

# Republic of Yemen

Ministry of Higher Education & Scientific Research

Faculty

21 SEPTEMBER UNIVERSITY for MEDICALS &

of

## APPLIEED SCIENCES



Engineering and Computer

Department of Biomedical Engineering

Course Specification of

Electrical Circuits 1

Course No. (07.02.718)

**2022/2023**

Prepared by:	Reviewed by:	Head of the Department:	Quality affairs Dean	Dean of College:
Dr. Abdulrahman Obaid	Dr. -----	Dr.Awadh Ali Abdo	Dr. Mohammed Al-Shamahi	Dr. Abdulrahman Obaid

## I. Course Identification and General Information:

1	Course Title:	Electrical Circuits 1			
2	Course Code & Number:	07.02.718			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
			Lecture	Exercise	
		3	2	--	2
4	Study Level/ Semester at which this Course is offered:	2 <sup>nd</sup> Level / 1 <sup>st</sup> Semester			
5	Pre –Requisite (if any):	None			
6	Co –Requisite (if any):	None			
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)			
10	Mode of Delivery:	Face-to-face learning			
11	Location of Teaching the Course:	University Campus			
12	Prepared by:	Dr. Abdulrahman Obaid			
13	Date of Approval:				

## II. Course Description:

This course introduces the student to the basic concepts of electrical circuits, components and laws. It will cover the current, voltage and alternating current circuits, while presenting the most important theories and methods in teaching and solving electrical circuits. Analyzing and calculating the concept of power in electrical circuits. It concludes with a study on the concept of magnetic coupling and transformers and their important applications. At the end of this course the students can be analysis the electrical circuits and apply the basic laws to solve the basic electrical problems.

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III. Course Intended Learning Outcomes (CILOs) : (مخرجات تعلم المقرر)			Referenced PILOs (مخرجات تعلم البرنامج)	
A.	B. Knowledge and Understanding: Upon successful completion of the course, students will be able to:			
a1	Knowing the basic theories and concepts in DC and AC circuits.	I	A1	Demonstrate an understanding of appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology disciplines.
a2	Explaining the theories and methods for solving electrical circuits and solution concepts related to solving linear circuits.	I	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	Understanding the methodology for solving problems associated with electrical circuits.	I	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:				
b1	Differentiating, defining and suggesting solutions to various practical problems in electrical circuits.	I	B1	Critically analyze complex biomedical devices and equipment's problems, faults and propose appropriate biomedical devices maintenance based solutions and integrate them effectively into the uses and healthcare organizations.
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b2	Analyzing a circuit, identifying it, self-developing and using different research methods to develop and improve the solution, defining associated solution requirements and compare with various solutions.	I	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	Reconfiguring theories and methods for solving electrical circuits and using the mathematical tools to solve electrical circuits.	I	B3	Explore variety of challenges and problems related to maintenance, troubleshooting and performance of biomedical devices to select the optimal solution.
<b>C. Professional and Practical Skills:</b> Upon successful completion of the course, students will be able to:				
c1	Applying of practical skills related to the application of electrical circuits solution.	I	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	Designing and implementing electrical circuits.	I	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	Using the laboratory tools and various methods in solving electrical circuits, and properly calibrate laboratory equipment related to electrical circuits.	I	C4	Use the techniques, skills, and necessary tools for biomedical engineering practices.
<b>D. Transferable Skills:</b> Upon successful completion of the course, students will be able to:				
d1	Reviewing systematically analyze	I	D1	Function effectively as an

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	a problem and implement effective solutions both individually and within a group.			individual, as a member, or leader of a team engaged in appropriate activities to the biomedical engineering technology disciplines to accomplish a common goal.
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**(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:**

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
a1	Knowing the basic theories and concepts in DC and AC circuits.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Interactive Class Discussions,</li> <li>Directed Self- Study.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities</li> <li>Written tests</li> <li>Lab report</li> <li>Practical Lab Sessions</li> <li>Home works and assignments.</li> </ul>
a2	Explaining the theories and methods for solving electrical circuits and solution concepts related to solving linear circuits.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities</li> <li>Written tests</li> <li>Written assessments such as multiple-choice questions and Quizzes</li> <li>Lab Report/ Practical Lab Sessions</li> <li>Home works and assignments.</li> </ul>
a3	Understanding the methodology for solving problems associated with electrical circuits.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities</li> <li>Written tests</li> <li>Written assessments such as multiple-choice questions and Quizzes</li> </ul>

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		<p>session,</p> <ul style="list-style-type: none"> <li>Interactive Class Discussions,</li> <li>Directed Self- Study,</li> <li>Exercises and Home Works,</li> </ul>	<ul style="list-style-type: none"> <li>Lab report/ Practical Lab Sessions</li> <li>Home works and assignments.</li> </ul>
<b>(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
b1	Differentiating, defining and suggesting solutions to various practical problems in electrical circuits.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session,</li> <li>Interactive Class Discussions,</li> <li>Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities,</li> <li>Written tests,</li> <li>Written assessments such as multiple-choice questions and Quizzes,</li> <li>Lab report</li> <li>Home works and assignments.</li> </ul>
b2	Analyzing a circuit, identifying it, self-developing and using different research methods to develop and improve the solution, defining associated solution requirements and compare with various solutions.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session,</li> <li>Directed Self- Study,</li> <li>Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities,</li> <li>Written tests,</li> <li>Written assessments,</li> <li>Practical Lab Sessions,</li> <li>Home works and assignments.</li> </ul>
b3	Reconfiguring theories and methods for solving electrical circuits and using the mathematical tools to solve electrical circuits.	<ul style="list-style-type: none"> <li>Interactive lectures,</li> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session,</li> <li>Interactive Class Discussions,</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities,</li> <li>Written tests ,</li> <li>Written assessments,</li> <li>Lab report,</li> <li>Home works and assignments.</li> </ul>

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		<ul style="list-style-type: none"> <li>Directed Self- Study,</li> <li>Exercises and Home Works.</li> </ul>	
<b>(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>
c1	Applying of practical skills related to the application of electrical circuits solution.	<ul style="list-style-type: none"> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session,</li> <li>Interactive Class Discussions,</li> <li>Directed Self- Study,</li> <li>Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities,</li> <li>Written tests,</li> <li>Written assessments such as multiple-choice questions and Quizzes,</li> <li>Lab report/Project/ Practical Lab Sessions,</li> <li>Home works and assignments.</li> </ul>
c2	Designing and implementing electrical circuits.	<ul style="list-style-type: none"> <li>Problem solving,</li> <li>Tutorials,</li> <li>Laboratory based session,</li> <li>Directed Self- Study,</li> <li>Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities,</li> <li>Written tests ,</li> <li>Report/Project/ Practical Lab Sessions,</li> <li>Home works and assignments.</li> </ul>
c3	Using the laboratory tools and various methods in solving electrical circuits, and properly calibrate laboratory equipment related to electrical circuits.	<ul style="list-style-type: none"> <li>Laboratory based session,</li> <li>Interactive Class Discussions,</li> <li>Directed Self- Study,</li> <li>Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>Coursework Activities</li> <li>Written assessments such as multiple-choice questions and Quizzes,</li> <li>Report/Project/ Practical Lab Sessions,</li> <li>Home works and assignments.</li> </ul>
<b>(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:</b>			
	<b>Course Intended Learning Outcomes</b>	<b>Teaching Strategies</b>	<b>Assessment Strategies</b>

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d1	Reviewing systematically analyze a problem and implement effective solutions both individually and within a group.	<ul style="list-style-type: none"> <li>• Problem solving,</li> <li>• Tutorials,</li> <li>• Laboratory based session,</li> <li>• Exercises and Home Works.</li> </ul>	<ul style="list-style-type: none"> <li>• Coursework Activities,</li> <li>• Written tests ,</li> <li>• Report/Project/ Practical Lab Sessions,</li> <li>• Home works and assignments.</li> </ul>
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#### IV. Course Contents:

##### A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CLOs)
1	Introduction	<ul style="list-style-type: none"> <li>– Introduction to the course.</li> <li>– Course objectives</li> <li>– Course outlines.</li> </ul>	1 <sup>st</sup>	2	a1
2	Quantities and Units	<ul style="list-style-type: none"> <li>– Units of Measurement</li> <li>– Scientific Notation</li> <li>– Engineering Notation and Metric Prefixes</li> <li>– Metric Unit Conversions</li> <li>– Measured Numbers</li> </ul>	2 <sup>nd</sup>	2	a1, a2
3	Voltage, Current, and Resistance	<ul style="list-style-type: none"> <li>– Atomic Structure</li> <li>– Electrical Charge</li> <li>– Voltage</li> <li>– Current</li> <li>– Resistance</li> </ul>	3 <sup>ed</sup>	2	a1, a2, b1
4	Voltage, Current, and Resistance	<ul style="list-style-type: none"> <li>– The Electric Circuit</li> <li>– Basic Circuit Measurements</li> <li>– Electrical Safety</li> <li>– Application Activity</li> </ul>	4 <sup>th</sup>	2	a1, a2, b1
5	Ohm's Law	<ul style="list-style-type: none"> <li>– The Relationship of Current, Voltage, and Resistance</li> <li>– Current Calculations</li> <li>– Voltage Calculations</li> <li>– Resistance Calculations</li> <li>– Introduction to Troubleshooting</li> <li>– Application Activity</li> </ul>	5 <sup>th</sup>	2	a1, a2, a3, b2

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6	Energy and Power	<ul style="list-style-type: none"> <li>Energy and Power</li> <li>Power in an Electric Circuit</li> <li>Resistor Power Ratings</li> <li>Energy Conversion and Voltage Drop in Resistance</li> <li>Power Supplies and Batteries</li> <li>Application Activity</li> </ul>	6 <sup>th</sup>	2	a2, a3, b1, b2, c1
7	Series Circuits	<ul style="list-style-type: none"> <li>Resistors in Series</li> <li>Total Series Resistance</li> <li>Current in a Series Circuit</li> <li>Application of Ohm's Law</li> <li>Voltage Sources in Series</li> <li>Kirchhoff's Voltage Law</li> </ul>	7 <sup>th</sup>	2	a2, a3, b1, b2, c1
8	Mid-Term Theoretical Exam	<ul style="list-style-type: none"> <li>All previous topics</li> </ul>	8 <sup>th</sup>	2	a1, a2, a3, b1, b2, c1
9	Series Circuits	<ul style="list-style-type: none"> <li>Voltage Dividers</li> <li>Power in Series Circuits</li> <li>Voltage Measurements</li> <li>Troubleshooting</li> <li>Application Activity</li> </ul>	9 <sup>th</sup>	2	a3, b1, b2, c1, c2,
10	Parallel Circuits	<ul style="list-style-type: none"> <li>Resistors in Parallel</li> <li>Voltage in a Parallel Circuit</li> <li>Kirchhoff's Current Law</li> <li>Total Parallel Resistance</li> <li>Application of Ohm's Law</li> <li>Current Sources in Parallel</li> </ul>	10 <sup>th</sup>	2	a3, b1, b2, c2, c3
11	Parallel Circuits	<ul style="list-style-type: none"> <li>Current Dividers</li> <li>Power in Parallel Circuits</li> <li>Parallel Circuit Applications</li> <li>Troubleshooting</li> <li>Application Activity</li> </ul>	11 <sup>th</sup>	2	a2, a3, b3, c1, c2, c3
12	Series-Parallel Circuits	<ul style="list-style-type: none"> <li>Identifying Series-Parallel Relationships</li> <li>Analysis of Series-Parallel Resistive Circuits</li> <li>Voltage Dividers with Resistive Loads</li> <li>Loading Effect of a Voltmeter</li> </ul>	12 <sup>th</sup>	2	a2, a3, b1, b2, c1, c2, c3
13	Series-Parallel	<ul style="list-style-type: none"> <li>Ladder Networks</li> </ul>	13 <sup>th</sup>	2	a3, b1,

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	Circuits	<ul style="list-style-type: none"> <li>The Wheatstone Bridge</li> <li>Troubleshooting</li> <li>Application Activity</li> </ul>			b2, b3, c1, c2, c3
14	Circuit Theorems and Conversions	<ul style="list-style-type: none"> <li>The DC Voltage Source</li> <li>The Current Source</li> <li>Source Conversions</li> <li>The Superposition Theorem</li> </ul>	14 <sup>th</sup>	2	b1, b2, c1, c2, c3
15	Final Practical Exam	<ul style="list-style-type: none"> <li>All practical topics.</li> </ul>	15 <sup>th</sup>	2	a3, b1, b2, c1, c2, c3
16	Final Theoretical Exam	<ul style="list-style-type: none"> <li>All topics.</li> </ul>	16 <sup>th</sup>	2	a1, a2, a3, b1, b2, b3, c1, c2, c3
Number of Weeks /and Units Per Semester			16	32	

### B. Practical Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	Introduction in electrical measurements devices types and uses	1,2	4	a1
2	Voltage, Current, and Resistance circuit measurements and circuit testing	3,4	4	a2, a3, b1, c1
3	Series Circuits designing, measurement and testing	5,6	4	a1, a2, a3, b2, b3, c1,
4	Parallel Circuits designing, measurement and testing	7,8,9	6	a1, a2, a3, b2, b3, c1, c2, c3, d1
5	Series-Parallel Circuits designing, measurement and testing	10,11,12	6	a3, b2, b3, c1, c2, c3,

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				d1
6	<ul style="list-style-type: none"> <li>- Source Conversions Circuits designing, measurement and testing</li> <li>- Power supply designing</li> </ul>	13,14	4	a2, a3, b2, b3, c1, c2, c3, d1
7	Final lab exam	15	2	a3, b1, b2, b3, c1, c2, c3
Number of Weeks /and Units Per Semester		15	30	

### C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	NONE			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
Number of Weeks /and Units Per Semester		15	30	

### V. Teaching Strategies of the Course:

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- Interactive lectures,
- Problem solving,
- Tutorials,
- Teamwork,
- Laboratory based session,
- Interactive Class Discussions,
- Directed Self- Study,
- Exercises and Home Works,

## VI. Assessment Methods of the Course:

- Coursework Activities
- Written tests
- Written assessments such as multiple-choice questions and Quizzes
- Report/Project/ Practical Lab Sessions
- Home works and assignments.

## VII. Assignments:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Lab Reports Assignment	5	5	b1, b2, c1, c2, d1
2	Course Project	15	5	a3, b1, b2, c1, c2, d1
<b>Total</b>			<b>10</b>	

## 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	Assignments & Quizzes	5, 10, 14,	10	10%	a1, a2, a3, b1, b2, c1, c2, c3

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		15			
2	Midterm Theoretical Exam	8	20	20%	a1, a2, a3, b1, b2, c1
3	Final Practical Exam	15	20	20%	a1, a2, a3, b1, b2, c1, c2, c3
4	Final Theoretical Exam	16	50	50%	a1, a2, a3, b1, b2, b3, c1, c2, c3
Total			100	100%	

## IX. Learning Resources:

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

- 1- Thomas L. Floyd, Pearson, 2020, Principles of electric circuits, 10th Edition, pearson.
- 2- Richard C. Dorf, James A. Svoboda, 2013 , Introduction to Electric Circuits, 9th Edition, Wiley.

### 2- Essential References:

- 1- Nilsson Riedel, 2008, Electric Circuits, Pearson International Edition.
- 2- Robert L. Boylestad, Pearson, 2015, Introductory Circuit Analysis, 13th Edition.

### 3- Electronic Materials and Web Sites etc.:

#### Websites:

- 1- edX offers free online learning courses in circuits from top engineering universities. <https://www.edx.org/learn/circuits>

#### Journals:

- 1- International Journal of Wiley journal Circuit Theory and Applications, dedicated to the publication of original work on both the theory and its parctice. <https://onlinelibrary.wiley.com/journal/1097007x>

#### Other Web Sources:

- 1- CircuitBread – The best way to learn electronics. <https://www.circuitbread.com/>
- 2- 7 best websites to Learn and Build Electronics. <https://www.gadgetronicx.com/best-websites-to-learn-build-electronics/>
- 3- learning about electronics technology. <https://learnabout-electronics.org/>

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

1	<b>Class Attendance:</b> 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	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> 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	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> 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	<b>Forgery and Impersonation:</b> 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	<b>Other policies:</b> 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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# Second Part of Course Specification

## Faculty of **Medial Technology**

## Department of **Biomedical Engineering**

Course Plan (Syllabus) of Electrical Circuits 1

Course No. (07.02.718)

I. Information about Faculty Member Responsible for the Course:							
Name of Faculty Member:							
Location & Telephone No.:	Office Hours						
E-mail:		SAT	SUN	MON	TUE	WED	THU

2022/2023

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## I. Course Identification and General Information:

1	Course Title:	Electrical Circuits 1			
2	Course Code & Number:	07.02.718			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
			Lecture	Exercise	
		3	2	--	2
4	Study Level/ Semester at which this Course is offered:	2 <sup>nd</sup> Level / 1 <sup>st</sup> Semester			
5	Pre -Requisite (if any):	None			
6	Co -Requisite (if any):	None			
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)			
10	Mode of Delivery:	Face-to-face learning			
11	Location of Teaching the Course:	University Campus			
12	Prepared by:	Dr. Abdulrahman Obaid			
13	Date of Approval:				

## II. Course Description:

This course introduces the student to the basic concepts of electrical circuits, components and laws. It will cover the current, voltage and alternating current circuits, while presenting the most important theories and methods in teaching and solving electrical circuits. Analyzing and calculating the concept of power in electrical circuits. It concludes with a study on the concept of magnetic coupling and transformers and their important applications. At the end of this course the students can analyze the electrical circuits and apply the basic laws to solve the basic

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electrical problems.

### 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 | Knowing the basic theories and concepts in DC and AC circuits.  |
| a2 | Explaining the theories and methods for solving electrical circuits and solution concepts related to solving linear circuits. |
| a3 | Understanding the methodology for solving problems associated with electrical circuits.                                       |

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

- |    |  |
|----|--|
| b1 | b1: Differentiating, defining and suggesting solutions to various practical problems in electrical circuits.   |
| b2 | Analyzing a circuit, identifying it, self-developing and using different research methods to develop and improve the solution, defining associated solution requirements and compare with various solutions. |
| b3 | Reconfiguring theories and methods for solving electrical circuits and using the mathematical tools to solve electrical circuits.  |

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

- |    |  |
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| c1 | Applying of practical skills related to the application of electrical circuits solution.   |
| c2 | Designing and implementing electrical circuits.  |
| c3 | Using the laboratory tools and various methods in solving electrical circuits, and properly calibrate laboratory equipment related to electrical circuits. |

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

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| d1 | Reviewing systematically analyze a problem and implement effective solutions both individually and within a group. |
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### IV. Course Contents:

**A. Theoretical Aspect:**

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Dr. Abdulrahman Obaid	Dr. -----	Dr.Awadh Ali Abdo	Dr. Mohammed Al-Shamahi	Dr. Abdulrahman Obaid

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	Introduction	<ul style="list-style-type: none"> <li>– Introduction to the course.</li> <li>– Course objectives</li> <li>– Course outlines.</li> </ul>	1 <sup>st</sup>	2
2	Quantities and Units	<ul style="list-style-type: none"> <li>– Units of Measurement</li> <li>– Scientific Notation</li> <li>– Engineering Notation and Metric Prefixes</li> <li>– Metric Unit Conversions</li> <li>– Measured Numbers</li> </ul>	2 <sup>nd</sup>	2
3	Voltage, Current, and Resistance	<ul style="list-style-type: none"> <li>– Atomic Structure</li> <li>– Electrical Charge</li> <li>– Voltage</li> <li>– Current</li> <li>– Resistance</li> </ul>	3 <sup>ed</sup>	2
4	Voltage, Current, and Resistance	<ul style="list-style-type: none"> <li>– The Electric Circuit</li> <li>– Basic Circuit Measurements</li> <li>– Electrical Safety</li> <li>– Application Activity</li> </ul>	4 <sup>th</sup>	2
5	Ohm's Law	<ul style="list-style-type: none"> <li>– The Relationship of Current, Voltage, and Resistance</li> <li>– Current Calculations</li> <li>– Voltage Calculations</li> <li>– Resistance Calculations</li> <li>– Introduction to Troubleshooting</li> <li>– Application Activity</li> </ul>	5 <sup>th</sup>	2
6	Energy and Power	<ul style="list-style-type: none"> <li>– Energy and Power</li> <li>– Power in an Electric Circuit</li> <li>– Resistor Power Ratings</li> <li>– Energy Conversion and Voltage Drop in Resistance</li> <li>– Power Supplies and Batteries</li> <li>Application Activity</li> </ul>	6 <sup>th</sup>	2
7	Series Circuits	<ul style="list-style-type: none"> <li>– Resistors in Series</li> <li>– Total Series Resistance</li> <li>– Current in a Series Circuit</li> <li>– Application of Ohm's Law</li> <li>– Voltage Sources in Series</li> <li>– Kirchhoff's Voltage Law</li> </ul>	7 <sup>th</sup>	2

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8	Mid-Term Theoretical Exam	– All previous topics	8 <sup>th</sup>	2
9	Series Circuits	– Voltage Dividers – Power in Series Circuits – Voltage Measurements – Troubleshooting – Application Activity	9 <sup>th</sup>	2
10	Parallel Circuits	– Resistors in Parallel – Voltage in a Parallel Circuit – Kirchhoff's Current Law – Total Parallel Resistance – Application of Ohm's Law – Current Sources in Parallel –	10 <sup>th</sup>	2
11	Parallel Circuits	– Current Dividers – Power in Parallel Circuits – Parallel Circuit Applications – Troubleshooting – Application Activity	11 <sup>th</sup>	2
12	Series-Parallel Circuits	– Identifying Series-Parallel Relationships – Analysis of Series-Parallel Resistive Circuits – Voltage Dividers with Resistive Loads Loading Effect of a Voltmeter	12 <sup>th</sup>	2
13	Series-Parallel Circuits	– Ladder Networks – The Wheatstone Bridge – Troubleshooting Application Activity	13 <sup>th</sup>	2
14	Circuit Theorems and Conversions	– The DC Voltage Source – The Current Source – Source Conversions The Superposition Theorem	14 <sup>th</sup>	2
15	Final Practical Exam	All practical topics.	15 <sup>th</sup>	2
16	Final Theoretical	All topics.	16 <sup>th</sup>	2

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Exam		
Number of Weeks /and Units Per Semester		16 32

### B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Number of Weeks	Contact Hours
1	Introduction in electrical measurements devices types and uses	1,2	4
2	Voltage, Current, and Resistance circuit measurements and circuit testing	3,4	4
3	Series Circuits designing, measurement and testing	5,6	4
4	Parallel Circuits designing, measurement and testing	7,8,9	6
5	Series-Parallel Circuits designing, measurement and testing	10,11,12	6
6	<ul style="list-style-type: none"> <li>- Source Conversions Circuits designing, measurement and testing</li> <li>- Power supply designing</li> </ul>	13,14	4
7	Final lab exam	15	2
Number of Weeks /and Units Per Semester		15	30

### C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours
1	NONE		
2			
3			
4			

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5			
6			
7			
8			
9			
10			
11			
12			
Number of Weeks /and Units Per Semester		15	30

#### V. Teaching Strategies of the Course:

- Interactive lectures,
- Problem solving,
- Tutorials,
- Teamwork,
- Laboratory based session,
- Interactive Class Discussions,
- Directed Self- Study,
- Exercises and Home Works.

#### VI. Assessment Methods of the Course:

- Coursework Activities
- Written tests
- Written assessments such as multiple-choice questions and Quizzes
- Report/Project/ Practical Lab Sessions
- Home works and assignments.

#### VII. Assignments:

No.	Assignments	Week Due	Mark
1	Lab Reports Assignment	5	5

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2	Course Project	15	5
Total			10

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

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Quizzes	5, 10, 14, 15	10	10%
2	Midterm Theoretical Exam	8	20	20%
3	Final Practical Exam	15	20	20%
4	Final Theoretical Exam	16	50	50%
Total			100	100%

### IX. Learning Resources:

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

- 1- Thomas L. Floyd, Pearson, 2020, Principles of electric circuits, 10th Edition, pearson.
- 2- Richard C. Dorf, James A. Svoboda, 2013 , Introduction to Electric Circuits, 9th Edition, Wiley.

#### 2- Essential References:

- 1- Nilsson Riedel, 2008, Electric Circuits, Pearson International Edition.
- 2- Robert L. Boylestad, Pearson, 2015, Introductory Circuit Analysis, 13th Edition.

#### 3- Electronic Materials and Web Sites etc.:

##### Websites:

- 1- edX offers free online learning courses in circuits from top engineering universities. <https://www.edx.org/learn/circuits>

##### Journals:

- 1- International Journal of Wiley journal Circuit Theory and Applications, dedicated to the publication of original work on both the theory and its parctice. <https://onlinelibrary.wiley.com/journal/1097007x>

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#### Other Web Sources:

- 1- CircuitBread – The best way to learn electronics. <https://www.circuitbread.com/>
- 2- 7 best websites to Learn and Build Electronics.  
<https://www.gadgetronicx.com/best-websites-to-learn-build-electronics/>
- 3- learning about electronics technology. <https://learnabout-electronics.org/>

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

1	<b>Class Attendance:</b> 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	<b>Tardiness:</b> A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	<b>Exam Attendance/Punctuality:</b> 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	<b>Assignments &amp; Projects:</b> Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	<b>Cheating:</b> 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	<b>Forgery and Impersonation:</b> 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	<b>Other policies:</b> 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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