			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	1	0	4

2. Course Aims

No.	Aim
1	Identify, analyze, and solve practical electronic circuit. (AM3)
2	Acquire the required skills to perform laboratory and field experiments and interpret their results.(AM4)

3. Course Learning Outcomes (LOs)

CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
CLO.24	Implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.

4. Course Contents

Topics	Week
Memories	1
Sawtooth generators	2
Active filters	3
Analog multiplication circuits	4
Logarithmic Amplifiers	5
Stability of circuits	6
Probes and Signal processing circuits	7
Information transformation	8
Midterm Exam	9
Digital to analog converter/Analog to digital converter	10
Voltage to current converter/current to voltage converter	11
Automatic measurement systems	12
Phase Locked loop	13
Spectrum Analyzer	14

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion

CLO.23	√	√			√	√						√
CLO.24	√	√			√	√						√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Written exam	CLO.23, CLO.24
2	Quizzes and reports	CLO.23, CLO.24
3	Oral exams	
4	Practical	
5	Project applied on a practical field problem	
6	Presentation	
7	Assignments	CLO.23, CLO.24
8	Researches	CLO.23, CLO.24
9	Self-Learning	
10	Simulations	

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Presentation	----
4	Mid-term Exam	9
5	Oral/ Practical Exam	----
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	40%	40	15%	15
	Attendance			5%	5

	Mid-term exam			20%	20
Final Exam		60%	60		60
Total			100		100

8. List of References

[1] D. A. Neamen, Microelectronics: Circuit Analysis and Design, F. Edition, Ed., New York: Raghothaman Srinivasan, 2010.
[2] T. L. Floyd, ELECTRONIC DEVICES, Electron Flow Version, Ninth Edition ed., New Jersey: Prentice Hall,, 2012.
[3] B. Razavi, Fundamentals of microelectronics, Review Edition ed., 2007.
[4] K. C. S. Adel S. Sedra, Microelectronic Circuits, s. edition, Ed., New York:Oxford University Press, 2015.

9. Facilities required for teaching and learning

Lecture
White board

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Memories	1	CLO.23
2	Sawtooth generators	1	CLO.23
3	Active filters	1	CLO.23, CLO.24
4	Analog multiplication circuits	1	CLO.23
5	Logarithmic Amplifiers	1	CLO.23
6	Stability of circuits	1	CLO.23, CLO.24
7	Probes and Signal processing circuits	2	CLO.23, CLO.24
8	Information transformation	1	CLO.23
9	Midterm Exam		CLO.23
10	Digital to analog converter/Analog to digital converter	1,2	CLO.23
11	Voltage to current converter/current to voltage converter	1,2	CLO.23
12	Automatic measurement systems	2	CLO.23
13	Phase Locked loop	1,2	CLO.23
14	Spectrum Analyzer	1,2	CLO.23, CLO.24

11. Matrix of Program LOs with Course Los

Program Los		Course Los	
PLO13	Design and implement elements, modules, sub-systems or systems using technological and professional tools.	CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
		CLO.24	Implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.

Title	Name	Signature
Course coordinator		
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: ECE 4162 **Course Title: Satellite communication system**

1. Basic information

Program Title	Electronics and communications Engineering Depart.			
Department offering the program	Electronics and communications Engineering Depart.			
Department offering the course	Electronics and communications Engineering Depart.			
Course Code	**ECE 4162**			
Prerequisite	----------			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Combine scientific research skills with continuous development through self-learning and acquiring additional skills and knowledge (AM2)
2	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)

3. Course Learning Outcomes (LOs)

CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

4. Course content

Topics	Week
Overview of satellite systems	1
Orbits and lunching method	2
Orbits and lunching method	3
Radio wave propagation	4
Bandwidth utilisation and antennas	5
Space segment	6
Earth segment	7
Revision	8
Mid Term Exam	9
Space link	10
Interference	11
Interference	12
Research discussion	13
Research discussion	14
Practical exam	15
Final exam	16

4. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.25	√	√		√								
CLO.30	√			√	√	√						

5. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

6. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Sheets	CLO.25
3	Quizzes	CLO25
4	Mid-term Exam	CLO.25
5	Presentation	CLO.30
6	Final Exam	CLO.25,CLO.30

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Sheets	Bi-weekly
3	Quizzes	3 &5&7& 11
4	Mid-term Exam	9
5	Presentation	14
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Attendance	30%	30	5%	5
	Quiz 1 / Quiz 2			5%	5
	Mid-term exam			20%	20
Presentation	Presentation			10%	10
Final Exam				60%	60
Total				100%	100

7. List of References

[1] Satellite Communications, 4th Edition, Dennis Roddy

8. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show

9. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Overview of satellite systems	2	CLO.25
2	Orbits and lunching method	2	CLO.25
3	Orbits and lunching method	2	CLO.25
4	**Radio wave communication**	2	CLO.25
5	Bandwidth utilization and antennas	2	CLO.25
6	Space segment	2	CLO.25
7	Earth segment	2	CLO.25
8	Revision	2	CLO.30
9	Mid Term Exam		
10	Space link	1	CLO.25
11	Interference	2	CLO.25
12	Interference	2	CLO.25
13	Research discussion	3	CLO.25,CLO.30
014	Research discussion	3	CLO.25,CLO.30
15	practical exam	3	
16	Final exam		CLO.25,CLO30

10. Matrix of Program LOs with Course Los

Program Los		Course Los
PLO14	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO.25 Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
PLO17	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems	CLO.30 Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

Title	Name	Signature
Course coordinator	**Dr. Ahmed Magdy**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE 4163 **Course Title: Integrated Circuit Technology**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4163			
Prerequisite	--			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	1	0	4

2. Course Aims

No.	Aim
1	Apply Communication and electronic engineering based on physical sciences and mathematics. (AM1)

3. Course Learning Outcomes (LOs)

CLO1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
CLO2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess.

4. Course Contents

Topics	Week
Introduction to IC technology	1
Silicon Fabrication Process	2
Fabrication techniques	3
Passive element Fabrication	4
Active Element Fabrication: BJT	5
Active Element Fabrication: MoSFET	6
Layout Simulation	7
Design of IC (1)	8
Midterm Exam.	9
Design of IC (2)	10
Connection lines Modeling (1)	11
Connection lines Modeling (2)	12
Electrostatic charges	13
Packaging	14
Revisions	15
Final Exam.	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO1	√	√			√							
CLO2	√	√		√	√				√			
CLO3	√	√			√							

6. Teaching and Learning methods of Disabled Students

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

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Reports / Sheets	CLO1, CLO2
3	Quiz 1 / Quiz 2	CLO3
4	Mid-term Exam	CLO1, CLO2
5	Oral/ Practical Exam	CLO3
6	Final Exam	CLO1, CLO2, CLO3

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	4 & 10
4	Mid-term Exam	9
5	Oral/ Practical Exam	15
6	Final Exam	16

7.3 Weighting of Assessments					
	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	sheets			5%	5
	Attendance			5%	5
	Quiz			%10	10
	Mid-term exam			20%	20
Final Exam				60%	60
Total				100%	100

8. List of References

[1] S.K. Kataria and Sons, “Integrated Circuit Technology”, 2016

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction to IC technology	1	CLO1
2	Silicon Fabrication Process	1	CLO1, CLO2
3	Fabrication techniques	1	CLO1, CLO2
4	Passive element Fabrication	1	CLO1, CLO2
5	Active Element Fabrication: BJT	1	CLO1, CLO2
6	Active Element Fabrication: MoSFET	1	CLO1, CLO2
7	Layout Simulation	1	CLO1, CLO2
8	Design of IC (1)	1	CLO1, CLO2
9	Design of IC (2)	1	CLO1, CLO2
10	Connection lines Modeling (1)	1	CLO1, CLO2
11	Connection lines Modeling (2)	1	CLO1, CLO2
12	Electrostatic charges	2	CLO3
13	Packaging	2	CLO3
14	Revisions	2	CLO3

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.	CLO1	Explain the concepts of amplifiers and oscillators.
PL2	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.	CLO2	Develop and conduct appropriate experimentation and/or simulation, analyze and interpret data, assess.

Title	Name	Signature
Course coordinator		
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE 4171 **Course Title: Optical Communication systems**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4171			
Prerequisite	----			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	1	0	3

2. Course Aims

No.	Aim
1	Dealing and characterization of electronic circuits.(AM5)

3. Course Learning Outcomes (LOs)

CLO.17	Explain the concepts of Optical Fiber cable with applying the design process. By Select, model and analyze optical systems applicable to the specific discipline.
CLO.18	Applying the concepts of: generation, transmission and distribution of Optical fiber systems. Discovering and identifying the communication system of the fiber cable system.
CLO.19	Designing an optical fiber system with avoiding dispersion. And study the different types of dispersion. Design model and analyze an electrical/electronic/digital system or component for a specific application.
CLO.20	Identify the tools required to optimize this design and analyze the optical link budget for an optical communication system.
CLO.21	Model an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
CLO.22	Analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

4. Course Contents

Topics	Week
Introduction of Optical Fiber Systems.	1
Fundamentals of Optical Fiber Systems.	2
Dispersion in Optical Fiber.	3
Modal Dispersion.	4
Chromatic Dispersion.	5
Waveguide Dispersion.	6
Polarization Mode Dispersion.	7
Total Dispersion and Dispersion Comparisons.	8
Midterm Exam.	9
Fiber Characteristics	10
Fiber Optic Light Sources.	11
Detectors & Receivers.	12
Optical Budget.	13
Modulation and Multiplexing.	14
Photo Detectors.	15
Final Exam.	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.17	√											
CLO.18			√	√								
CLO.19		√								√	√	√
CLO.20						√		√				
CLO.21					√							
CLO.22				√			√					

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	CLO17, CLO18, CLO19, CLO20
2	Assignments	CLO21, CLO22

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz	4 & 10
4	Mid-term Exam	9
5	Oral/ Practical Exam	15
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	%35	35	5%	5
	Attendance			5%	5
	Quiz			5%	5
	Mid-term exam			20%	20
Practical / Oral	Practical Attendance	5%	5		
	Lab. Reports				
	Lab. Activities / Projects			5%	5
	Final oral / practical exam				
Final Exam				60%	60
Total				100%	100

8. List of References

[1] Kumar, "Principles Of Optical Communications & Opto Electronics" SECOND EDITION, Laxmi Publications, 2007.
[2] Kaminow, "The Optical Communications Reference", FIRST EDITION, 2009.
[3] Kang Liu, "Principles And Applications Of Optical Communications", Irwin, 1996.
[4] Binh, "Optical Fiber Communications Systems", SECOND EDITION, 2014.
[5] Gerd Keiser, "Optical Fiber Communications" THIRD EDITION, Mc Graw Hill Higher Education, 2000.
[6] John M. Senior, "Optical Fiber Communications Principles and Practice", THIRD EDITION, Pearson Education, 2009.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction of Optical Fiber Systems.	1	CLO.17, CLO.18, CLO19
2	Fundamentals of Optical Fiber Systems.	1	CLO.17, CLO.18, CLO19
3	Dispersion in Optical Fiber.	1	CLO.17, CLO.18, CLO19
4	Modal Dispersion.	1	CLO.17, CLO.18, CLO19
5	Chromatic Dispersion.	1	CLO.17, CLO.18, CLO19
6	Waveguide Dispersion.	1	CLO.17, CLO.18, CLO19
7	Polarization Mode Dispersion.	1	CLO.17, CLO.18, CLO19
8	Total Dispersion and Dispersion Comparisons.	1	CLO.17
9	Fiber Characteristics	1	CLO.18
10	Fiber Optic Light Sources.	1	CLO.20, CLO.21, CLO22
11	Detectors & Receivers.	1	CLO.20, CLO.21, CLO22
12	Optical Budget.	1	CLO.20, CLO.21, CLO22
13	Modulation and Multiplexing.	1	CLO.20, CLO.21, CLO22
14	Photo Detectors.	1	CLO.20, CLO.21, CLO22

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL11	Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of: generation,	CLO.17	Explain the concepts of Optical Fiber cable with applying the design process. By Select, model and analyze optical systems applicable to the specific discipline.
		CLO.18	Applying the concepts of: generation, transmission and distribution of Optical fiber systems. Discovering and identifying the communication system of

	transmission and distribution of electrical power systems.		the fiber cable system.
		CLO.19	Designing an optical fiber system with avoiding dispersion. And study the different types of dispersion. Design model and analyze an electrical/electronic/digital system or component for a specific application.
PL12	Design model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO.20	Identify the tools required to optimize this design and analyze the optical link budget for an optical communication system.
		CLO.21	Model an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
		CLO.22	Analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

Title	Name	Signature
Course coordinator	**Dr. Ahmed Fawzy**	
Program coordinator	**Assoc. Prof. Dr. Osama EL-Ghandour**	
Head of Department	**Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE4172 **Course Title: specialized elective course (3)**

Application Specific integrated Circuits

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4172			
Prerequisite	--			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	1	0	4

2. Course Aims

No.	Aim
1	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)
2	Perform effectively as a member of a multi-disciplinary professional team. (AM7)

3. Course Learning Outcomes (LOs)

CLO.21	Model an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
CLO.22	Analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

4. Course Contents

Topics	Week
Introduction	1
Application specific integrated circuits: Library Design	2
Application specific programmable integrated circuits	3
Application specific programmable integrated circuits: Logic Cells (1)	4
Application specific programmable integrated circuits: Logic Cells (2)	5
Application specific programmable integrated circuits: Input/Output Circuits	6
Application specific programmable integrated circuits: interconnects	7
Application specific programmable integrated circuits: Simulators (FPGA) (1)	8
Midterm Exam	9
Application specific programmable integrated circuits: Simulators (FPGA) (2)	10
Application specific integrated circuits: Programming Languages (VHDL)(1)	11
Application specific integrated circuits: Programming Languages (VHDL)(2)	12
Application specific integrated circuits: Programming Languages (C) (1)	13
Application specific integrated circuits: Programming Languages (C) (2)	14

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.21	√	√			√							
CLO.22	√	√			√							

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Written exam	CLO.21, CLO.22
2	Quizzes and reports	CLO.21, CLO.22
3	Oral exams	
4	Practical	
5	Project applied on a practical field problem	
6	Presentation	
7	Assignments	CLO.21, CLO.22
8	Researches	
9	Self-Learning	
10	Simulations	

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Presentation	----
4	Mid-term Exam	9
5	Oral/ Practical Exam	----
6	Final Exam	16

7.3 Weighting of Assessments					
	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	40%	40	15%	15
	Attendance			5%	5
	Mid-term exam			20%	20
Final Exam		60%	60		60
Total			100		100

8. List of References

[1] Fisher, Edward, ed. *Application Specific Integrated Circuits: Technologies, Digital Systems and Design Methodologies*. BoD–Books on Demand, 2019.

9. Facilities required for teaching and learning

Lecture

White board

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction	1	CLO.21, CLO.22
2	Application specific integrated circuits: Library Design	1	CLO.21, CLO.22
3	Application specific programmable integrated circuits	1	CLO.21, CLO.22
4	Application specific programmable integrated circuits: Logic Cells (1)	1	CLO.21, CLO.22
5	Application specific programmable integrated circuits: Logic Cells (2)	1	CLO.21, CLO.22

6	Application specific programmable integrated circuits: Input/Output Circuits	1	CLO.21, CLO.22
7	Application specific programmable integrated circuits: interconnects	1	CLO.21, CLO.22
8	Application specific programmable integrated circuits: Simulators (FPGA) (1)	1	CLO.21, CLO.22
9	Midterm Exam		
10	Application specific programmable integrated circuits: Simulators (FPGA) (2)	1	CLO.21, CLO.22
11	Application specific integrated circuits: Programming Languages (VHDL)(1)	1	CLO.21, CLO.22
12	Application specific integrated circuits: Programming Languages (VHDL)(2)	1	CLO.21, CLO.22
13	Application specific integrated circuits: Programming Languages (C) (1)	1	CLO.21, CLO.22
14	Application specific integrated circuits: Programming Languages (C) (2)	1	CLO.21, CLO.22

11. Matrix of Program LOs with Course Los

Program LOs		Course LOs	
PL12	Design model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO.21	Model an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.
		CLO.22	Analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

Title	Name	Signature
Course coordinator		
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

Course Specification

Course Code: ECE4173 **Course Title: specialized elective course (3) Integrated circuits applications**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4173			
Prerequisite	--			
Year/level	Fourth year / First Semester (1st Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	1	0	4

2. Course Aims

No.	Aim
1	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)

3. Course Learning Outcomes (LOs)

CLO.6	Apply engineering design processes to meet specified needs.
CLO.23	Design and implement modules, sub-systems or systems using technological and professional tools.

4. Course Contents

Topics	Week
Radio amplifiers	1
MidBand frequency amplifiers	2
Video Amplifiers	3

Harmonic Oscillators	4
Non-Harmonic Oscillators	5
Oscillators stability	6
Voltage controlled oscillators	7
Phase locked loop	8
Midterm Exam	9
Mixers	10
Transmitter and receiver circuits	11
Numerical systems	12
Analog systems	13
Mixed-mode systems	14

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO1	√	√		√	√							
CLO2	√	√		√	√							

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√
2		

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Written exam	CLO.6, CLO.23
2	Quizzes and reports	CLO.6, CLO.23
3	Oral exams	
4	Practical	
5	Project applied on a practical field problem	CLO.6, CLO.23
6	Presentation	
7	Assignments	CLO.6, CLO.23
8	Researches	
9	Self-Learning	
10	Simulations	

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Presentation	----
4	Mid-term Exam	9
5	Oral/ Practical Exam	----
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	40%	40	15%	15
	Attendance			5%	5
	Mid-term exam			20%	20
Final Exam		60%	60		60
Total			100		100

8. List of References

[1] Morant, Martin J. *Integrated circuit design and technology*. Vol. 18. Springer, 2013.

9. Facilities required for teaching and learning

Lecture
White board

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Radio amplifiers	1	CLO.6, CLO.23
2	MidBand frequency amplifiers	1	CLO.6, CLO.23
3	Video Amplifiers	1	CLO.6, CLO.23
4	Harmonic Oscillators	1	CLO.6, CLO.23
5	Non-Harmonic Oscillators	1	CLO.6, CLO.23
6	Oscillators stability	1	CLO.6, CLO.23
7	Voltage controlled oscillators	1	CLO.6, CLO.23
8	Phase locked loop	1	CLO.6, CLO.23
9	Midterm Exam		CLO.6, CLO.23
10	Mixers	1	CLO.6, CLO.23
11	Transmitter and receiver circuits	1	CLO.6, CLO.23
12	Numerical systems	1	CLO.6, CLO.23
13	Analog systems	1	CLO.6, CLO.23
14	Mixed-mode systems	1	CLO.6, CLO.23

11. Matrix of Program LOs with Course Los

Program LOs		Course LOs	
PL3	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.	CLO.6	Apply engineering design processes to meet specified needs.
PL13	Design and implement elements, modules, sub-systems or systems using technological and professional tools.	CLO.23	Design and implement modules, sub-systems or systems using technological and professional tools.

Title	Name	Signature
Course coordinator		
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

برنامج هندسة الالكترونيات والاتصالات
المعهد العالي للهندسة والتكنولوجيا
بالتجمع الخامس

Course Specification

Course Code: ECE 4201 **Course Title:** Electronic Measurements & Testing 4

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4201			
Prerequisite	-----			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Prerequired Course	**----**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	0	0	4	4

2. Course Aims

No.	Aim
1	Design and conduct experiments as well as analyze and interpret data. Work effectively within multi-disciplinary teams in the experiments of: complex open microwave systems, microwave power consumption, attenuation, SWR, and Direction coupler. (AM4)

3. Course Learning Outcomes (LOs)

CLO.31	Use the appropriate tools and equipment to measure system performance
CLO.32	analyze the system performance's results correctly

4. Course Contents

Topics	Week
Explain Microwave open system Experiment	1
Microwave open system Experiment	2
Explain Power consumption with different loads	3
Power consumption with different loads	4
Explain Power, and interactions of microwave attenuators	5
Power, and interactions of microwave attenuators	6
Explain Gun Oscillator adjustment and its parameters experiments	7
Gun Oscillator adjustment and its parameters experiments	8
Midterm Exam	9
Explain Microwave gain measurement experiments	10
Microwave gain measurement experiments	11
Explain SWR setup and measurement experiments	12
SWR setup and measurement experiments	13
Explain Direction Coupler performance experiments	14
Direction Coupler performance experiments	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO1			√									√
CLO2			√									√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Written exam	CLO.32
2	Oral exams	CLO.31, CLO.32
3	Practical	CLO.31, CLO.32

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Mid-term Exam	9
4	Oral/ Practical Exam	15
5	Final Exam	16

	Assessment Method	Weights%	Weights
Teacher Opinion	Practical Attendance	10%	10
	Attendance	10%	10
	Quiz 1 / Quiz 2	10%	10
	Final oral / practical exam	30%	30
Final Exam		40%	40
Total		100%	100

8. List of References

[1] Laboratory manual.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Explain Microwave open system Experiment	1	CLO.31
2	Microwave open system Experiment	1	CLO.31
3	Explain Power consumption with different loads	1	CLO.31
4	Power consumption with different loads	1	CLO.31
5	Explain Power, and interactions of microwave attenuators	1	CLO.31, CLO.32
6	Power, and interactions of microwave attenuators	1	CLO.31, CLO.32
7	Explain Gun Oscillator adjustment and its parameters experiments	1	CLO.31
8	Gun Oscillator adjustment and its parameters experiments	1	CLO.31
9	Explain Microwave gain measurement experiments	1	CLO.31
10	Microwave gain measurement experiments	1	CLO.31
11	Explain SWR setup and measurement experiments	1	CLO.31
12	SWR setup and measurement experiments	1	CLO.31
13	Explain Direction Coupler performance experiments	1	CLO.31
14	Direction Coupler performance experiments	1	CLO.31

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL18	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 for complex open microwave systems, microwave power consumption, attenuation, SWR, and Direction coupler.	CLO.31	Use the appropriate tools and equipment to measure system performance
PL18	Use the appropriate tools and equipment to measure complex open microwave systems, microwave power consumption, attenuation, SWR, and Direction coupler and analyze the results correctly.	CLO.32	analyze the system performance's results correctly

Title	Name	Signature
Course coordinator	**Dr. Osama Elmowafy**	
Program coordinator	**Associate Prof. Dr. Osama El-Ghandour**	
Head of Department	**Associate Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/9/2022**	

Course Specification

Course Code: ECE 4202 **Course Title: Communication Networks**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4202			
Prerequisite	ECE 3201			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Dealing and characterization of electronic circuits. (AM5)

3. Course Learning Outcomes (LOs)

CLO.27	Adopt suitable national and international standards and codes to: design, build, operate, inspect.

4. Course Contents

Topics	Week
Introduction to Networks.	1
History of mobile communications.	2
Data Communications and Networking.	3
Network Models.	4
Underlying Technology.	5
Introduction to Network Layer.	6
Using Telephone and Cable Networks for Data Transmission.	7
Introduction to the Transport Layer.	8
Midterm Exam.	9
Transmission Control Protocol (TCP).	10
Congestion Control.	11
User Datagram Program.	12
Introduction to Packet Tracer program.	13
Project discussion on packet tracer.	14
Discussing, presenting and test the project.	15
Final Exam.	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.27	√	√	√			√		√				√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Written exam	CLO.27
2	Assignments	CLO.27
3	Simulations	CLO.27

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz	4 & 10
4	Mid-term Exam	9
5	Oral/ Practical Exam	15
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	35%	35	5%	5
	Attendance			5%	5
	Quiz			5%	5
	Mid-term exam			20%	20
Practical / Oral	Practical Attendance	5%	5		
	Lab. Reports				
	Lab. Activities / Projects			5%	5
	Final oral / practical exam				
Final Exam				60%	60
Total				100%	100

8. List of References

[1] Dhubkarya, “Network And System”, 2007.
[2] Gupta, “Network Analysis And Synthesis”, 2010.
[3] Behrouz A. Forouzan, “DATA COMMUNICATIONS AND NETWORKING,” FOURTH EDITION, Copyright © 2007 byThe McGraw-Hill Companies.
[4] Behrouz A. Forouzan, “TCP/IP PROTOCOL SUITE,” FOURTH EDITION, Copyright © 2010 byThe McGraw-Hill Companies.
[5] Simon Haykin, ”Communication systems,” fourth edition, Copyright © 2000 by John Wiley.
[6] A. Bruce Carlson, “Communication systems (An Introduction to Signals and Noise in Electrical Communication),” FOURTH EDITION, Copyright © 2010 by The McGraw-Hill Companies.
[5] Cisco Certified Network Associate course (ICND 1 and ICND 2), 2014

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction to Networks.	1	CLO.27
2	History of mobile communications.	1	CLO.27
3	Data Communications and Networking.	1	CLO.27
4	Network Models.	1	CLO.27
5	Underlying Technology.	1	CLO.27
6	Introduction to Network Layer.	1	CLO.27
7	Using Telephone and Cable Networks for Data Transmission.	1	CLO.27
8	Introduction to the Transport Layer.	1	CLO.27
9	Transmission Control Protocol (TCP).	1	CLO.27
10	Congestion Control.	1	CLO.27
11	User Datagram Program.	1	CLO.27
12	Introduction to Packet Tracer program.	1	CLO.27
13	Project discussion on packet tracer.	1	CLO.27
14	Discussing, presenting and test the project.	1	CLO.27

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PL15	Adopt suitable national and international standards and codes to: design, build, operate, inspect and maintain electrical/electronic equipment, systems and services.	CLO.27	Adopt suitable national and international standards and codes to: design, build, operate, inspect.

Title	Name	Signature
Course coordinator	**Dr. Ahmed Magdy**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/09/2022**	

Course Specification

Course Code: ECE 4203 **Course Title: Antennas**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4203			
Prerequisite	ECE 3105			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Dealing and characterization of electronic circuits. (AM5)

3. Course Learning Outcomes (LOs)

CLO.23	Explain the concepts of antenna with applying the design process of the antenna parameters.
CLO.24	Discovering and identifying the antenna parameters of antenna sustainable design and development.
CLO.31	Designing an antenna using a simulator to reach the certain needs to measure system performance.
CLO.32	Fabricating the antenna and measure it and analyze the results correctly.

4. Course Contents

Topics	Week
Introduction to Antennas.	1
Fundamental Parameters of Antennas.	2
Fundamental Parameters of Antennas.	3
Linear Wire Antennas.	4
Auxiliary Potential Functions.	5
Loop Antennas.	6
Antenna Arrays.	7
Antenna Arrays.	8
Midterm Exam.	9
Microstrip Patch Antennas.	10
Microstrip Patch Antennas.	11
Broadband Dipoles and Matching Techniques.	12
Project paper reviewing.	13
Introducing the project tool program CST or HFSS.	14
Discussing, presenting and test the paper project.	15
Final Exam.	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.23	√											
CLO.24			√	√								
CLO.31		√					√			√	√	√
CLO.32						√		√	√			

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	CLO23, CLO24, CLO31, CLO32
2	Assignments	CLO23, CLO24, CLO31, CLO32
3	Simulations	CLO31, CLO32

7.2 Assessment Schedule		
No.	**Assessment Method**	**Weeks**
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz	4 & 10
4	Mid-term Exam	9
5	Oral/ Practical Exam	15
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets / Activities	35%	35	5%	5
	Attendance			5%	5
	Quiz			5%	5
	Mid-term exam			20%	20
Practical / Oral	Practical Attendance	5%	5		
	Lab. Reports				
	Lab. Activities / Projects			5%	5
	Final oral / practical exam				
Final Exam				60%	60
Total				100%	100

8. List of References

[1] Fang, “Antenna Theory and Microstrip Antennas”, First Editon, 2006
[2] Kraus, “Antennas And Wave Propagation”, Fourth edition, 2010.
[3] Constantine A. Balanis “ANTENNA THEORY ANALYSIS AND DESIGN”, 2005.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction to Antennas.	1	CLO23,
2	Fundamental Parameters of Antennas.	1	CLO23
3	Linear Wire Antennas.	1	CLO23, CLO24
4	Auxiliary Potential Functions.	1	CLO23, CLO24
5	Loop Antennas.	1	CLO23, CLO24
6	Antenna Arrays.	1	CLO23, CLO24
7	Microstrip Patch Antennas.	1	CLO23, CLO24
8	Broadband Dipoles and Matching Techniques.	1	CLO23, CLO24
9	Project paper reviewing.	1	CLO23, CLO24, CLO31, CLO32
10	Introducing the project tool program CST or HFSS.	1	CLO31, CLO32
11	Discussing, presenting and test the paper project.	1	CLO23, CLO24, CLO31, CLO32

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL13	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.	CLO23	Explain the concepts of antenna with applying the design process of the antenna parameters.
		CLO24	Discovering and identifying the antenna parameters of antenna sustainable design and development.
PL18	Use the appropriate tools and equipment to measure system performance and analyze the results correctly.	CLO31	Designing an antenna using a simulator to reach the certain needs to measure system performance.
		CLO32	Fabricating the antenna and measure it and analyze the results correctly.

Title	Name	Signature
Course coordinator	**Dr. Ahmed Magdy**	
Program coordinator	**Assoc. Prof. Dr. Osama EL-Ghandour**	
Head of Department	**Prof. Dr. Osama El-Ghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE4261 **Course Title:** Specialized Elective Course (4) Mobile Communication

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4261			
Prerequisite	----------			
Year/level	Fourth year / Second Semester (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Identify, analyse, and solve practical problems, making use of appropriate engineering tools, programs and techniques (AM.3)

3. Course Learning Outcomes (LOs)

CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

4. Course contents

Topics	Week
Introduction and over view of wireless communication system	1
GSM architecture	2
Air interface channels	3
Signal processing and physical layer implementation	4
Call management and location update	5
Handover mobility management	6
Mobility model & Cellular traffic management	8
Mid Term Exam	9
Cellular geometry and frequency reuse planning and sectorization	10
Study of Wireless Propagation Models	11
Link Budget Calculation	12
Coverage and capacity planning	13
Revision	14
Practical exam	15
Final Exam	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO25	√	√			√							
CLO30				√							√	√

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Reports / Sheets	CLO25, CLO.30
3	Quizzes	CLO25
4	Mid-term Exam	CLO25
5	Final Exam	CLO25

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	11.13
3	Quiz	10
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments					
	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	Reports / sheets	40%	40	10%	10
	Quiz 1 / Quiz 2			10%	10
	Mid-term exam			20%	20
Final Exam				60%	60
Total				100%	100

8. List of References

- B.P. Lathi, Modern Digital and Analog communication systems, 2018.
- LEON W. COUCH II , Digital And Analog Communication systems, 2017

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction and over view of wireless communication system	1	CLO.25
2	GSM architecture	1	CLO.25
3	Air interface channels	1	CLO.25
4	Signal processing and physical layer implementation	1	CLO.25
5	Call management and location update	1	CLO.25
6	Handover mobility management	1	CLO.25
8	Mobility model & Cellular traffic management	1	CLO.25
9	Mid Term Exam	1	CLO.25
10	Cellular geometry and frequency reuse planning and sectorization	1	CLO.25
11	Study of Wireless Propagation Models	1	CLO.25
12	Link Budget Calculation	1	CLO.25
13	Coverage and capacity planning	1	CLO.25,CLO.30
14	Revision	1	CLO.25,CLO.30
15	Practical exam	1	
16	Final Exam		CLO.25

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PLO14	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO.25	Estimate the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
PLO17	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems	CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

Title	Name	Signature
Course coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE 5252 **Course Title: Specialized Elective course (4) Selected Topics on Communication Systems**

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 5252			
Year/level	Fourth year / second Semester (2^{nd} Semester)			
Specialization	**Major**			
Prerequired Course	ECE 5252			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Use appropriate mathematical methods or IT tools for modelling and analysing electronic and Advanced communication systems. (AM1)

3. Course Learning Outcomes (LOs)

CLO.23	Design elements, modules, sub-systems, or systems in communication engineering using technological and professional tools.
CLO.30	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

4. Course Contents

Topics	Week
Radar Systems Overview.	1
Radar system physics.	2
Radar System principles of working.	3
Optical Fiber communications system.	4
Light propagation, and Fiber classifications.	5
Fiber optics Losses, and Noise.	6
Light sources and detectors; Link budget	7
Telephone Systems: Subscriber loop;	8
Call procedures; Cordless	10
Telephones; Paging systems	11
Public telephone network	12
Microwave Radio Communications	13
Analog versus digital microwave	14
FM system; Repeaters; Diversity; System gain analysis.	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.23	√	√		√								
CLO.30	√	√		√			√					

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	CLO.23, CLO.30
2	Quizzes and reports	CLO.23, CLO.30
3	Assignments	CLO.23, CLO.30
4	Self-Learning	CLO.23, CLO.30

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	4 & 10
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports / sheets / Activities	%10	40	%25	10
	Attendance	%10		%25	10
	Quiz 1 / Quiz 2	%10		%25	10
	Mid-term exam	%10		%20	20
Final Exam		%60	60		60
Total		%100	100		100

8. List of References

[1] Sonnenberg, Gerrit Jacobus. *Radar and electronic navigation*. Elsevier, 2013.
[2] Couch, "Digital and Analog Communication Systems", Seventh Edition ©2007.
[3] Kennedy & Davis, "Electronic Communication System", 4th Edition 1992.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Radar Systems Overview.	1	CLO.23, CLO.30
2	Radar system physics.	1	CLO.23, CLO.30
3	Radar System principles of working.	1	CLO.23, CLO.30
4	Optical Fiber communications system.	1	CLO.23, CLO.30
5	Light propagation, and Fiber classifications.	1	CLO.23, CLO.30
6	Fiber optics Losses, and Noise.	1	CLO.23, CLO.30
7	Light sources and detectors; Link budget	1	CLO.23, CLO.30
8	Telephone Systems: Subscriber loop;	1	CLO.23, CLO.30
9	Call procedures; Cordless	1	CLO.23, CLO.30
10	Telephones; Paging systems	1	CLO.23, CLO.30
11	Public telephone network	1	CLO.23, CLO.30
12	Microwave Radio Communications	1	CLO.23, CLO.30
13	Analog versus digital microwave	1	CLO.23, CLO.30
14	FM system; Repeaters; Diversity; System gain analysis.	1	CLO.23, CLO.30

11. Matrix of Program LOs with Course Los

Program LOs		Course LOs	
PL13	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, andmathematics.	**CLO.23**	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
PL17	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems	**CLO.30**	Practice computer programs for the design and diagnostics of digital and analog communication, mobile communication, coding and decoding systems

Title	Name	Signature
Course coordinator	**Dr. Osama Elmowafy**	
Program coordinator	**Associate Prof. Dr. Osama El-Ghandour**	
Head of Department	**Associate Prof. Dr. Osama El-Ghandour**	
Date of Approval	3/**9/2023**	

Course Specification

Course Code: ECE 42623 Course Title: Specialized Elective Course (4) Analog Integrated Circuit Design

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4263			
Prerequisite	-----			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Identify, formulate, and solve Analog Integrated Circuit Design problems by applying electric engineering fundamentals, basic science, and mathematics. (AM1)

3. Course Learning Outcomes (LOs)

CLO.4	Develop appropriate experimentation and/or simulation, to analyze, interpret data, assess, and evaluate findings, and using statistical analyses and objective engineering judgment to draw conclusions.
CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering

4. Course Contents

Topics	Week
Introduction to analog VLSI, Device Modelling.	1
Basic analog blocks (current mirrors, and common-source).	2
Basic analog blocks (common-drain, and common-gate).	3
Basic analog blocks (cascode-different pair).	4
Frequency Response	5
Stability and frequency	6
Compensation	7
Introduction to operational amplifier.	8
operational amplifier (basics, and two-stage)	10
operational amplifier (miller, symmetrical, and telescope)	11
operational amplifier (folded, and cascode)	12
Noise	13
Voltage and current references	14
Power references and assumptions	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.4	√	√		√								
CLO.23	√	√		√			√					

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Written exam	**CLO.4, CLO.23**
2	Quizzes and reports	**CLO.4, CLO.23**
3	Assignments	**CLO.4, CLO.23**
4	Self-Learning	**CLO.4, CLO.23**

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	4 & 10
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	sheets	%10	40	%25	10
	Attendance	%10		%25	10
	Quiz 1 / Quiz 2	%10		%25	10
	Mid-term exam	%10		%25	10
Final Exam		%60	60		60
Total		%100	100		100

8. List of References

[1] Sharma Sanjay, "Analog & Digital Communication Engineering", 2010.
[2] Couch, "Digital and Analog Communication Systems", Seventh Edition ©2007.
[3] Kennedy & Davis, "Electronic Communication System", 4th Edition 1992.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction to analog VLSI, Device Modelling.	1, 2	**CLO.4, CLO.23**
2	Basic analog blocks (current mirrors, and common-source).	1, 2	**CLO.4, CLO.23**
3	Basic analog blocks (common-drain, and common-gate).	1, 2	**CLO.4, CLO.23**
4	Basic analog blocks (cascode-different pair).	1, 2	**CLO.4, CLO.23**
5	Frequency Response	1, 2	**CLO.4, CLO.23**
6	Stability and frequency	1, 2	**CLO.4, CLO.23**
7	Compensation	1, 2	**CLO.4, CLO.23**
8	Introduction to operational amplifier.	1, 2	**CLO.4, CLO.23**
9	operational amplifier (basics, and two-stage)	1, 2	**CLO.4, CLO.23**
10	operational amplifier (miller, symmetrical, and telescope)	1, 2	**CLO.4, CLO.23**
11	operational amplifier (folded, and cascode)	1, 2	**CLO.4, CLO.23**
12	Noise	1, 2	**CLO.4, CLO.23**
13	Voltage and current references	1, 2	**CLO.4, CLO.23**
14	Power references and assumptions	1, 2	**CLO.4, CLO.23**

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL2	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.	**CLO.4**	Develop appropriate experimentation and/or simulation, to analyze, interpret data, assess, and evaluate findings, and using statistical analyses and objective engineering judgment to draw conclusions.
PL13	Design and implement elements, modules, sub-systems or systems using technological and professional tools.	**CLO.23**	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering

Title	Name	Signature
Course coordinator	**Dr. Osama Elmowafy**	
Program coordinator	**Assoc.Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc.Prof. Dr. Osama ELghandour**	
Date of Approval	3**/9/2022**	

Course Specification

Course Code: ECE 4271 **Course Title: Specialized Elective course (5)**

Selected Topics in Electronics

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE 4271			
Prerequisite	--			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Minor**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	3

2. Course Aims

No.	Aim
1	Apply Communication and electronic engineering based on physical sciences and mathematics. (AM1)
2	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)

3. Course Learning Outcomes (LOs)

CLO.8	Practice research techniques and methods of investigation as an inherent part of learning.
CLO.20	Design, an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

4. Course Contents

Topics	Week
Developments in Micro-electronics.	1
Developments in Micro-electronics.	2
Developments in Nanoelectronics.	3
Developments in Nanoelectronics.	4
Micro electrochemical Technologies	5
Micro electrochemical Technologies	6
Nano electrochemical Technologies	7
Nano electrochemical Technologies	8
Midterm Exam.	9
Integrated Circuit Design	10
Integrated Circuit Design	11
Electronic designs	12
Electronic designs	13
Methods of using computers in design	14
Methods of using computers in design	15
Final Exam.	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.8	√	√			√							
CLO.20	√	√			√							

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Reports / Sheets	CLO.8, CLO.20
3	Quiz 1 / Quiz 2	CLO.8, CLO.20
4	Mid-term Exam	CLO.8, CLO.20
5	Final Exam	CLO.8, CLO.20

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Sheets	Bi-weekly
3	Quiz	4 & 10
4	Mid-term Exam	9
5	Final Exam	16

7.3 Weighting of Assessments					
	Assessment Method	**Weights%**	**Weights**	**Weights%**	**Weights**
Teacher Opinion	sheets	40%	40	10%	10
	Attendance			5%	5
	Quiz			5%	5
	Mid-term exam			20%	20
Final Exam				60%	60
Total				100%	100

8. List of References

[1] Quantum-Based Electronic Devices and Systems, Selected Topics in Electronics and Systems, Vol 14, 1998.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Developments in Micro-electronics.	1	CLO.8, CLO.20
2	Developments in Nanoelectronics.	1	CLO.8, CLO.20
3	Micro electrochemical Technologies	1, 2	CLO.8, CLO.20
4	Nano electrochemical Technologies	1, 2	CLO.8, CLO.20
5	Integrated Circuit Design	2	CLO.8, CLO.20
6	Electronic designs	2	CLO.8, CLO.20
7	Methods of using computers in design	2	CLO.8, CLO.20

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PLO5	Practice research techniques and methods of investigation as an inherent part of learning.	CLO.8	Practice research techniques and methods of investigation as an inherent part of learning.
PLO12	Design, model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO.20	Design, an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.

Title	Name	Signature
Course coordinator	**Dr.**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE4272 **Course Title:** Information theory

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	ECE4272			
Prerequisite	----------			
Year/level	Fourth year / Second Semester (2^{nd} Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	3	2	0	5

2. Course Aims

No.	Aim
1	Identify, analyse, and solve practical problems, making use of appropriate engineering tools, programs and techniques (AM.3)

3. Course Learning Outcomes (LOs)

CLO.26	Measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.
CLO.29	analyzing electronic and communication systems

4. Course contents

Topics	Week
Introduction of probability theory concept and deferent information sources.	1
Self-information and entropy	2
Average mutual information and conditional entropy	3
Channel types and channel capacity	4
Shannon theory	5
Differential entropy	6
Source encoding techniques	7
Markov source	8
Mid Term Exam	9
Rate Distortion Theory	10
Design of Linear Block code	11
Design of Cylic Code	12
Design of convolution code	13
Design of Turbo Code	14
Practical Exam	15
Final Exam	16

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.26	√	√										
CLO.29	√				√							

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Reports	CLO.26
3	Quiz	CLO.26
4	Mid-term Exam	CLO.26, CLO.29
5	Final Exam	CLO.26, CLO.29

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports	6,11
3	Quiz	7,12
4	Mid-term Exam	9

5	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Reports	40%	40	10%	10
	Quiz			10%	10
	Mid-term exam			20%	20
Final Exam				60%	60
Total				100%	100

8. List of References

- B.P. Lathi, Modern Digital and Analog communication systems, 2018.
- LEON W. COUCH II , Digital And Analog Communication systems, 2017

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)
Moodle and Microsoft teams
Data show

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Introduction of probability theory concept and deferent information sources.	1	CLO.26, CLO.29
2	Self-information and entropy	1	CLO26
3	Average mutual information and conditional entropy	1	CLO.26
4	Channel types and channel capacity	1	CLO.26
5	Shannon theory	1	CLO.26
6	Differential entropy	1	CLO.26
7	Source encoding techniques	1	CLO.26
8	Markov source	1	CLO.26,CLO.29
9	Mid Term Exam	1	CLO.26
10	Rate Distortion Theory	1	CLO.26
11	Design of Linear Block code	1	CLO.26,CLO.29
12	Design of Cylic Code	1	CLO.26,CLO.29
13	Design of convolution code	1	CLO.26,CLO.29
14	Design of Turbo Code	1	CLO.26,CLO.29
15	Practical exam		
16	Final Exam	1	CLO.26,CLO.29

11. Matrix of Program LOs with Course Los

Program LOs		Course Los	
PLO14	Measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application.	CLO.26	Measure the performance of an electrical/electronic/digital system and circuit under specific input excitation and evaluate its suitability for a specific application
PLO16	analyzing electronic and communication systems	CLO.29	analyzing electronic and communication systems

Title	Name	Signature
Course coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE 4273 **Course Title: Specialized Elective Course (5)**

Selected topics in microwave

1. Basic information

Program Title	Electronics and Communication Engineering Depart.			
Department offering the program	Electronics and Communication Engineering Depart.			
Department offering the course	Electronics and Communication Engineering Depart.			
Course Code	**ECE 4273**			
prerequisite	**----**			
Year/level	Fourth year / second Semester (2nd Semester)			
Specialization	**Major**			
Teaching Hours	Lectures	Tutorial	Practical	Total
	2	2	0	4

2. Course Aims

No.	Aim
1	Use the techniques, skills, and appropriate engineering tools, necessary for engineering practice and project management. (AM3)

3. Learning Outcomes (LOs)

CLO.8	Practice research techniques and methods of investigation as an inherent part of learning
CLO.20	Design, an electronic system
CLO.22	Analyze an electronic/digital system

4. Course Contents

Topics	Week
Revision on microwave	1
Revision on antenna	2

Smart antenna	3
Microwave Resonator	4
Microwave Filters	5
Osciltor phase noise	6
RF Osciltor	7
Frequency Multiplyer	8
Mid Term Exam	9
Mixer	10
Field Effect Transistor	11
Microwave integreted circuit	12
System aspects of antenna	13
Wireless Communication	14
Practical exam	15

5. Teaching and Learning methods

Course learning Outcomes (LOs)	Teaching and Learning Methods											
	Interactive lectures	Tutorials	Practical	Projects	Assignment	Research\reports	Self-Learning	Brain Storming	Modeling and simulations	Site Visits	Presentation	Discussion
CLO.8	√	√	√			√	√					
CLO.20	√	√										
CLO.22	√	√					√				√	

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	Los
1	Attendance	-------
2	Sheets	CLO.8, CLO.20, CLO.22
3	Quiz	CLO.8, CLO.20, CLO.22
4	Mid-term Exam	CLO.8, CLO.20, CLO.22
5	Final Exam	CLO.8

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Weekly
2	Reports / Sheets	Bi-weekly
3	Quiz 1 / Quiz 2	5&11
4	Mid-term Exam	9
5	Oral/ Practical Exam	15
6	Final Exam	16

7.3 Weighting of Assessments

	Assessment Method	Weights%	Weights	Weights%	Weights
Teacher Opinion	Attendance	40%	40	5%	5
	Quiz			15%	15
	Mid-term exam			20%	20
Final Exam		60%	60	60%	60
Total				100%	100

8. List of References

[1] Pozar, David M. *Microwave engineering*. John wiley & sons, 2011.

9. Facilities required for teaching and learning

Lecture/Classroom
White board
Data show
Laboratory Usage

10. Matrix of Course Content with Course LO's

No.	Topics	Aim	LO's
1	Revision on microwave	2	CLO.8, CLO.20, CLO.22
2	Revision on antenna	2,1	CLO.8, CLO.20, CLO.22
3	Smart antenna	2	CLO.8, CLO.20, CLO.22
4	Microwave Resonator	2,1	CLO.8, CLO.20, CLO.22
5	Microwave Filters	2	CLO.8, CLO.20, CLO.22
6	Oscilltor phase noise	1	CLO.8, CLO.20, CLO.22
7	RF Oscilltor	1	CLO.8, CLO.20, CLO.22
8	Frequency Multiplyer	1	CLO.8, CLO.20, CLO.22
9	Mid Term Exam		
10	Mixer	1	CLO.8, CLO.20, CLO.22
11	Field Effect Transistor	1	CLO.8, CLO.20, CLO.22
12	Microwave integreted circuit	1	CLO.8, CLO.20, CLO.22
13	System aspects of antenna	1	CLO.8, CLO.20, CLO.22
14	Wireless Communication		CLO.8, CLO.20, CLO.22
15	Practical exam		
16	Final exam		

11. Matrix of Program LOs with Course Los

Program Los		Course Los	
PL5	Practice research techniques and methods of investigation as an inherent part of learning.	CLO.8	Practice research techniques and methods of investigation as an inherent part of learning

PL12	Design model and analyze an electrical/electronic/digital system or component for a specific application; and identify the tools required to optimize this design.	CLO.20	Design, an electronic system
		CLO.22	Analyze an electronic/digital system

Title	Name	Signature
Course coordinator	**Dr. Ahmed Fawzy**	
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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Course Specification

Course Code: ECE4299 Course Title: Graduation Project

1. Basic information

Program Title		Electronics and Communication Engineering Depart.			
Department offering the program		Electronics and Communication Engineering Depart.			
Department offering the course		Electronics and Communication Engineering Depart.			
Course Code		ECE4299			
Prerequisite		----			
Year/level		Fourth year/ First and Second Terms			
Specialization		Major			
Teaching Hours	**First & Second Term**	Lectures	Tutorial	Practical	Total
		2	2	4	8

2. Course Aims

No.	Aim
1	Identify, analyze, and solve practical problems, making use of appropriate engineering tools, programs and techniques. (AM3)
2	Manage time efficiently by assigning specific tasks within designated time schedules to accomplish work within the specified deadlines (AM6)
3	Perform effectively as an individual or as a member of a multi-disciplinary professional team with possessing a firm understanding of engineering ethical, legal, and professional responsibilities (AM7)

3. Course Learning Outcomes (LOs)

CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
CLO.24	Implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
CLO.31	Use the appropriate tools and equipment to measure system performance
CLO.32	analyze the system performance's results correctly

4. Course Contents

No.	Topics	Week
	First Term	
1	An introduction to the project and its application in industrial utilities – Students choose one of the following projects: • Simulation of tunneling field effect transistor using Sentaurus TCAD • Face recognition using artificial intelligence • ECG monitoring system • Home Automation System • Car park Automation System • Integrating AI and Atoll RF software for enhanced LTE Network performance • A compact four-port MIMO antenna for 28GHz millimeter wave 5G application. • Intelligent antenna optimization: enhancing performance with AI technique.	1,2
4	Project Layout	3:6
5	Discussing the Project Time Schedule (timed work tree)	8:10
6	Seminar to discuss the project progress	11:14
	Second Term	
7	Seminar to discuss the project progress	1:7,9
8	Students' Presentations	10:12
9	Project's Report examination and oral discussion	13:15
10	Final Report Examination and Oral Discussion and presentation	16

5. Teaching and Learning methods

No.	Teaching Method
1	Interactive lectures
2	Practical
3	Mini – project
4	Self-Learning

6. Teaching and Learning methods of Disabled Students

No.	Teaching Method	Reason
1	Additional Tutorials	√

7. Students' Assessment

7.1 Students' Assessment Method

No.	Assessment Method	LOs
1	Attendance	--
2	Reports	CLO.23 ,CLO24
3	Oral Discussion and presentation	CLO.31
4	Final Report Examination and presentation	CLO.23 ,CLO24, CLO.31,CLO32

7.2 Assessment Schedule

No.	Assessment Method	Weeks
1	Attendance	Every Week
2	Reports	12
3	Oral Discussion and presentation	13,14
4	Final Report Examination and presentation	16

7.3 Weighting of Assessments

No.	Assessment Method	Weights %	Weights
1	Attendance	4%	10
2	Reports	18%	45
3	Oral Discussion and presentation	18%	45
4	Final Report Examination and presentation	40%	100

8. List of References

A list of books regarding the project topic is given

9. Facilities required for teaching and learning

Lecture room equipped with e-learning tools (computer, internet, mike, headphones, etc.)

Moodle and Microsoft teams

Data show
Lab Facilities

10. Matrix of Knowledge and Skills of the Course

No.	Topics	Aim	LO's
	First Term		
4	An introduction to the project and its application in industrial utilities	1,2	CLO.31
5	Project Layout (Part I & II)	1, 2	CLO.31
6	Discussing the Project Time Schedule (timed work tree)	1, 2	CLO.23 , CLO24, CLO.31,CLO32
7	Seminar to discuss the project progress	1, 2	CLO.23 , CLO24, CLO.31,CLO32
8	Second Term		
9	Seminar to discuss the project progress	1, 2	CLO.23 , CLO24, CLO.31,CLO32
10	Students' Presentations	1, 2	CLO.23 , CLO24, CLO.31,CLO32
11	Project's Report examination and oral discussion	1, 2	CLO.23 , CLO24, CLO.31,CLO32
12	Final Report Examination and Oral Discussion and presentation	1, 2	CLO.23 , CLO24, CLO.31,CLO32

11. Matrix of Program LOs with Course LOs

Program LOs		Course LOs	
PL13	Design and implement elements, modules, sub-systems or systems using technological and professional tools.	CLO.23	Design elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
		CLO.24	Implement elements, modules, sub-systems, or systems in electrical/electronic/digital engineering using technological and professional tools.
PL18	Use the appropriate tools and equipment to measure system performance and analyze the results correctly	CLO.31	Use the appropriate tools and equipment to measure system performance
		CLO.32	analyze the system performance's results correctly

Title	Name	Signature
Course coordinator	All Staff	Amira Nabil Osama Elmoursy
Program coordinator	**Assoc. Prof. Dr. Osama ELghandour**	
Head of Department	**Assoc. Prof. Dr. Osama ELghandour**	
Date of Approval	**3/09/2022**	

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