

# MODULE DESCRIPTION FORM

## نموذج وصف المادة الدراسية

| Module Information                 |  |                               |   |
|------------------------------------|--|-------------------------------|---|
| معلومات المادة الدراسية            |  |                               |   |
| Module Title                       | Electrical Engineering Fundamentals II |                               | Module Delivery   |
| Module Type                        | Core                                   |                               | <input checked="" type="checkbox"/> Theory<br><input checked="" type="checkbox"/> Lecture<br><input checked="" type="checkbox"/> Lab<br><input checked="" type="checkbox"/> Tutorial<br><input checked="" type="checkbox"/> Practical<br><input type="checkbox"/> Seminar |
| Module Code                        | EPE 104                                |                               |   |
| ECTS Credits                       | 7                                      |                               |   |
| SWL (hr/sem)                       | 175                                    |                               |   |
| Module Level                       | 1                                      | Semester of Delivery          | 1   |
| Administering Department           | Type Dept. Code                        | College                       | Type College Code   |
| Module Leader                      | Name: Yasir Ghazi Rashid               | e-mail                        | E-mail: yasserghazee_enge@uodiyala.edu.iq   |
| Module Leader's Acad. Title        | Asst. Lect.                            | Module Leader's Qualification | M.Sc.   |
| Module Tutor                       | Name (if available)                    | e-mail                        | E-mail  |
| Peer Reviewer Name                 | Name                                   | e-mail                        | E-mail  |
| Scientific Committee Approval Date | 01/06/2023                             | Version Number                | 1.0   |

### Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

|                             |  |                 |   |
|-----------------------------|--|-----------------|---|
| <b>Prerequisite module</b>  | <b>Electrical Engineering Fundamentals I</b> | <b>Semester</b> | 1 |
| <b>Co-requisites module</b> | None   | <b>Semester</b> |   |

### 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. This course deals with the basic concept of AC electrical circuits.</li><li>2. To understand ac voltage and current from a given circuit.</li><li>3. To understand Root Mean-Square (R.M.S.) &amp; Average Value</li><li>4. To understand ac power Average power, Reactive power, Complex power.</li><li>5. To analysis the RL, RC, RLC circuit analysis</li><li>6. To perform mesh and Nodal analysis in AC circuit.</li><li>7. To develop problem solving skills and understanding of circuit theory through the application of techniques.</li></ol> |
| <b>Module Learning Outcomes</b><br>مخرجات التعلم للمادة الدراسية | <ol style="list-style-type: none"><li>1. Recognize advantages of use alternating current.</li><li>2. Recognize why using Sine Waveform</li><li>3. Define inductors and capacitors.</li><li>4. How generation of alternating voltages and currents.</li><li>5. Recognize Phasor representation of AC quantities.</li><li>6. Define Ohm's Law in AC. Circuits.</li><li>7. Identify the basic circuit elements and their applications.</li></ol>  |

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|  | <p>8. Explain the two Kirchoff's laws used in circuit analysis.</p> <p>9. Discuss the Sinusoidal Steady-State Analysis.</p>   |
| <p><b>Indicative Contents</b></p> <p>المحتويات الإرشادية</p> | <p>Indicative content includes the following.</p> <p><b><u>Part A - A.C. Fundamentals</u></b></p> <p>Introduction, Sinusoids, Phasors, Phasor Relationships for Circuit Elements, Root Mean-Square (R.M.S.) &amp; Average Values, Impedance and Admittance, [18 hrs]</p> <p><b><u>Part B - A.C Circuit</u></b></p> <p>Introduction, Capacitors, Series and Parallel Capacitors, Inductors, Series and Parallel Inductors, Series A.C. circuits, Parallel A.C. Circuits, Kirchoff's Laws in the Frequency Domain, Impedance Combinations. [15 hrs]</p> <p><b><u>Part C - Sinusoidal Steady-State Analysis</u></b></p> <p>Nodal Analysis, Nodal Analysis with Voltage Sources, Mesh Analysis, Mesh Analysis with Current Sources, Superposition Theorem, Thevenin and Norton Equivalent Circuits [24 hrs]</p> <p><b><u>Part D - Frequency Response</u></b></p> <p>Series Resonance, Parallel Resonance, [6 hrs]</p> <p>Revision problem classes [6 hrs]</p> |

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| <p><b>Learning and Teaching Strategies</b></p> <p>استراتيجيات التعلم والتعليم</p> |                                      |
| <p><b>Strategies</b></p>  | <p><b>1. Behavior management</b></p> |

Behavior management strategies foster an atmosphere of mutual respect, reduce disruptive behavior and ensure students have an equal opportunity to fulfill their potential in the classroom. It's crucial to provide them with both a positive and productive learning environment. Examples include establishing a reward system with an interactive chart where students move up or down depending on their performance and behavior in class.

## 2. Blended learning

With a blended learning teaching strategy, technology is incorporated with traditional learning. This allows students to work at their own pace, research their ideas and become more physically engaged during lessons. Examples include providing interactive tablets or whiteboards with engaging activities and posting classwork online for easier access.

## 3. Cooperative learning

Group work is a cooperative learning strategy that allows students with various learning levels to work together. By encouraging them to express their own ideas and listen to others' ideas as a group, you help students develop communication and critical thinking skills. Examples include solving math puzzles together, performing skits as a team or working on group presentations.

## 4. Formative assessment

A formative assessment is used periodically to monitor student learning incrementally. This can more effectively measure the process of learning as opposed to end-of-unit tests and can help you to improve your teaching methods throughout the year. Examples of this teaching strategy include self-evaluation exercises and summarizing a topic in multiple ways.

## 5. Student-led teaching

The student-led teaching strategy lets students become the teacher. In a classroom with learners at different levels, you can better engage those learning faster by showing them how to teach and give feedback to their peers. They may team-teach or work in groups to teach a new topic. Examples include letting a student teach an entire lesson or having advanced writers lead a peer-editing session as well as provide constructive criticism.

### Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

| Structured SWL (h/sem)                  | 100 | Structured SWL (h/w)                 | 7 |
|---|-----|--------------------------------------|---|
| الحمل الدراسي المنتظم للطالب خلال الفصل |     | الحمل الدراسي المنتظم للطالب أسبوعيا |   |

|  |            |   |   |
|--|------------|---|---|
| <b>Unstructured SWL (h/sem)</b><br>الحمل الدراسي غير المنتظم للطلاب خلال الفصل | 75         | <b>Unstructured SWL (h/w)</b><br>الحمل الدراسي غير المنتظم للطلاب أسبوعيا | 6 |
| <b>Total SWL (h/sem)</b><br>الحمل الدراسي الكلي للطلاب خلال الفصل              | <b>175</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 12   | LO #1, #4 and #8, #11     |
|   | <b>Assignments</b>     | 2           | 10% (10)         | 3 and 13   | LO #3, #4 and #10, #14    |
|   | <b>Projects / Lab.</b> | 1           | 10% (10)         | Continuous | All                       |
|   | <b>Report</b>          | 1           | 10% (10)         | 14         | 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 |  |
|---|--|
|   | Material Covered   |
| <b>Week 1</b>   | <ul style="list-style-type: none"> <li>Introduction: AC Circuits, A.C. Fundamentals, Types of waveforms</li> </ul> |

|                |   |
|----------------|---|
| <b>Week 2</b>  | <ul style="list-style-type: none"> <li>• Definition of: Waveform, Instantaneous value, Cycle, Time period, Frequency, Amplitude, Peak-to-peak value, Phase, Phase angle, Phase difference, Angular Frequency</li> </ul> |
| <b>Week 3</b>  | Root-Mean-Square (R.M.S.) & Average Values  |
| <b>Week 4</b>  | <ul style="list-style-type: none"> <li>• Capacitors, Series and Parallel Capacitors</li> <li>• Inductors, Series and Parallel Inductors</li> </ul>  |
| <b>Week 5</b>  | <ul style="list-style-type: none"> <li>• A.C. Through Resistance, Inductance and Capacitances</li> </ul>  |
| <b>Week 6</b>  | Series A.C. circuits  |
| <b>Week 7</b>  | Parallel A.C. circuits: Vector or Phasor Method, Admittance Method (Y), Complex or Phasor Algebra   |
| <b>Week 8</b>  | <b>Mid-term Exam</b>  |
| <b>Week 9</b>  | <ul style="list-style-type: none"> <li>• Kirchoff's Laws in the Frequency Domain</li> <li>• Impedance Combinations</li> <li>• Wye-to-Delta transformations</li> </ul>   |
| <b>Week 10</b> | Sinusoidal Steady-State Analysis: Nodal Analysis, Mesh Analysis   |
| <b>Week 11</b> | Sinusoidal Steady-State Analysis: Mesh Analysis   |
| <b>Week 12</b> | Circuit Theorems: Superposition, Source Transformation  |
| <b>Week 13</b> | Circuit Theorems: Thevenin and Norton Equivalent Circuits   |
| <b>Week 14</b> | AC Power Analysis: Power Triangle, Power Factor, Complex Power  |
| <b>Week 15</b> | Frequency Response: Series Resonance, Parallel Resonance  |
| <b>Week 16</b> | <b>Preparatory week before the final Exam</b>   |

### Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

| <b>Material Covered</b> |                                     |
|-------------------------|-------------------------------------|
| <b>Week 1</b>           | Lab 1: A.C. Measurement Instruments |

|                |   |
|----------------|---|
| <b>Week 2</b>  | Lab 2: Introduction to Oscilloscope             |
| <b>Week 3</b>  | Lab 3: Inductors                                |
| <b>Week 4</b>  | Lab 4: Capacitors                               |
| <b>Week 5</b>  | Lab 5: Ohm's Law in A.C. Circuits               |
| <b>Week 6</b>  | Lab 6: Series and Parallel Combinations         |
| <b>Week 7</b>  | Lab 7: Wye-Delta Transformations                |
| <b>Week 8</b>  | Lab 8: Kirchhoff's Laws in the Frequency Domain |
| <b>Week 9</b>  | Lab 9: Superposition theorems                   |
| <b>Week 10</b> | Lab 10: Thevenin's theorems                     |
| <b>Week 11</b> | Lab 11: Norton's theorems                       |
| <b>Week 12</b> | Lab 12: Power in AC circuit                     |
| <b>Week 13</b> | Lab 13: Series Resonance                        |
| <b>Week 14</b> | Lab 14: Parallel Resonance                      |
| <b>Week 15</b> | <b>Final Exam</b>                               |

| <b>Learning and Teaching Resources</b> |  |                           |
|--|--|---------------------------|
| مصادر التعلم والتدريس                  |  |                           |
|  | Text   | Available in the Library? |
| <b>Required Texts</b>                  | <ul style="list-style-type: none"> <li>• Theraja, B. L. <b>A Textbook of Electrical Technology-Volume I (Basic Electrical Engineering)</b>. Vol. 1. S. Chand Publishing, 2005.</li> <li>• C.K. Alexander and M.N.O Sadiku, <b>Fundamentals of Electric Circuits</b>, McGraw-Hill Education, Fifth Edition, 2013</li> </ul> | Yes                       |
| <b>Recommended Texts</b>               | <ul style="list-style-type: none"> <li>• Allan H. Robbins and Wilhelm C. Miller, <b>Circuit analysis: Theory and practice</b>, Cengage Learning, Fifth Edition, 2013.</li> <li>• Nilsson, James William, <b>Electric circuits</b>, Pearson Education India, 2008.</li> </ul>   | No                        |

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|-----------------|---|
| <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  |
|                                     |                         |                     |          |                                       |

**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.