



COURSE OUTLINE: ELR104 - ELECTRICAL FUNDAMENT

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Approved: Martha Irwin - Dean

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| Course Code: Title | ELR104: ELECTRICAL FUNDAMENTALS |
| Program Number: Name | 4061: AVIATION TECHNOLOGY |
| Department: | ELECT./INSTRUMENTATION PS |
| Academic Year: | 2025-2026 |
| Course Description: | The student will learn to explain terminology and devices, draw symbols, and use standard analysis techniques for DC circuits, as they relate to the Aviation Industry. Students will analyze series, parallel and series-parallel DC circuits. Students will explain basic principles of magnetism and magnetic devices, inductors and capacitors, and their principle operation in DC and AC circuits, including phasor diagrams and power factor correction. The student will explain basic principles of Aircraft Batteries, Motors, Generators, and Power distribution systems, with a focus on interpreting Aircraft Electrical System Schematics, as found in Aircraft Manuals. |
| Total Credits: | 3 |
| Hours/Week: | 3 |
| Total Hours: | 45 |
| Prerequisites: | There are no pre-requisites for this course. |
| Corequisites: | There are no co-requisites for this course. |
| This course is a pre-requisite for: | AFT130, ELN224 |
| Vocational Learning Outcomes (VLO's) addressed in this course: | 4061 - AVIATION TECHNOLOGY VLO 1 Aviation Technology - Flight |
| <small>Please refer to program web page for a complete listing of program outcomes where applicable.</small> | |
| Essential Employability Skills (EES) addressed in this course: | EES 3 Execute mathematical operations accurately. EES 4 Apply a systematic approach to solve problems. EES 5 Use a variety of thinking skills to anticipate and solve problems. |
| Course Evaluation: | Passing Grade: 50%, D A minimum program GPA of 2.0 or higher where program specific standards exist is required for graduation. |
| Other Course Evaluation & Assessment Requirements: | The student must earn a passing grade (minimum 40/80) in the Tests portion of the course to pass the course. |
| Books and Required | Aircraft Electricity and Electronics by Thomas K. Eismín |



Resources:

Publisher: McGraw-Hill Edition: 7
ISBN: 978-0071799157

Scientific Calculator, similar to Sharp EL-520W

Course Outcomes and Learning Objectives:

| Course Outcome 1 | Learning Objectives for Course Outcome 1 |
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| 1. Analyze Series, Parallel and Series-Parallel DC circuits containing voltage and current sources and resistors, to determine individual voltage, current and power values. | 1.1 Be able to identify basic circuit components and draw and interpret circuit diagrams. 1.2 Recall and use Ohm's Law, Kirchoff's laws, power formulae and other network Theorems to find the unknown quantities in basic series and parallel circuits. 1.3 Recall and use the correct network Theorems to simplify and analyze series-parallel combination circuits. |
| Course Outcome 2 | Learning Objectives for Course Outcome 2 |
| 2. Analyze magnetic properties of circuits and devices. | 2.1 Explain magnetic properties of materials. 2.2 Perform calculations relating to flux, flux density, MMF, permeability and reluctance. 2.3 Determine the direction of magnetic flux present as a result of DC current flow in a conductor and in a coil. 2.4 Determine the direction of rotation of a simple dc motor 2.5 Determine the polarity of induced voltage in a simple dc generator 2.6 Complete DC machine diagrams showing flux fields, main fields and rotation |
| Course Outcome 3 | Learning Objectives for Course Outcome 3 |
| 3. Analyze DC circuits containing inductors or capacitors and resistors | 3.1 Explain behavior of resistors and capacitors in RC and RL circuits 3.2 Calculate charge and discharge time, voltage and current values for RL and RC circuits |
| Course Outcome 4 | Learning Objectives for Course Outcome 4 |
| 4. Analyze AC circuits containing inductors and/or capacitors, to determine circuit impedance, voltage, current, phase angle and power factor. | 4.1 Describe characteristics of sinusoidal AC voltages and currents 4.2 Describe relationships between AC voltages and currents in RC, RL and RLC circuits 4.3 Calculate voltages, impedances, currents, and phase angles in AC circuits 4.4 Perform calculations for power factor correction in parallel AC circuits |
| Course Outcome 5 | Learning Objectives for Course Outcome 5 |
| 5. Describe Aircraft Electrical Systems, and read and interpret schematic drawings. | 5.1 Identify schematic symbols for aircraft starters, generators, and related control circuits. 5.2 Trace the flow of current for aircraft starters, generators, and control circuits. 5.3 Explain and label key components in Aircraft Power Distribution Systems 5.4 Explain basic principles of design and maintenance of aircraft electrical systems. |



Evaluation Process and Grading System:

| Evaluation Type | Evaluation Weight |
|-------------------------|--------------------------|
| Assignments and Quizzes | 20% |
| Tests | 80% |

Date:

August 12, 2025

Addendum:

Please refer to the course outline addendum on the Learning Management System for further information.

