



Republic of Yemen

**Ministry of Higher Education & Scientific Research
21 SEPTEMBER UNIVERSITY for MEDICALS &**



APPLIEED SCIENCES

Engineering and Computer

Department of Biomedical Engineering Technology

Course Specification of Electronics 2

Course No. (07.12.717)

2023/2024

I. Course Identification and General Information:

1	Course Title:	Electronics 2			
2	Course Code & Number:	07.12.717			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
		3	Lecture	Exercise	Hours
			2	--	2
4	Study Level/ Semester at which this Course is offered:	3 Level / 1 Semester			
5	Pre –Requisite (if any):	Electronics 1			
6	Co –Requisite (if any):				
7	Program (s) in which the Course is Offered:	Biomedical Engineering Technology			
8	Language of Teaching the Course:	English - Arabic			
9	Study System:	Regular Semester system (full-time)			
10	Mode of Delivery:	Regular, minimum attendance 75%			
11	Location of Teaching the Course:	University Campus			
12	Prepared by:	Dr. Abdulrahman Mohammed Obaid			
13	Date of Approval:				

II. Course Description:

This course builds on the concepts covering analysis and design of basic electronic circuits that are required in the design and implementation of biomedical equipment. The course review the theory and biasing techniques of BJT amplifiers with highlight on Q point, load line, Q point stability, and basic BJT amplifier configurations. The topics include the theory of Field Effect Transistors: FET biasing, FET amplifiers, multi stage circuits of BJT and FET amplifiers, differential amplifiers. In addition the course concentrate on the theory of ideal and practical operational amplifiers with emphasize

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on OP-amp operation modes, negative feedback, OP-amp limitations, basic OP-amp circuits, active filters, and Instrumentation Amplifiers. The main teaching strategies include lectures, tutorials, practical, computer simulations, dialogue, discussion, and practical projects. The course Must be taken concurrently with the course Medical Electronics Lab

III. Course Intended Learning Outcomes (CILOs) : (مخرجات تعلم المقرر)		Referenced PILOs (مخرجات تعلم البرنامج)		
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:				
a1	demonstrate an understanding of terminology and concepts of electronic devices and circuits.	A1	Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology disciplines.	
a2	explain the role of electronic components in the design of electronic systems to meet desired needs within realistic constraints.	A2	Demonstrate a profound knowledge in maintenance, troubleshooting, tools, techniques, practices, and methods, utilizing and adapting biomedical engineering technology for solving biomedical devices and equipment's problems in health environment.	
a3	Describe the electronic components characteristic and analyze its operation	A3	Identify user and healthcare needs to provide biomedical engineering technology maintenance based solutions to real-world problem.	
a4	Demonstrate an understanding of concepts of electronic devices and circuits.	A4	Demonstrate a sound understanding the biomedical engineering technology concept related to maintenance, troubleshooting, programming, utilizing, analysis, design, implementation, and evaluation of biomedical equipment's, devices and systems.	
B. Intellectual Skills: Upon successful completion of the course, students will be able to:				
	analyze and investigate	B1	Critically analyze complex biomedical	
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	electronic circuits to judge the performance of electronic systems that meet desired applications		devices and equipment's problems, faults and propose appropriate biomedical devices maintenance based solutions and integrate them effectively into the uses and healthcare organizations.
b2	depict how electronic components are modeled and how the models are used in the design and analysis of electric and electronic circuits.	B2	Analyze the impacts of biomedical devices and equipment's problems and faults on health objectives, customer needs and consider them during the purchasing, maintenance, selection, integration, configuration and administration of biomedical devices, equipment's and systems.
b3	Analyze and measure electronics circuits	B3	Explore variety of challenges and problems related to maintenance, troubleshooting and performance of biomedical devices to select the optimal solution.
b4	evaluate the extent of electronic technologies and what kind of effect they have on Bio-medical engineering problems solutions	B4	Evaluate biomedical engineering based solution to meet a given set of health requirements in the context of biomedical engineering technology discipline.

C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:

c1	build small projects using electrical and electronic circuit components	C1	Employ effectively the biomedical engineering technology concepts, principles of engineering, maintenance, evaluation tools and techniques used for the analysis and troubleshooting of medical devices faults of varying complexity.
c2	design, simulate, and implement simple electronic systems using electronic components and computer simulation package	C2	Design, implement, and test of biomedical devices and equipment's maintenance based solution to meet a given set of engineering requirement in the context of biomedical engineering technology.
c3	Use electronic device models and	C3	Use systematic approaches to

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	mathematic knowledge in solving and analyzing electronic circuits		maintenance, select, develop and administrate biomedical devices and equipment's to accomplish user and health goals.
c4	Use electronic computers software in simulating and analyzing electronic circuits as a verification tool.	C4	Use the techniques, skills, and necessary tools for biomedical engineering practices.
D. Transferable Skills: Upon successful completion of the course, students will be able to:			
d1	develop student's cooperative work though efficient team works.	D1	Function effectively as an individual, as a member, or leader of a team engaged in appropriate activities to the biomedical engineering technology disciplines to accomplish a common goal.
d2	Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices.	D2	Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices.
d3	improve and practice technical writing skills via homework and projects reporting.	D3	Communicate effectively in writing and orally in a variety of professional contexts.
d4	Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.	D4	Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.

(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:				
	<u>Course Intended Learning Outcomes</u>	<u>Teaching Strategies</u>	<u>Assessment Strategies</u>	
a1	demonstrate an understanding of terminology and concepts of electronic devices and circuits.	<ul style="list-style-type: none"> ▪ The lecture method ▪ The discussion method ▪ The method of cooperative learning 	<ul style="list-style-type: none"> ▪ Written tests(mid ▪ And final terms and ▪ quizzes), ▪ The guidance 	
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			<ul style="list-style-type: none"> and leadership of the educational process Notes & observation
a2	explain the role of electronic components in the design of electronic systems to meet desired needs within realistic constraints.	<ul style="list-style-type: none"> The lecture method The discussion method The method of cooperative learning 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), The guidance and leadership of the educational process Notes & observation
a3	Describe the electronic components characteristic and analyze its operation	<ul style="list-style-type: none"> The lecture method The discussion method The method of cooperative learning 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), The guidance and leadership of the educational process Notes & observation
a4	Demonstrate an understanding of concepts of electronic devices and circuits.	<ul style="list-style-type: none"> The lecture method The discussion method The method of cooperative learning 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), The guidance and leadership of the educational process Notes & observation

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(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
b1	analyze and investigate electronic circuits to judge the performance of electronic systems that meet desired applications	<ul style="list-style-type: none"> ▪ lectures ▪ discussion ▪ cooperative learning ▪ Assignments 	<ul style="list-style-type: none"> ▪ Written tests(mid ▪ And final terms and ▪ quizzes), ▪ The guidance and ▪ leadership of the ▪ educational process ▪ Notes & observation
b2	depict how electronic components are modeled and how the models are used in the design and analysis of electric and electronic circuits.	<ul style="list-style-type: none"> ▪ lectures ▪ discussion ▪ cooperative learning ▪ Assignments 	<ul style="list-style-type: none"> ▪ Written tests(mid ▪ And final terms and ▪ quizzes), ▪ The guidance and ▪ leadership of the ▪ educational process ▪ Notes & observation
b3	Analyze and measure electronics circuits	<ul style="list-style-type: none"> ▪ lectures ▪ discussion ▪ cooperative learning ▪ Assignments 	<ul style="list-style-type: none"> ▪ Written tests(mid ▪ And final terms and ▪ quizzes), ▪ The guidance and ▪ leadership of the ▪ educational process ▪ Notes & observation
b4	evaluate the extent of electronic technologies	<ul style="list-style-type: none"> ▪ lectures ▪ discussion 	<ul style="list-style-type: none"> ▪

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	and what kind of effect they have on Bio-medical engineering problems solutions	<ul style="list-style-type: none"> cooperative learning Assignments 	
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(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
c1	build small projects using electrical and electronic circuit components	<ul style="list-style-type: none"> Interactive class Discussions Directed self-study Demonstration 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Rev homework
c2	design, simulate, and implement simple electronic systems using electronic components and computer simulation package	<ul style="list-style-type: none"> Interactive class Discussions Directed self-study Group lab 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Rev homework
c3	Use electronic device models and mathematic knowledge in solving and analyzing electronic circuits	<ul style="list-style-type: none"> Interactive class Discussions Directed self-study Group lab 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Rev homework
c4	Use electronic computers software in simulating and analyzing electronic circuits as a verification tool.	<ul style="list-style-type: none"> Interactive class Discussions Directed self-study Group lab 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Rev homework lab evaluation

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	develop student's	<ul style="list-style-type: none"> Interactive class 	<ul style="list-style-type: none"> Written tests(mid

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	cooperative work though efficient team works.	<ul style="list-style-type: none"> discussions, work lab 	<ul style="list-style-type: none"> And final terms and quizzes), Notes & observation Solve th.lab
d2	Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices.	<ul style="list-style-type: none"> Interactive class discussions, work lab 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Solve th.lab
d3	improve and practice technical writing skills via homework and projects reporting.	<ul style="list-style-type: none"> Interactive class discussions, self -study work lab 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation Solve theor. lab
d4	Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.	<ul style="list-style-type: none"> Interactive class discussions, presentation 	<ul style="list-style-type: none"> Written tests(mid And final terms and quizzes), Notes & observation presentation

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CLOs)
1	<ul style="list-style-type: none"> Introduction Review the theory of BJT 	<ul style="list-style-type: none"> The DC operating Point: DC Bias, DC Load Line Linear Operation BJT Biasing circuits Q-Point Stability 	1	3	a1,a2,b1,b2,d1,d4

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		<ul style="list-style-type: none"> ➤ Amplifier Operation 			
2	<ul style="list-style-type: none"> ➤ Introduction ➤ Review the theory of BJT 	<ul style="list-style-type: none"> ➤ Linear Amplifier ➤ Transistor Models ➤ BJT Amplifiers (CE,CC CB) ➤ Multistage Amplifiers ➤ The Differential Amplifier 	1	3	a1,a2,b 1,b2c3,c 4,d2,d3
3	JFET transistor	<ul style="list-style-type: none"> ➤ Structure and operation, ➤ Characteristics and Parameters, ➤ biasing and Ohmic Region , ➤ basic circuits 	1	3	a1,a2,b 1,b2,d2, d3
4	MOSFET transistor	<ul style="list-style-type: none"> ➤ types ➤ Operation, ➤ biasing 	1	3	a1,a2,b 1,b2c3,c 4,d2,d3
5	FET Amplifiers	<ul style="list-style-type: none"> ➤ Common-Source Amplifier ➤ Common-Drain Amplifier ➤ Common-Gate Amplifier ➤ Class D Amplifier ➤ MOSFET Switching 	1	3	a1,a2,b 1,b2c3,c 4,d2,d3
6	FET Amplifiers	<ul style="list-style-type: none"> ➤ Class D Amplifier ➤ MOSFET Switching 	1	3	a1,a2,b 1,b2c3,c 4,d2,d3
7	Midterm Exam	Midterm Exam theory	1	3	a1, a2, a3, b1, b2, c1, c2, d2
8	Operational Amplifier	<ul style="list-style-type: none"> ➤ Introduction to Operational Amplifiers ➤ Op-Amp Input Modes and Parameters ➤ Op-Amps with Negative Feedback ➤ Effects of Negative Feedback on Op-Amp Parameters 	1	3	a1,a2,b1, b2c3,c4, d2,d3
9	Operational Amplifier	<ul style="list-style-type: none"> ➤ Bias Current and Offset Voltage ➤ Open-Loop and Closed Loop Frequency Responses ➤ Troubleshooting 	1	3	a1,a2,b1, b2c3,c4, d2,d3

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10	Basic Op-Amp Circuits	<ul style="list-style-type: none"> ▶ Comparators ▶ Summing Amplifiers 	1	3	a1,a2,b1, b2c3,c4, d2,d3
11	Basic Op-Amp Circuits	<ul style="list-style-type: none"> ▶ Integrators and Differentiators ▶ Troubleshooting ▶ Application Activity 	1	3	a1,a2, a3 a4, b1,b2, b3,b4, c1,c2, c3,c4, d3,d4
12	Active Filters	<ul style="list-style-type: none"> ▶ Basic Filter Responses ▶ Filter Response Characteristics ▶ Low-Pass Filters ▶ High-Pass Filters ▶ Band-Pass Filters ▶ Band-Stop Filters ▶ Filter Response Measurements 	1	3	a1,a2,b1, b2c3,c4,d 2,d3
13	Final Practical Exam	<ul style="list-style-type: none"> ▶ All tops 	1	6	a1,a2, a3 a4, b1,b2, b3,b4, c1,c2, c3,c4, d3,d4
14	Special-Purpose Op-Amp Circuits	<ul style="list-style-type: none"> ▶ Instrumentation Amplifiers ▶ Isolation Amplifiers 	1	3	a1,a2,b1, b2c3,c4,d 2,d3
15	OSCILLATOR	<ul style="list-style-type: none"> ▶ The Oscillator ▶ Feedback oscillator ▶ Oscillator with RC feedback circuits ▶ Oscillators with LC feedback circuits ▶ The 555 timer as an oscillator 	1	3	a1,a2,b1, b2c3,c4,d 2,d3
16	Final exam	<ul style="list-style-type: none"> ☒ All tops 	1	2	a1,a2, a3 a4, b1,b2, b3,b4, c1,c2, c3,c4, d3,d4
Number of Weeks /and Units Per Semester			16	50	

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B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Biassing of BJT Amplifiers	1	1%	
2	BJT Amplifiers analysis	1	1%	
3	Field Effect Transistors	2	1%	
4	Biassing of FET Amplifiers	2	1%	
5	MOSFET	1	1%	
6	FET Amplifiers analysis	1	1%	
7	Basic OP-AmP circuits	2	1%	
8	Instrumentation Amplifiers	1	1%	
9	Active Filters	2	1%	
10	Oscillator	1	1%	
11	Homework	1	1%	
12	Team-project	1	1%	
13				
14	-			
15	-			
16				
Number of Weeks /and Units Per Semester		15		

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)	
1	Biassing of BJT Amplifiers	1	2	a1, a2, a3, c1, c2,	
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				d1
2	BJT Amplifiers analysis	1	2	a2, a3, b1, b2, c1, c2, d1
3	Field Effect Transistors	2	4	a2, a3, b1, b2, c1, c2, d1
4	Biasing of FET Amplifiers	2	4	a1, a2, a3, b1, b2, c1, c2, d1
5	MOSFET	1	2	a2, a3, b1, b2, c1, c2, d1
6	FET Amplifiers analysis	1	2	a1, a2, a3, b1, b2, c1, c2
7	Basic OP-Amp circuits	2	4	a2, a3, b1, b2, c1, c2, d1
8	Instrumentation Amplifiers	1	2	a1, a2, a3, b1, b2, c1, c2, d1
9	Active Filters	2	4	a1, a2, a3, b1, b2, c1, c2, d1
10	Oscillator	1	2	a1, a2, a3, b1, b2, c1, c2, d1
11	Review	1	2	
Number of Weeks /and Units Per Semester		15	30	

V. Teaching Strategies of the Course:

- Lectures
- Tutorials
- laboratory works
- Self-learning

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- Dialogue and discussion
- Analysis and Problem solving .
- Project work
- Design exercises
- Simulation tools
- Coursework
- Discussion
- Brainstorming

VI. Assessment Methods of the Course:

Written tests (mid and final terms and quizzes),
Class discussions,
Presentations.
experiment lab theory.
project
Home work

VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1				
2				
3				
Total				

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VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Homework/Tasks/Assignments	2,4,6,8,10	5	10%	
2	Practical final exam	13	15	15%	
3	Midterm Exam theoretical	7	10	10%	
4	project	14	15	15%	
5	Oral and discussion notices	weekly	5	5%	
6	Final Exam	16	50	50%	
Total			100	100%	

IX. Learning Resources:

1. Floyd TL, Electronic Devices, 8th/7thed. Pearson/Prentice Hall. 2008/2005.
2. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 10th Edition, Prentice Hall, 2009.

1- Required Textbook(s) (maximum two): مثال example

1. Reddy SR. Electronic Devices and Circuits, Pangbourne: Alpha Science International, 2004.
2. J. D. Irwin, Basic Engineering Circuit Analysis, 7th Edition, Prentice-Hall, 2002.
3. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuit, 3rd Edition, John Wiley & Sons, 1996.
4. N. R. Malik, Electronic Circuit Analysis, Simulation and Design, Prentice-Hall, 1995.
5. D. Comer and D. Comer, Fundamentals of Electronic Circuit Design, John Wiley & Sons, 2003.

2- Essential References:

1. Reddy SR. Electronic Devices and Circuits, Pangbourne: Alpha Science International, 2004.
2. J. D. Irwin, Basic Engineering Circuit Analysis, 7th Edition, Prentice-Hall, 2002.
3. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuit, 3rd Edition, John Wiley & Sons, 1996.
4. N. R. Malik, Electronic Circuit Analysis, Simulation and Design, Prentice-Hall, 1995.
5. D. Comer and D. Comer, Fundamentals of Electronic Circuit Design, John Wiley & Sons, 2003.

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3-Electronic Materials and Web Sites etc.:

X. Course Policies: (Based on the Uniform Students' By law (2007) تتحرك كما هي)

1	Class Attendance: Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	Tardiness: A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	Exam Attendance/Punctuality: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

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1	Course Title:	Electronics 2			
2	Course Code & Number:	07.12.717			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
		3	Lecture	Exercise	Hours
			2	--	2
4	Study Level/ Semester at which this Course is offered:	3 Level / 1 Semester			
5	Pre –Requisite (if any):	Electronics 1			
6	Co –Requisite (if any):				
7	Program (s) in which the Course is Offered:	Biomedical Engineering Technology			
8	Language of Teaching the Course:	English - Arabic			
9	Study System:	Regular Semester system (full-time)			
10	Mode of Delivery:	Regular, minimum attendance 75%			
11	Location of Teaching the Course:	University Campus			
12	Prepared by:	Dr. Abdulrahman Mohammed Obaid			
13	Date of Approval:				

II. Course Description:

This course builds on the concepts covering analysis and design of basic electronic circuits that are required in the design and implementation of biomedical equipment. The course review the theory and biasing techniques of BJT amplifiers with highlight on Q point, load line, Q point stability, and basic BJT amplifier configurations. The topics include the theory of Field Effect Transistors: FET biasing, FET amplifiers, multi stage circuits of BJT and FET amplifiers, differential amplifiers. In addition the course concentrate on the theory of ideal and practical operational amplifiers with emphasize on OP-amp operation modes, negative feedback, OP-amp limitations, basic OP-amp

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circuits, active filters, and Instrumentation Amplifiers. The main teaching strategies include lectures, tutorials, practical, computer simulations, dialogue, discussion, and practical projects. The course Must be taken concurrently with the course Medical Electronics Lab

III. Course Intended Learning Outcomes (CILOs): (مخرجات تعلم المقرر)

A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:

- | | |
|----|---|
| a1 | demonstrate an understanding of terminology and concepts of electronic devices and circuits. |
| a2 | explain the role of electronic components in the design of electronic systems to meet desired needs within realistic constraints. |
| a3 | Describe the electronic components characteristic and analyze its operation |
| a4 | Demonstrate an understanding of concepts of electronic devices and circuits. |

B. Intellectual Skills: Upon successful completion of the course, students will be able to:

- | | |
|----|--|
| b1 | analyze and investigate electronic circuits to judge the performance of electronic systems that meet desired applications |
| b2 | depict how electronic components are modeled and how the models are used in the design and analysis of electric and electronic circuits. |
| b3 | Analyze and measure electronics circuits |
| b4 | evaluate the extent of electronic technologies and what kind of effect they have on Bio-medical engineering problems solutions |

C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:

- | | |
|----|---|
| c1 | build small projects using electrical and electronic circuit components |
| c2 | design, simulate, and implement simple electronic systems using electronic components and computer simulation package |
| c3 | Use electronic device models and mathematic knowledge in solving and analyzing electronic circuits |
| c4 | Use electronic computers software in simulating and analyzing electronic circuits as a verification tool. |

D. Transferable Skills: Upon successful completion of the course, students will be able to:

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d1	develop student's cooperative work though efficient team works.
d2	Commit to professional ethics, responsibilities, and norms of professional biomedical engineering practices.
d3	improve and practice technical writing skills via homework and projects reporting.
d4	Engage in continuing professional development and lifelong learning as an biomedical engineering technology professional.

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	<ul style="list-style-type: none"> ➤ Introduction ➤ Review the theory of BJT 	<ul style="list-style-type: none"> ➤ The DC operating Point: DC Bias, DC Load Line ➤ Linear Operation ➤ BJT Biasing circuits ➤ Q-Point Stability ➤ Amplifier Operation 	1	3
2	<ul style="list-style-type: none"> ➤ Introduction ➤ Review the theory of BJT 	<ul style="list-style-type: none"> ➤ Linear Amplifier ➤ Transistor Models ➤ BJT Amplifiers (CE,CC CB) ➤ Multistage Amplifiers ➤ The Differential Amplifier 	1	3
3	JFET transistor	<ul style="list-style-type: none"> ➤ Structure and operation, ➤ Characteristics and Parameters, ➤ biasing and Ohmic Region , ➤ basic circuits 	1	3
4	MOSFET transistor	<ul style="list-style-type: none"> ➤ types ➤ Operation, ➤ biasing 	1	3
5	FET Amplifiers	<ul style="list-style-type: none"> ➤ Common-Source Amplifier ➤ Common-Drain Amplifier ➤ Common-Gate Amplifier ➤ Class D Amplifier ➤ MOSFET Switching 	1	3
6	FET Amplifiers	<ul style="list-style-type: none"> ➤ Class D Amplifier ➤ MOSFET Switching 	1	3

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7	Midterm Exam	Midterm Exam theory	1	3
8	Operational Amplifier	<ul style="list-style-type: none"> ➤ Introduction to Operational Amplifiers ➤ Op-Amp Input Modes and Parameters ➤ Op-Amps with Negative Feedback ➤ Effects of Negative Feedback on Op-Amp Parameters 	1	3
9	Operational Amplifier	<ul style="list-style-type: none"> ➤ Bias Current and Offset Voltage ➤ Open-Loop and Closed Loop Frequency Responses ➤ Troubleshooting 	1	3
10	Basic Op-Amp Circuits	<ul style="list-style-type: none"> ➤ Comparators ➤ Summing Amplifiers 	1	3
11	Basic Op-Amp Circuits	<ul style="list-style-type: none"> ➤ Integrators and Differentiators ➤ Troubleshooting ➤ Application Activity 	1	3
12	Active Filters	<ul style="list-style-type: none"> ➤ Basic Filter Responses ➤ Filter Response Characteristics ➤ Low-Pass Filters ➤ High-Pass Filters ➤ Band-Pass Filters ➤ Band-Stop Filters ➤ Filter Response Measurements 	1	3
13	Final Practical Exam	<ul style="list-style-type: none"> ➤ All tops 	1	6
14	Special-Purpose Op-Amp Circuits	<ul style="list-style-type: none"> ➤ Instrumentation Amplifiers ➤ Isolation Amplifiers 	1	3
15	Oscillator	<ul style="list-style-type: none"> ➤ The Oscillator ➤ Feedback oscillator ➤ Oscillator with RC feedback circuits ➤ Oscillators with LC feedback circuits ➤ The 555 timer as an oscillator 	1	3
16	Final exam	All tops	1	2
Number of Weeks /and Units Per Semester			16	50

B. Case Studies and Practical Aspect:

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No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Biasing of BJT Amplifiers	1	1%
2	BJT Amplifiers analysis	1	1%
3	Field Effect Transistors	2	1%
4	Biasing of FET Amplifiers	2	1%
5	MOSFET	1	1%
6	FET Amplifiers analysis	1	1%
7	Basic OP-AmP circuits	2	1%
8	Instrumentation Amplifiers	1	1%
9	Active Filters	2	1%
10	Oscillator	1	1%
11	Homework	1	1%
12	Team-project	1	1%
13	-		
14	-		
15	-		
16			
Number of Weeks /and Units Per Semester		15	30

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours

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1	Biasing of BJT Amplifiers	1	2
2	BJT Amplifiers analysis	1	2
3	Field Effect Transistors	2	4
4	Biasing of FET Amplifiers	2	4
5	MOSFET	1	2
6	FET Amplifiers analysis	1	2
7	Basic OP-AmP circuits	2	4
8	Instrumentation Amplifiers	1	2
9	Active Filters	2	4
10	Oscillator	1	2
11	Review	1	2
12			
Number of Weeks /and Units Per Semester			

V. Teaching Strategies of the Course:

- ▶ Lectures
- ▶ Tutorials
- ▶ laboratory works
- ▶ Self-learning
- ▶ Dialogue and discussion
- ▶ Analysis and Problem solving .
- ▶ Project work
- ▶ Design exercises
- ▶ Simulation tools
- ▶ Coursework
- ▶ Discussion

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► Brainstorming

VI. Assessment Methods of the Course:

- Written tests (mid and final terms and quizzes),
- Class discussions,
- Presentations.
- experiment lab theory.
- project
- Home work

VII. Assignments:

No.	Assignments	Week Due	Mark
1			
2			
3			
Total			

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Homework/Tasks/Assignments	2,4,6,8,10	5	10%
2	Practical final exam	13	15	15%
3	Midterm Exam theoretical	7	10	10%
4	project	14	15	15%
5	Oral and discussion notices	weekl y	5	5%

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6	Final Exam	16	50	50%
Total			Total	100

IX. Learning Resources:

1. Floyd TL, Electronic Devices, 8th/7thed. Pearson/Prentice Hall. 2008/2005.
2. R. L. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 10th Edition, Prentice Hall, 2009.

1- Required Textbook(s) (maximum two): مثال example

1. Reddy SR. Electronic Devices and Circuits, Pangbourne: Alapha Science International, 2004.
2. J. D. Irwin, Basic Engineering Circuit Analysis, 7th Edition, Prentice-Hall, 2002.
3. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuit, 3rd Edition, John Wiley & Sons, 1996.
4. N. R. Malik, Electronic Circuit Analysis, Simulation and Design, Prentice-Hall, 1995.
5. D. Comer and D. Comer, Fundamentals of Electronic Circuit Design, John Wiley & Sons, 2003.

2- Essential References:

1. Reddy SR. Electronic Devices and Circuits, Pangbourne: Alapha Science International, 2004.
2. J. D. Irwin, Basic Engineering Circuit Analysis, 7th Edition, Prentice-Hall, 2002.
3. R. C. Dorf and J. A. Svoboda, Introduction to Electric Circuit, 3rd Edition, John Wiley & Sons, 1996.
4. N. R. Malik, Electronic Circuit Analysis, Simulation and Design, Prentice-Hall, 1995.
5. D. Comer and D. Comer, Fundamentals of Electronic Circuit Design, John Wiley & Sons, 2003.

3- Electronic Materials and Web Sites etc.:

Websites:

Journals:

1-

Other Web Sources:

X. Course Policies: (Based on the Uniform Students' By law (2007) تتحرك كما هي)

1	Class Attendance: Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
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2	Tardiness: A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	Exam Attendance/Punctuality: No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	Assignments & Projects: Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	Cheating: Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	Forgery and Impersonation: Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	Other policies: The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

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