WEastern WV Community & Technical College
Master Course Record

Course Prefix and Number: ELM 105
Course Title: DC Electrical Circuits
Recommended Transcript Title: DC Electrical Circuits
Date Approved/Revised: November 2, 2007
Credit Hours: 4 **Contact hours per week (Based on 15 week term):** **Lecture:** 3 **Lab:** 3
Prerequisite: **Corequisite:** **Pre/Corequisite:**
Grading Mode: Letter grade
Catalog Description: This course introduces the student to direct-current (DC) electrical circuits and devices. Theory of series, parallel and series-parallel circuits will be studied. The student will learn about components, instruments; and linear networks and theorems. Measuring and troubleshooting techniques will be used to analyze circuits and components. Magnetism, electro-magnetism and electro-magnetic induction will be studied.
Course Outcomes: 1. Use the SI system of units. 2. Apply powers of ten in algebraic operations. 3. Demonstrate conversion procedures between units of measurements. 4. Use proper metric prefixes and units notations for electrical quantities. 5. Perform calculations using engineering notation. 6. Recognize various symbols used in electrical schematics. 7. Discuss the properties and characteristics of resistance in an electric circuit. 8. Explain the factors that determine the size of electrical wires. 9. Discuss the properties and characteristics of current in an electric circuit. 10. Explain the characteristics of various voltage sources. 11. Discuss the properties and characteristics of voltage in electrical circuits. 12. Explain the differences between conductors, insulators and semiconductors. 13. Use a multimeter to correctly measure resistance. 14. Use a multimeter to correctly measure DC current. 15. Use a multimeter to correctly measure DC voltage. 16. Explain the effect of temperature on electrical components. 17. Explain the difference between fixed and variable resistors. 18. Explain the relationship between current, voltage and resistance as it applies to Ohm's Law (I=E/R). 19. Apply Ohm's Law to analyze a DC electrical circuit. 20. Discuss the concept of power in a resistive electrical circuit.

21. Explain the relationship between current, voltage, resistance and power in Watt's Power Law (P=EI)
22. Apply Watt's Power Law to analyze a DC electrical circuit.
23. Explain the characteristics of current in a series circuit.
24. Explain the characteristics of voltage in a series circuit.
25. Explain the characteristics of resistance in a series circuit.
26. Discuss Kirchhoff's voltage law.
27. Use a multimeter to measure the quantities of a series circuit.
28. Explain the loading effects of meters to a circuit.
29. Calculate the total resistance for a series circuit.
30. Calculate the total current in a series circuit.
31. Calculate the voltage drops in a series circuit.
32. Describe the concept of a voltage divider circuit.
33. Explain the characteristics of current in a parallel circuit.
34. Explain the characteristics of voltage in a parallel circuit.
35. Explain the characteristic of resistance in a parallel circuit.
36. Discuss Kirchhoff's current law.
37. Describe the concept of a current divider circuit.
38. Calculate the total resistance for a parallel circuit.
39. Calculate the total current in a parallel circuit.
40. Calculate the branch currents in a parallel circuit.
41. Explain the characteristics of current in a series-parallel circuit.
42. Explain the characteristics of voltage in a series-parallel circuit.
43. Explain the characteristics of resistance in a series-parallel circuit.
44. Determine the effect of a resistive load on a voltage-divider circuit.
45. Determine the loading effect of a voltmeter on a circuit.
46. Understand the function of a Wheatstone bridge.
47. Discuss the difference between an un-balanced and balanced Wheatstone bridge.
48. Analyze a Wheatstone bridge.
49. Describe Thevenin's Theorem of equivalent circuits.
50. Apply Thevenin's Theorem to develop an equivalent circuit.
51. Use Thevenin's Theorem to analyze a bridge circuit.
52. Describe the principles for the maximum power transfer theorem.
53. Calculate maximum power transfer of a circuit.
54. Describe the superposition theorem.
55. Apply the superposition theorem for a circuit containing more than one power source.
56. Explain the principles of a magnetic field.
57. Discuss electromagnetism and how it is created.
58. Explain and discuss the application of electromagnet.
59. Discuss the principles, creation and application of electromagnetic induction.
60. Explain Faraday's Law.
61. Explain Lenz's Law.

Implementation Cycle: Fall

Role in College Curriculum:

□ **General Education Core** Ξ **Technical Core:** Electromechanical Technology □ **Restricted Elective** □ **General Elective** □ **Workforce Education** □ **Other**
Course Fee: Yes
Instructor's Qualifications: BS Engineering/Technology or related discipline and/or expertise and experience in the field.
Expanded Course Description: This course provides the student with a working knowledge of the fundamental laws, principles, units of measurement and analysis techniques for DC linear circuits. The student will learn to use test instruments to measure resistance, voltage and current. These readings will be used to analyze series, parallel and series-parallel DC networks. The student will be able to use test equipment to make various measurements and develop techniques to verify calculations and circuit parameters.

Prepared by:

Name, Title Date

Approved Per LOT Minutes

Dean, Academic and Student Services Date