MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

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| **Module Information**  **معلومات المادة الدراسية** | | | | | | | |
| **Module Title** | ‎Electrical Circuits Analysis | | | | **Module Delivery** | | |
| **Module Type** | B | | | | * **☒ Theory** * **☐ Lecture** * **☒ Lab** * **☒ Tutorial** * **☒ Practical** * **☐ Seminar** | | |
| **Module Code** | ELCA111 | | | |
| **ECTS Credits** | 7 | | | |
| **SWL (hr/sem)** | 175 | | | |
| **Module Level** | | UGx11 UG1 | **Semester of Delivery** | | | | 1 |
| **Administering Department** | | Type Dept. Code | **College** | Type College Code | | | |
| **Module Leader** | DR. Nihad Ibrahim Abbas | | **e-mail** | Nihad.I.abbas@uotechnology.edu.iq | | | |
| **Module Leader’s Acad. Title** | | Lecturer | **Module Leader’s Qualification** | | | | Ph.D. |
| **Module Tutor** | Dr. Saddam Kamil Alwane | | **e-mail** | Saddam.K,Alwane@uotechnology.edu.iq | | | |
| **Peer Reviewer Name** | | Name | **e-mail** | E-mail | | | |
| **Scientific Committee Approval Date** | |  | **Version Number** | | |  | |

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| **Relation with other Modules**  **العلاقة مع المواد الدراسية الأخرى** | | | |
| **Prerequisite module** | None | **Semester** |  |
| **Co-requisites module** | None | **Semester** |  |

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| **Module Aims, Learning Outcomes and Indicative Contents**  **أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية** | |
| **Module Objectives**  **أهداف المادة الدراسية** | 1. To understand the concepts of basic electrical elements, sources, and electrical network configurations. Also, to understand how the electrical elements such as resistors, capacitors, and inductors are construct a simple and complex electrical network configuration 2. To develop problem solving skills through different solving techniques. 3. The course deals with the basic concept of electrical circuit theories, rules methods analysis (Ohm Law, Kirchhoff’s Laws, Thevenin, Norton, Superposition, Mesh analysis, maximum power transfer, etc.) |
| **Module Learning Outcomes**  **مخرجات التعلم للمادة الدراسية** | 1. Learning standard measurement units used in electrical networks, 2. study the nature of electricity of materials in term of conductivity and resistivity of materials and how it divided into the conductor, insulator, and semiconductor elements. 3. Define electrical power, charge, voltage, current, resistors, capacitors, inductors, and electrical energy. 4. Study and analysis different types of circuit connections (series, parallel, delta, star, and complex configuration). 5. Discuss dependent and independent electrical source (voltage and current). 6. Define Ohm's law and explain its importance in electric and electronic circuit analysis. 7. Explain Kirchhoff voltage law (KVL) and Kirchhoff current law (KCL) that   it is used in electric network analysis.   1. Study and explain in details various theorems and techniques used in electrical circuit analysis (superposition, Nodal analysis, Mesh, Thevenin, Norton theorem, and maximum power transfer) 2. study capacitor sand inductors properties and their circuit configurations. 3. Discuss alternating current and voltage waveforms AC sinusoidal waveforms in term of mean, effective values and phasors diagrams in an electric circuit. 4. Repeat various techniques used in solving electrical circuits exceed by ac sources. |
| **Indicative Contents**  **المحتويات الإرشادية** | Indicative content includes the following.  DC part: standard units used in electrical circuits, Charge, Current and voltage definitions, Passive electric components (R, C, and L), series and parallel connections, sources conversions. [20 hrs.]  Della to star and star to delta conversion, Ohm’s law, power, energy, and Kirchhoff’s laws. [20]  Methods of analysis (Source Conversions, Mesh analysis, Nodal analysis, superposition theorem, Thévenin’s theorem, Norton’s Theorem, and maximum power transfer theorem) [ 30].  Capacitors and Inductors (introduction, properties, and configurations) [ 10 hrs.]  AC part: Sinusoidal Ac Voltage Characteristics and Definitions, average value, effective value (rms value). [10 hrs.]  Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [20 hrs.]  AC Circuits II - Phasor diagrams, complex impedance, AC circuit with complex numbers. [10 hrs.]  Series-Parallel Ac Networks, Methods of Analysis of AC networks (Source Conversions, Mesh analysis, Nodal analysis, superposition theorem, Thévenin’s theorem, Norton’s Theorem, and maximum power transfer theorem) [ 20 hrs.]  Revision problem class [10hrs]  . |

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| **Learning and Teaching Strategies**  **استراتيجيات التعلم والتعليم** | |
| **Strategies** | Teaching strategies adopted in electrical circuit analysis class encourage students to understanding basic electrical components (R, C, and L) properties and electric ac and dc sources used in supplying different electric networks. Also, expanding their problem solving skills. Also, help them to improve skills in discovering electrical systems fault diagnosis. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students. |

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| **Student Workload (SWL)**  **الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا** | | | |
| **Structured SWL (h/sem)**  **الحمل الدراسي المنتظم للطالب خلال الفصل** | 100 | **Structured SWL (h/w)**  **الحمل الدراسي المنتظم للطالب أسبوعيا** | 6 |
| **Unstructured SWL (h/sem)**  **الحمل الدراسي غير المنتظم للطالب خلال الفصل** | 50 | **Unstructured SWL (h/w)**  **الحمل الدراسي غير المنتظم للطالب أسبوعيا** | 3 |
| **Total SWL (h/sem)**  **الحمل الدراسي الكلي للطالب خلال الفصل** | **150** | | |

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| **Module Evaluation**  **تقييم المادة الدراسية** | | | | | |
| **As** | | **Time/Number** | **Weight (Marks)** | **Week Due** | **Relevant Learning Outcome** |
| **Formative assessment** | **Quizzes** | 2 | 10% (10) | 5 and 10 | LO #1, #2 and #10, #11 |
| **Assignments** | 2 | 10% (10) | 2 and 12 | LO #3, #4 and #6, #7 |
| **Projects / Lab.** | 1 | 10% (10) | Continuous | All |
| **Report** | 1 | 10% (10) | 13 | LO #5, #8 and #10 |
| **Summative assessment** | **Midterm Exam** | 2hr | 10% (10) | 7 | LO #1 - #7 |
| **Final Exam** | 3hr | 50% (50) | 16 | All |
| **Total assessment** | | | 100% (100 Marks) |  |  |

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| **Delivery Plan (Weekly Syllabus)**  **المنهاج الاسبوعي النظري** | |
| **Week** | **Material Covered** |
| **Week 1** | Electrical Circuit Elements And Variables |
| **Week 2** | Ohm’s law, electrical power, energy, and efficiency |
| **Week 3** | Resistance Series and Parallel Networks. Current and Voltage Divider Rules. |
| **Week 4** | Kirchhoff’s Laws (KVL and KCL) |
| **Week 5** | Sources Conversions and ∆ To ꓬ Transformations |
| **Week 6** | Loop Current Method (Mesh Analysis) and Nodal Analysis |
| **Week 7** | Thévenin’s and Norton’s Theorems |
| **Week 8** | Superposition Theorem |
| **Week 9** | Maximum Power Transfer Theorem |
| **Week 10** | Introduction to Sinusoidal Ac Waveforms (Characteristics and Definitions). |
| **Week 11** | Average and Rms Waveforms Values. Response of Basic R, L, And C Elements to A Sinusoidal Voltage Or Current. |
| **Week 12** | Series and Parallel Ac Circuits and Power Factor |
| **Week 13** | Methods of AC circuit analysis I |
| **Week 14** | Methods of AC circuit analysis II |
| **Week 15** | Inductor and capacitor circuits |
| **Week 16** | **Preparatory week before the final Exam** |

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| **Delivery Plan (Weekly Lab. Syllabus)**  **المنهاج الاسبوعي للمختبر** | |
| **Week** | **Material Covered** |
| **Week 1** | Lab 1: resistance measurement (color code and mustimeter method ) |
| **Week 2** | Lab 2: Ohms Law |
| **Week 3** | Lab 3: Resistance Series and Parallel Networks. |
| **Week 4** | Lab 4: Kirchhoff’s Laws (KVL and KCL). |
| **Week 5** | Lab 5: ∆ To ꓬ Transformations |
| **Week 6** | Lab 6: Superposition Theorem |
| **Week 7** | Lab 7:Thévenin’s Theorems. |
| **Week** | Lab 8: Norton’s Theorems. |
| **Week 9** | Lab 9:Maximum Power Transfer Theorem |
| **Week 10** | Lab 10:Characteristics of Sinusoidal Ac Waveforms |
| **Week 11** | Lab 11: Series and Parallel Ac Circuits |
| **Week12** | Lab12: Series and Parallel Capacitors. |
| **Week13** | Lab13: Series and Parallel Inductor Circuits |
| **Week14** | Lab14: Transient in Capacitance Networks and Time Constant |
| **Week15** | Lab15: R-L Transient and Time Constant |

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| **Learning and Teaching Resources**  **مصادر التعلم والتدريس** | | |
|  | **Text** | **Available in the Library?** |
| **Required Texts** | R.L, Boylestad " Introductory Circuit analysis 5th edition. Merrill publishing company | Yes |
| **Recommended Texts** | Charles Alexander, “Fundamentals of Electric Circuits” 5TH Edition, Publisher: McGraw-Hill Publishing Company, 2013. | yes |
| **Websites** | [https://www.coursera.org/browse/physical-sience-and-engineering/electronic](https://www.coursera.org/browse/physical-science-and-engineering/electronic) | |

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| **Grading Scheme**  **مخطط الدرجات** | | | | |
| **Group** | **Grade** | **التقدير** | **Marks %** | **Definition** |
| **Success Group**  **(50 - 100)** | **A -** Excellent | **امتياز** | 90 - 100 | Outstanding Performance |
| **B -** Very Good | **جيد جدا** | 80 - 89 | Above average with some errors |
| **C -** Good | **جيد** | 70 - 79 | Sound work with notable errors |
| **D -** Satisfactory | **متوسط** | 60 - 69 | Fair but with major shortcomings |
| **E -** Sufficient | **مقبول** | 50 - 59 | Work meets minimum criteria |
| **Fail Group**  **(0 – 49)** | **FX –** Fail | **راسب (قيد المعالجة)** | (45-49) | More work required but credit awarded |
| **F –** Fail | **راسب** | (0-44) | Considerable amount of work required |
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| **Note:** Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above. | | | | |