1. .....

## 1. Basic Information

| | | | | | |
|---|---|---|---|---|---|
| Course Title (according to the bylaw) | Electric Circuits 1 | | | | |
| Course Code (according to the bylaw) | ELC 141 | | | | |
| Department/s participating in delivery of the course | Electrical Engineering Department | | | | |
| Number of credit hours/points of the course (according to the bylaw) | Lectures | Practical | Tutorial | Total | Credit hours |
| | 2 | 0 | 2 | 4 | 3 |
| Course Type | Major | | | | |
| Academic level at which the course is taught | 1 | | | | |
| Academic Program | Electrical Power and Machines Engineering | | | | |
| Faculty/Institute | Engineering | | | | |
| University/Academy | Suez Canal University | | | | |
| Name of Course Coordinator | Assoc. Prof. Ahmed Salem | | | | |
| Course Specification Approval Date | 25/8/2025 | | | | |
| Course Specification Approval (Attach the decision/minutes of the department /committee/council ....) | 25/8/2025 | | | | |

## 2. Course Overview (Brief summary of scientific content)

By the end of this course, students should be able to understand the following topics:

- *Direct current circuits. Electrical quantities: Electric charge; electric current; voltage; electric power and energy . Circuit elements : Voltage and current sources (dependent & independent) ; electrical resistance ; Ohm's law ; construction of circuit model ; Kirchhoff's laws. Simple resistive circuits : Resistors in series ; in parallel ;delta-to- wye and vice versa equivalent circuit ; voltage divider circuit ; current divider circuit ;Wheatstone bridge. Techniques of circuit analysis : Node-voltage method (dependent & independent sources ) ; Mesh- current method (dependent & independent sources);source transformation ; Thevenin and Norton equivalents (dependent & sources ) ;Maximum power transfer ; superposition.*
- *Alternating current circuits. Sinusoidal steady- state analysis : sinusoidal source output signal ;sinusoidal response; phase transform ;passive circuit elements in phasor domain ; impedance combination in phasor domain ; techniques of circuit analysis in phasor domain. Sinusoidal steady state power calculations: Real and reactive power ; rms value and power calculations; complex power.*
- *Balanced and unbalanced three – phase voltages : three phase voltage sources ; analysis of the Y –Y circuit ; analysis of Y - Δ circuit ; analysis of Δ - Δ circuits ; power calculations and measurements.*

## 3. Course Learning Outcomes CLOs

### Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

| Program Outcomes (NARS/ARS) (according to the matrix in the program specs) | | Course Learning Outcomes Upon completion of the course, the student will be able to: | |
|---|---|---|---|
| **Code** | **Text** | **Code** | **Text** |
| A1 | **Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science.** | A.1.1 | **Identify the basics and the components of DC and Ac electric circuits.** |
| | | A.1.3 | **Recognize the electric currents and voltages by using Kirchhoff's laws and different techniques and theories for solving electric circuits** |
| A2 | **Develop and conduct appropriate Experimentation and/or simulation, analyze and interpret data, assess, and evaluate findings, and use statistical analyses and objective engineering judgment to draw conclusions.** | A.2.1 | **Investigate Thevenin, Norton theories and superposition for solving electric circuits.** |

| Program Outcomes (NARS/ARS) (according to the matrix in the program specs) | | Course Learning Outcomes Upon completion of the course, the student will be able to: | |
|---|---|---|---|
| Code | Text | Code | Text |
| B1 | Select, model and analyze electrical power systems applicable to the specific discipline by applying the concepts of generation, transmission and distribution of electrical power systems. | B.1.1 | Analysis of three phase system (Y –Y circuit ; analysis of Y - Δ circuit; analysis of Δ - Δ circuits) |

## 4. Teaching and Learning Methods

1- linteractive lectures.
2. Active learning e.g. group discussion, brainstorming, demonstration.
3. Problem and Project based learning.
4. Self-Learning.

### Course Schedule

| Number of the Week | Scientific content of the course (Course Topics) | Total Weekly Hours | Expected number of the Learning Hours | | | |
|---|---|---|---|---|---|---|
| | | | **Theoretical teaching** (lectures/discussion groups/ .....) | **Training** (Practical/Clinical/ .....) | **Self-learning** (Tasks/ Assignments/ Projects/ ...) | **Tutorial** |
| 1 | Direct current circuits. Electrical quantities: Electric charge; electric current; voltage; electric power and energy. Circuit elements: Voltage and current sources (dependent & independent) ; electrical resistance; Ohm's law | **4** | **2** | | | **2** |
| 2 | construction of circuit model; Kirchhoff's laws. Simple resistive circuits: Resistors in series; in parallel; delta-to-wye and vice versa equivalent circuit | **4** | **2** | | | **2** |
| 3 | voltage divider circuit; current divider circuit; .Wheatstone bridge | **4** | **2** | | | **2** |
| 4 | Techniques of circuit analysis: Node-voltage method (dependent & ;(independent sources | **4** | **2** | | | **2** |
| 5 | Mesh- current method (dependent & independent sources); super node and super mesh | **4** | **2** | | | **2** |
| 6 | Thevenin and Norton equivalents (dependent & sources); Maximum power transfer ; superposition. source transformation | **4** | **2** | | | **2** |
| 7 | Alternating current circuits. Sinusoidal steady- state analysis: sinusoidal source output signal; sinusoidal | **4** | **2** | | | **2** |

| | | | | | | |
|---|---|---|---|---|---|---|
| | response; phase transform; passive circuit elements in phasor domain | | | | | |
| 8 | Midterm exam | | | | | |
| 9 | impedance combination in phasor domain; techniques of circuit analysis in phasor domain | **4** | **2** | | | **2** |
| 10 | Sinusoidal steady state power calculations: Real and reactive power; rms value and power calculations; .complex power | **4** | **2** | | | **2** |
| 11 | analysis of three phase system (Y –Y circuit; analysis of Y - Δ circuit; (analysis of Δ - Δ circuits | **4** | **2** | | | **2** |
| 12 | Balanced and unbalanced three – phase voltages: three phase voltage sources, voltage and current relation Δ - for Y | **4** | **2** | | | **2** |
| 13 | power calculations in three phase systems | **4** | **2** | | | **2** |
| 14 | power measurements in three phase systems | **4** | **2** | | | **2** |
| 15 | Interview and oral Exam | **4** | **2** | | | **2** |
| **16** | Final exam | | | | | |

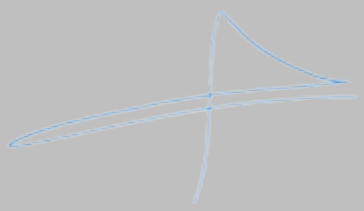
## 5. Methods of students' assessment

| No. | Assessment Methods * | Assessment Timing (Week Number) | Marks/ Scores | Percentage of total course Marks |
|---|---|---|---|---|
| **1** | Lectures discussion/Reports/ Sheets | Every Week | 15 | 15% |
| **2** | Mid-term Exam | 8 | 20 | 20% |
| **3** | Final oral Exam | 15 | 15 | 15% |
| **4** | Final Exam | or16 15 | 50 | 50% |

## 6. Learning Resources and Supportive Facilities *

| | | |
|---|---|---|
| **Learning resources (books, scientific references, etc.) *** | **The main (essential) reference for the course** (must be written in full according to the scientific documentation method) | Engineering Circuit Analysis |
| | **Other References** | Alexander & Sadiku, Fundamentals of Electric Circuits<br>Schaum's Outline of Electric Circuits |
| | **Electronic Sources** (Links must be added) | IEEE Xplore<br>NPTEL |
| | **Learning Platforms** (Links must be added) | MATLAB |
| | **Other** (to be mentioned) | Lecture notes prepared by the instructor<br>Tutorial/problem-solving sheets |
| | | |
| **Supportive facilities & equipment for teaching and learning *** | **Devices/Instruments** | DC power supplies<br>Multimeters<br>Breadboards |
| | **Supplies** | Resistors, capacitors, inductors |
| | **Electronic Programs** | MATLAB |
| | **Skill Labs/ Simulators** | (Basic circuit analysis lab (Ohm's law, KCL, KVL |
| | **Virtual Labs** | MATLAB simulations<br>Online circuit simulators |
| | **Other** (to be mentioned) | Weekly problem-solving sessions |

**Assoc. Prof. Ahmed Salem**



**Prof. Mohamed Nabil**