

# استمارة وصف البرنامج الأكاديمي للكليات والمعاهد للعام الدراسي

الجامعة : جامعة شط العرب الاهلية  
الكلية /المعهد : التقنية الهندسية  
القسم العلمي : هندسة تقنيات الحاسوب  
تاريخ ملء الملف : 2026 /7/6



التوقيع :

اسم المعاون العلمي : م. عصام خليل ابراهيم

التاريخ :



التوقيع

اسم رئيس القسم : م. د مظهر عبد الزهرة عبدعلي

التاريخ :



دقق الملف من قبل

شعبة ضمان الجودة والأداء الجامعي

اسم مدير شعبة ضمان الجودة والأداء الجامعي:

التاريخ / /

التوقيع

الصفحة 1

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |                                    |                               |                                                                                                                                                                                                                                                     |
|------------------------------------|------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| معلومات المادة الدراسية            |                                    |                               |                                                                                                                                                                                                                                                     |
| Module Title                       | <b>Fundamentals of Electricity</b> |                               | Module Delivery                                                                                                                                                                                                                                     |
| Module Type                        | Basic learning activities          |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input type="checkbox"/> Tutorial<br><input type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | <b>ATU12026</b>                    |                               |                                                                                                                                                                                                                                                     |
| ECTS Credits                       | 6                                  |                               |                                                                                                                                                                                                                                                     |
| SWL (hr/sem)                       | <b>150</b>                         |                               |                                                                                                                                                                                                                                                     |
| Module Level                       | 1                                  | Semester of Delivery          |                                                                                                                                                                                                                                                     |
| Administering Department           | ATU12                              | College                       | PMTEC                                                                                                                                                                                                                                               |
| Module Leader                      |                                    | e-mail                        | E-mail:                                                                                                                                                                                                                                             |
| Module Leader's Acad. Title        | lecturer                           | Module Leader's Qualification | Ph.D.                                                                                                                                                                                                                                               |
| Module Tutor                       | Name (if available)                | e-mail                        | E-mail                                                                                                                                                                                                                                              |
| Peer Reviewer Name                 | Name                               | e-mail                        | E-mail                                                                                                                                                                                                                                              |
| Scientific Committee Approval Date | 01/02/2024                         | Version Number                | 1.0                                                                                                                                                                                                                                                 |

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

## Module Aims, Learning Outcomes and Indicative Contents

### أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

|                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Module Objectives</b><br>أهداف المادة الدراسية                | <ol style="list-style-type: none"> <li>1. To develop problem solving skills and understanding of circuit theory through the application of techniques.</li> <li>2. To understand voltage, current and power from a given circuit.</li> <li>3. This course deals with the basic concept of electrical circuits.</li> <li>4. This is the basic subject for all electrical and electronic circuits.</li> <li>5. To understand Kirchhoff's current and voltage Laws problems.</li> <li>6. To perform mesh and Nodal analysis.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <p>Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks.</p> <ol style="list-style-type: none"> <li>1. Recognize how electricity works in electrical circuits.</li> <li>2. List the various terms associated with electrical circuits.</li> <li>3. Summarize what is meant by a basic electric circuit.</li> <li>4. Discuss the reaction and involvement of atoms in electric circuits.</li> <li>5. Describe electrical power, charge, and current.</li> <li>6. Define Ohm's law.</li> <li>7. Identify the basic circuit elements and their applications.</li> <li>8. Discuss the operations of sinusoid and phasors in an electric circuit.</li> <li>9. Discuss the various properties of resistors, capacitors, and inductors.</li> <li>10. Explain the two Kirchhoff's laws used in circuit analysis.</li> <li>11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.</li> </ol> |
| <b>Indicative Contents</b><br>المحتويات الإرشادية                | <p>Indicative content includes the following.</p> <p><u>Part A - Circuit Theory</u></p> <p>DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. [15 hrs.]</p> <p>AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs.]</p> <p>AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs.]</p> <p>RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass</p>                                                                                                                                                                           |

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|  | <p>circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [15 hrs.]</p> <p>Revision problem classes [6 hrs.]</p> <p><u>Part B - Analogue Electronics</u></p> <p>Fundamentals</p> <p>Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation, current limiting and over voltage protection. [15 hrs.]</p> <p>Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs.]</p> <p>Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs.]</p> |
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| <b>Learning and Teaching Strategies</b><br>استراتيجيات التعلم والتعليم |                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Strategies</b>                                                      | <p>Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. 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.</p> |

| <b>Student Workload (SWL)</b><br>الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا |    |                                                                     |   |
|--------------------------------------------------------------------------|----|---------------------------------------------------------------------|---|
| <b>Structured SWL (h/sem)</b><br>الحمل الدراسي المنتظم للطالب خلال الفصل | 78 | <b>Structured SWL (h/w)</b><br>الحمل الدراسي المنتظم للطالب أسبوعيا | 5 |

|                                                                                |            |                                                                           |   |
|--------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------|---|
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 72         | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 5 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | <b>150</b> |                                                                           |   |

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

| <b>Delivery Plan (Weekly Syllabus)</b><br>المنهاج الاسبوعي النظري |                                                                                                                   |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
|                                                                   | <b>Material Covered</b>                                                                                           |
| <b>Week 1</b>                                                     | Basic concepts and introduction to electrical circuits, elements and values                                       |
| <b>Week 2</b>                                                     | Resistors and thermal effects, capacitance, inductors and series and parallel connection                          |
| <b>Week 3</b>                                                     | Analysis of electrical circuits, Ohm's law and Kirchhoff's law                                                    |
| <b>Week 4</b>                                                     | Series and Parallel Circuits, Star and Delta connection and sources conversion                                    |
| <b>Week 5</b>                                                     | Techniques of Circuit Analysis – Nodal and Mesh methods                                                           |
| <b>Week 6</b>                                                     | Theorem's analysis of DC circuits (Superposition Theorem, Thevenin and Norton Equivalent and Reciprocity Theorem) |
| <b>Week 7</b>                                                     | Dependent and independent sources                                                                                 |
| <b>Week 8</b>                                                     | Mid-term Exam, Dependent and independent sources                                                                  |
| <b>Week 9</b>                                                     | AC circuits and sinusoidal quantities                                                                             |

|                |                                                                                                                   |
|----------------|-------------------------------------------------------------------------------------------------------------------|
| <b>Week 10</b> | Review of Inductor and Capacitor as Circuit Elements, Power calculations and phasor diagram in AC Circuits.       |
| <b>Week 11</b> | Nodal and Mesh Revisited, Average Power, RMS, Introduction to Polyphase Circuits                                  |
| <b>Week 12</b> | Frequency Response of Series/Parallel Resonances, High-Q Circuits                                                 |
| <b>Week 13</b> | Theorem's analysis of AC circuits (Superposition Theorem, Thevenin and Norton Equivalent and Reciprocity Theorem) |
| <b>Week 14</b> | Resonance in AC circuits                                                                                          |
| <b>Week 15</b> | <b>Analysis of magnetic circuits</b>                                                                              |

| <b>Delivery Plan (Weekly Lab. Syllabus)</b><br>المناهج الاسبوعي للمختبر |                                                            |
|-------------------------------------------------------------------------|------------------------------------------------------------|
|                                                                         | <b>Material Covered</b>                                    |
| <b>Week 1</b>                                                           | Introduction to Electrical appliance and measuring devices |
| <b>Week 2</b>                                                           | Ohm's Law                                                  |
| <b>Week 3</b>                                                           | Resistance Connection                                      |
| <b>Week 4</b>                                                           | $\Delta$ -Y and Y- $\Delta$ circuit conversions            |
| <b>Week 5</b>                                                           | Kirchhoff's Law                                            |
| <b>Week 6</b>                                                           | Superposition Theorem                                      |
| <b>Week 7</b>                                                           | Thevenin's Theorem                                         |
| <b>Week 8</b>                                                           | Reciprocity Theorem                                        |
| <b>Week 9</b>                                                           | RLC series circuit                                         |
| <b>Week 10</b>                                                          | RLC parallel circuit                                       |
| <b>Week 11</b>                                                          | Resonance in parallel circuits                             |

| <b>Learning and Teaching Resources</b><br>مصادر التعلم والتدريس |                                                                                           |                                  |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------|
|                                                                 | <b>Text</b>                                                                               | <b>Available in the Library?</b> |
| <b>Required Texts</b>                                           | Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education | Yes                              |

|                          |                                                                                                                                                                                               |    |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Recommended Texts</b> | DC Electrical Circuit Analysis: A Practical Approach<br>Copyright Year: 2020, dissidents.                                                                                                     | No |
| <b>Websites</b>          | <a href="https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering">https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering</a> |    |

| <b>Grading Scheme</b><br>مخطط الدرجات                                                                                                                                                                                                                                                                                                                                                |                         |                     |          |                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|----------|---------------------------------------|
| Group                                                                                                                                                                                                                                                                                                                                                                                | Grade                   | التقدير             | Marks %  | Definition                            |
| <b>Success Group<br/>(50 - 100)</b>                                                                                                                                                                                                                                                                                                                                                  | <b>A</b> - Excellent    | امتياز              | 90 - 100 | Outstanding Performance               |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>B</b> - Very Good    | جيد جدا             | 80 - 89  | Above average with some errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>C</b> - Good         | جيد                 | 70 - 79  | Sound work with notable errors        |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>D</b> - Satisfactory | متوسط               | 60 - 69  | Fair but with major shortcomings      |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>E</b> - Sufficient   | مقبول               | 50 - 59  | Work meets minimum criteria           |
| <b>Fail Group<br/>(0 – 49)</b>                                                                                                                                                                                                                                                                                                                                                       | <b>FX</b> – Fail        | راسب (قيد المعالجة) | (45-49)  | More work required but credit awarded |
|                                                                                                                                                                                                                                                                                                                                                                                      | <b>F</b> – Fail         | راسب                | (0-44)   | Considerable amount of work required  |
|                                                                                                                                                                                                                                                                                                                                                                                      |                         |                     |          |                                       |
| <b>Note:</b> 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. |                         |                     |          |                                       |