North Central State College

| MASTER SYLLABUS | 2025-2026 |
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A. Academic Division: Engineering Technology, Business & Criminal Justice Division

B. Discipline: Electronic Engineering Technology

C. Course Number and Title: ELET1510 DC Electricity

D. Assistant Dean: Brooke Miller, M.B.A.

E. Credit Hours: 3
Lecture: 2 hours
Laboratory: 2 hours

F. Prerequisites: None
Co-requisite(s): MATH1110

G. Last Course/Curriculum Revision Date: Fall 2025 Origin date: 05/11/2011

H. Textbook(s) Title:

Optional:

*Foundations of Electronics Circuits & Devices Electron Flow Version*

- Author(s): Meade
- Copyright Year: 2006
- Edition: 5th
- ISBN #: 978-1418-0053-75

I. Workbook(s) and/or Lab Manual:

Optional:

*Laboratory Projects to Accompany Foundations of Electronics*

- Author(s): Meade
- Copyright Year: 2006
- Edition: 5th
- ISBN #: 978-1418-0418-30

J. Course Description: DC Electricity is an introductory course in direct current circuit theory that includes the basic concepts of voltage, current, resistance and power. This curriculum has been previously approved under the Ohio Board of Regents Career Technical Credit Transfer guide (CTAG) and the Transfer Agreement Guide (TAG) as CTEET001 and OET 001 respectively. *No changes have been made to the outcomes based on these requirements*.

North Central State College

**SYLLABUS ADDENDUM**

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|---|---|---|---|
| **Academic Division:** | Engineering Technology, Business & Criminal Justice | **Discipline:** | Electronic Engineering Technology |
| **Course Coordinator:** | Jonathan DeWitt | | |
| **Course Number:** | ELET1510 | **Course Title:** | DC Electricity |
| **Semester / Session:** | Fall 2025 / Session A/B | **Start / End Date:** | 8/11/2025 – 12/12/2025 |

**Instructor Information**

| | | | |
|---|---|---|---|
| **Name:** | Jonathan DeWitt | **Phone Number:** | 419-755-4776 |
| | | **E-Mail Address:** | jdewitt@ncstatecollege.edu |
| **Office Location:** | 007 AT (Kehoe) | **Office Hours:** | Monday 2:30 PM - 4:30 PM<br>Wednesday 2:30 PM - 4:30 PM |

## I. Topical Timeline (Subject to Change):

### Electrical Quantities, Components, and Concepts

**Week 1**

- Define the term matter and list its physical and chemical states
- Describe the difference between elements and compounds
- Discuss the characteristics and structure of an atom, molecule, and ion
- Define the electrical characteristics of an electron, proton, and neutron
- Explain valence electrons and free electrons
- Describe the characteristics of conductors, semiconductors, and insulators
- State the law of electrical charges
- Discuss the terms polarity and reference points
- Define charge and its unit of measure, coulomb
- Define potential (emf) and give its unit of measure
- Define current and explain its unit of measure
- Calculate current when magnitude and rate of charge motion is known

**Week 2**

- Define resistance and give its unit of measure
- List the typical elements of an electrical circuit
- Describe the difference between closed and open circuits
- List the units of measure for charge, potential (emf), current, resistance, and conductance and give the appropriate abbreviations and symbols for each
- Use metric system terms and abbreviations to express subunits or multiple units of the primary electrical units
- List the factors that affect the resistance of a conductor
- Recognize common types of conductors
- Use a wire table to find conductor resistance for given lengths
- Recognize and/or draw the diagrammatic representations for conductors that cross and electrically connect, and that cross and do not connect
- Define the term superconductivity
- Give the characteristics of several common types of resistors
- Explain the characteristics of surface-mount “chip” resistors

**Week 3**

- Use the resistor color code
- Use other special resistor coding systems
- Explain how to connect meters to measure voltage, current, and resistance

- Recognize and/or draw the diagrammatic symbols for elemental electronic components or devices
- Interpret basic facts from block and schematic diagrams
- List key safety habits to be used in laboratory work

**Week 4**

- Basic Circuit Analysis
- Explain the relationships of current, voltage, and resistance
- Use Ohm's Law to solve for unknown circuit values
- Illustrate the direction of current flow and polarity of voltage drops on a schematic diagram
- Use metric prefixes and powers of 10 to solve Ohm's Law problems
- Use a calculator to solve circuit problems
- Use a computer spreadsheet program to solve circuit problems
- Explain power dissipation
- Use appropriate formulas to calculate values of power

**Week 5**

- Define the term series circuit
- List the primary characteristics of a series circuit
- Calculate the total resistance of series circuits using two different methods
- Calculate and explain the voltage distribution characteristics of series circuits
- State and use Kirchhoff's voltage law

**Week 6**

- Calculate power values in series circuits
- Explain the effects of opens in series circuits
- Explain the effects of shorts in series circuits
- List troubleshooting techniques for series circuits
- Series-connect voltage sources for desired voltages
- Analyze a voltage divider with reference points
- Calculate the required value of a series-dropping resistor
- Use the computer to solve circuit problems

**Week 7**

- Define the term parallel circuit
- List the characteristics of a parallel circuit
- Determine voltage in parallel circuits
- Calculate the total current and branch currents in parallel circuits
- Compute total resistance and branch resistance values in parallel circuits using at least three different methods

**Week 8**

- Determine conductance values in parallel circuits
- Calculate power values in parallel circuits
- List the effects of opens in parallel circuits
- List the effects of shorts in parallel circuits
- Describe troubleshooting techniques for parallel circuits
- Use current divider formulas

**Week 9**

- Define the term series-parallel circuit
- List the primary characteristic(s) of a series-parallel circuit
- Determine the total resistance in a series-parallel circuit
- Compute total circuit current and the current through any given portion of a series-parallel circuit
- Calculate voltages throughout a series-parallel circuit

**Week 10**

- Determine power values throughout a series-parallel circuit
- Analyze the effects of an open in a series-parallel circuit
- Analyze the effects of a short in a series-parallel circuit
- Explain the loading effects on a series-parallel circuit
- Calculate values relating to a loaded voltage divider
- Make calculations relating to bridge circuits

**Week 11**

- State the maximum power transfer theorem
- Determine the *RL* value needed for maximum power transfer in a given circuit
- State the superposition theorem
- Solve circuit parameters for a circuit having more than one source
- State Thevenin's theorem

**Week 12**

- Determine *VL* and *IL* for various values of *RL* connected across specified points in a given circuit or network using Thevenin's theorem
- State Norton's theorem
- Apply Norton's theorem in solving specified problems
- Convert between Norton and Thevenin equivalent parameters
- Use the computer to solve circuit problems
- Define the terms mesh, loop, and node
- Analyze a single-source circuit using a loop procedure
- Use the assumed mesh currents approach to find voltage and current parameters for each component in a network having two sources

**Week 13**

- Use the nodal analysis approach to find voltage and current parameters for each component in a network having two sources
- Convert from delta (□) circuit configuration parameters to wye (*Y*) circuit configuration
- Use the computer to solve circuit problems
- Basic Producing and Measuring of Electrical Quantities
- Define magnetism, magnetic field, magnetic polarity, and flux
- Draw representations of magnetic fields related to permanent magnets
- State the magnetic attraction and repulsion law
- State at least five generalizations about magnetic lines of force

**Week 14**

- Draw representations of fields related to current-carrying conductors
- Determine the polarity of electromagnets using the left-hand rule *(right hand rules)*
- List and define at least five magnetic units of measure, terms, and symbols
- Draw and explain a B-H curve and its parameters
- Draw and explain a hysteresis loop and its parameters
- Explain motor action and generator action related to magnetic fields
- List the key factors related to induced emf
- Briefly explain the relationships of quantities in Faraday's Law
- Briefly explain Lenz's Law
- Use the computer to solve circuit problems

**Week 15**

- List at least two key features of digital multimeters (DMMs)
- Describe at least one advantage and one disadvantage of an analog multimeter (VOM)
- Explain the meanings of the terms autoranging and autopolarity
- Describe and calculate meter loading effects for specified measurement conditions
- List at least two special-purpose measuring devices
- Define two basic methods of measuring voltage on a circuit having a ground reference
- Describe the technique for making continuity checks on a 200-foot-long cable
- Define the purpose and function of meter protection circuits

## II. Course Assignments:

1. Class activities and discussions
2. Learning checks
3. Homework
4. Labs
5. Tests
6. Final

## III. Grading and Testing Guidelines:

| | |
|---|---|
| Homework | 10 points |
| Weekly Quizzes | 20 points |
| Labs | 30 points |
| Midterm Exam | 20 points |
| Final Exam | 20 points |
| Total | 100 points |

Mid-Term Course Grading Policy

A) North Central State requires that at the mid-point of an academic course, students enrolled in that course be notified of their progress. A letter grade will be calculated based on the work completed at the mid-way point in the term.

B) North Central State College uses the standard 4.00 letter grade system (with pluses and minuses). Faculty will issue a grade to each student at the mid-point in the term and then again at the end of the term. Mid-term grades are not recorded in any permanent record or on a student's academic transcript.

C) Mid-term grades provide students with early feedback (both positive and negative) about their academic performance. Mid-term grades provide an opportunity for students to receive positive reinforcement and motivation if they are doing well, and intervention if they are struggling. Mid-semester grades allow faculty, advisors and other service providers on campus to intervene with students who are in academic difficulty, while there is still time to make improvement.

## IV. Examination Policy:

Student must makeup missed Quizzes and/or Exams ***before*** the next class meets.
No makeup exam (Midterm or Final) will be allowed unless the student notifies the instructor within the same day or the following calendar day of the reason for absence.

## V. Class Attendance and Homework Make-Up Policy:

Attendance will be taken during every class. No points are deducted for absenteeism, but the student will be dropped for the class for excessive absenteeism.

## VI. Classroom Expectations:

As an NC State Student your conduct in this course is subject to the NC State Student Code of Conduct. (See your Canvas course for links.)

As a future professional in your field, you will be expected to conduct yourself as a professional in this course in ALL work and communications - be it assignments, discussion forums, Canvas Inbox, emails etc.

This includes but is not limited to:

- Being respectful of classmates' opinions, work and comments
  *Good test = Is this something I would/should say to a co-worker in person?*
- Being respectful in communications with the instructor
  *Good test = Is this something I would/should say to my boss in the workplace?*
- Being respectful of diversity
  *Good test = Is this a comment/joke that is at some other groups, ethnicity, political etc. expense?*
  Note: Offensive "jokes", slurs or hate speech will NOT be tolerated
- Using Non-Profane, Appropriate Language
  *Good test = Is this language you would use in the workplace or in front of your grandmother?*
- Using proper. NON-"Text speak" Language to make Yourself Easily Understood
  *Good test = Could my older boss understand what I have written?*

Failure to conduct yourself as a professional and meet standards above in this course will result in the following consequences in this course:

- 1st Instance = Written warning from the instructor documenting issue
  *(No points deductions)*
- 2nd offense = Mandatory meeting with the instructor and or Department Chair or Division Dean
  *(Related assignment/Participation subject to Point Deductions)*
- 3rd offense: College Disciplinary procedures filed with the NC State Judicial Committee as a violation of the Student Code of Conduct.
  *(Course Grade subject to F)*

Extreme or repeated unprofessional behavior will result in initiating college disciplinary procedures as outlined in the NC State Student Code of Conduct._ NCSC Disciplinary hearings can result in a variety of consequences, including and up to suspension or being expelled from the college.

K. College-Wide Learning Outcomes

| College-Wide Learning Outcome | Assessments - - How it is met & When it is met |
|---|---|
| Communication – Written | |
| Communication – Speech | |
| Intercultural Knowledge and Competence | |
| Critical Thinking | Class discussions, class activities, tests, and labs – Entire term |
| Information Literacy | |
| Quantitative Literacy | Class discussions, class activities, tests, and labs - Regularly throughout the term |

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

| Outcomes | Assessments – How it is met & When it is met |
|---|---|
| 1. Demonstrate knowledge in the areas of basic electronics units of measure | Lecture, Labs, and Quizzes – Entire term |
| 2. Identify and explain the symbology used in electronic diagrams | Lecture, Labs, and Quizzes – Entire term |
| 3. Use meters to safely measure V, I, and R values. | Lecture, Labs, and Quizzes – Entire term |
| 4. Demonstrate knowledge and use of the resistor color code. | Lecture, Labs, and Quizzes – Entire term |
| 5. Analyze and calculate fundamental electronic circuit configurations using Ohm's Law and power formulas | Lecture, Labs, and Quizzes – Entire term |
| 6. Analyze and calculate V, I, and R in series, parallel, and series-parallel circuits. | Lecture, Labs, and Quizzes – Entire term |
| 7. Demonstrate the ability to use Norton's and Thevenin's theorems to solve circuit problems. | Lecture, Labs, and Quizzes – Second half of term |
| 8. Demonstrate the ability to use nodal analysis to solve circuit problems. | Lecture, Labs, and Quizzes - Second half of term |
| 9. Explain and use magnetic terms and units of measure. | Lecture, Labs, and Quizzes - Second half of term |
| 10. Define the properties of capacitance and the behavior of capacitors in DC circuits. | Lecture, Labs, and Quizzes - Second half of term |

M. Recommended Grading Scale:

| NUMERIC | GRADE | POINTS | DEFINITION |
|---|---|---|---|
| 93–100 | A | 4.00 | Superior |
| 90–92 | A- | 3.67 | Superior |
| 87–89 | B+ | 3.33 | Above Average |
| 83–86 | B | 3.00 | Above Average |
| 80–82 | B- | 2.67 | Above Average |
| 77–79 | C+ | 2.33 | Average |
| 73–76 | C | 2.00 | Average |
| 70-72 | C- | 1.67 | Below Average |
| 67–69 | D+ | 1.33 | Below Average |
| 63-66 | D | 1.00 | Below Average |
| 60-62 | D- | 0.67 | Poor |
| 00-59 | F | 0.00 | Failure |

N. College Procedures/Policies:

North Central State College believes that every student is a valued and equal member of the community.* Every student brings different experiences to the College, and all are important in enriching academic life and developing greater understanding and appreciation of one another. Therefore, NC State College creates an inclusive culture in which students feel comfortable sharing their experiences. Discrimination and prejudice have no place on the campus, and the College takes any complaint in this regard seriously. Students encountering aspects of the instruction that result in barriers to their sense of being included and respected should contact the instructor, assistant dean, or dean without fear of reprisal.

* *Inclusive of race, color, religion, gender, gender identity or expression, national origin (ancestry), military status (past, present or future), disability, age (40 years or older), status as a parent during pregnancy and immediately after the birth of a child, status as a parent of a young child, status as a foster parent, genetic information, or sexual orientation*

**Important information regarding College Procedures and Policies can be found on the syllabus supplement located at https://ncstatecollege.edu/documents/President/PoliciesProcedures/PolicyManual/Final%20PDFs/14-081b.pdf**