A. **Academic Division**: Business, Industry, and Technology  
B. **Discipline**: Electronic Engineering Technology  
C. **Course Number and Title**: ELET1510 DC Electricity  
D. **Course Coordinator**: Lenny Eaken  
   **Assistant Dean**: Daniel Wagner  

**Instructor Information:**  
- **Name**: Click here to enter text.  
- **Office Location**: Click here to enter text.  
- **Office Hours**: Click here to enter text.  
- **Phone Number**: Click here to enter text.  
- **E-Mail Address**: Click here to enter text.  

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

F. **Prerequisites**: None  
   **Co-requisite(s)**: MATH1050  

G. **Syllabus Effective Date**: Fall, 2017  

H. **Textbook(s) Title**:  
   *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**:  
   *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.*
K. College-Wide Learning Outcomes

<table>
<thead>
<tr>
<th>College-Wide Learning Outcome</th>
<th>Assessments - How it is met &amp; When it is met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication – Written</td>
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<td>Communication – Speech</td>
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<tr>
<td>Intercultural Knowledge and Competence</td>
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<td>Critical Thinking</td>
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<td>Information Literacy</td>
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<td>Quantitative Literacy</td>
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</table>

L. Course Outcomes and Assessment Methods:

Upon successful completion of this course, the student shall:

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Assessments – How it is met &amp; When it is met</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Demonstrate knowledge in the areas of basic electronics units of measure</td>
<td>Lecture, Labs, and Quizzes during the first two weeks and throughout the remainder of the semester.</td>
</tr>
<tr>
<td>2. Identify and explain the symbology used in electronic diagrams</td>
<td>Lecture, Labs, and Quizzes in weeks 2, 3, and 4 and throughout the remainder of the semester.</td>
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<tr>
<td>3. Use meters to safely measure V, I, and R values.</td>
<td>Lecture, Labs, and Quizzes in week 2 and throughout the remainder of the semester.</td>
</tr>
<tr>
<td>4. Demonstrate knowledge and use of the resistor color code.</td>
<td>Lecture, Labs, and Quizzes in week 2 and throughout the remainder of the semester.</td>
</tr>
<tr>
<td>5. Analyze and calculate fundamental electronic circuit configurations using Ohm’s Law and power formulas</td>
<td>Lecture, Labs, and Quizzes in weeks 3 and 4 and throughout the remainder of the semester.</td>
</tr>
<tr>
<td>6. Analyze and calculate V, I, and R in series, parallel, and series-parallel circuits.</td>
<td>Lecture, Labs, and Quizzes during weeks 4 through 7 and throughout the remainder of the semester.</td>
</tr>
<tr>
<td>7. Demonstrate the ability to use Norton’s and Thevenin’s theorems to solve circuit problems.</td>
<td>Lecture, Labs, and Quizzes during week 7.</td>
</tr>
<tr>
<td>8. Demonstrate the ability to use nodal analysis to solve circuit problems.</td>
<td>Lecture, Labs, and Quizzes during week 8.</td>
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<tr>
<td>9. Explain and use magnetic terms and units of measure.</td>
<td>Lecture, Labs, and Quizzes during week 9.</td>
</tr>
<tr>
<td>10. Define the properties of capacitance and the behavior of capacitors in DC circuits.</td>
<td>Lecture, Labs, and Quizzes during weeks 9 and 10.</td>
</tr>
</tbody>
</table>

M. 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
• 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 $V_L$ and $I_L$ 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 ($\Delta$) circuit configuration parameters to wye ($\gamma$) 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

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

O. Recommended Grading Scale:

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

P. Grading and Testing Guidelines:
Click here to enter text.

Q. Examination Policy:
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R. **Class Attendance and Homework Make-Up Policy:**

Click here to enter text.

S. **Classroom Expectations:**

Click here to enter text.

T. **College Procedures/Policies:**

**Attendance Requirements:** All students are required to attend all scheduled classes and examinations. Each faculty member has the right to establish regulations regarding attendance that he/she considers necessary for successful study.

Students who do not attend classes may be administratively withdrawn from those classes. However, failure to attend classes does not constitute withdrawal, and students are expected to process a formal withdrawal through the Student Records Office in Kee Hall.

**Student engagement requirements:**
Student engagement is based on the “active pursuit” of learning which can be measured by class attendance, class participation (in class or online), taking required quizzes/examinations, and submission of work assignments or papers. Student engagement consists of a student attending at least 60% of the class sessions (there should be attendance throughout the term) and/or completing 75% of the assignments listed on the syllabus at the midpoint in the term. Exceptions can be made when there is on-going communication between the student and faculty member. The communication must be documented and the faculty member and student must be in agreement regarding the exception. Students not meeting the expectation will be administratively withdrawn from class. If a student believes he/she was administratively withdrawn in error, he/she may file an appeal. Being administratively withdrawn may have program and financial aid implications.

**Academic Misconduct** is any activity that tends to compromise the academic integrity of the college, or subvert the educational process. Examples of academic misconduct include, but are not limited to:

1. **Violation of course or program rules** as contained in the course syllabus or other information provided to the student; violation of program requirements as established by departments and made available to students.

2. **Plagiarism** including, but not limited to, submitting, without appropriate acknowledgment, any written, visual or oral material that has been copied in whole or in part from the work of others (whether such source is published or not) even if the material is completely paraphrased in one’s own words. This includes another individual’s academic composition, compilation, or other product, or a commercially prepared paper. Plagiarism also includes submitting work in which portions were substantially produced by someone acting as a tutor or editor.

   Such practices constitute plagiarism regardless of motive. Those who deny deceitful intent, claim not to have known that the act constituted plagiarism, or maintain that what they did was inadvertent are nevertheless subject to penalties when plagiarism has been confirmed.

3. **Cheating** and dishonest practices in connection with examinations, papers and projects, including but not limited to using unauthorized notes, study aids or information on an examination; obtaining help from another student during an examination; taking an exam or doing work for another student; providing one’s own work for another student to copy and submit as his/her own; or allowing another student to do one’s work and then submitting the work as one’s own. Also included would be altering a graded work after it has been returned, then submitting the work for re-grading; or submitting...
identical or similar papers for credit in more than one course without prior permission from the course instructors.

4. **Fabrication** including but not limited to falsifying or inventing any information, data or citation; presenting data that were not gathered in accordance with defined appropriate guidelines, and failing to include an accurate account of the method by which data were collected.

5. **Obtaining an Unfair Advantage** including, but not limited to stealing, reproducing, circulating, or otherwise gaining access to examination materials prior to the time authorized by the instructor; unauthorized collaborating on an academic assignment; taking, hiding or altering resource material; or undertaking any activity with the purpose of creating or obtaining an unfair advantage over another student’s academic work.

6. **Aiding and Abetting Academic Dishonesty** including, but not limited to providing material, information or other assistance to another person with the knowledge that such aid could be used in any of the violations stated above, or providing false information in connection with any inquiry regarding academic integrity.

7. **Alteration of Grades or Marks** including but not limited to, action by the student in an effort to change the earned credit or grade.

In addition, cases of academic dishonesty may involve photocopied materials. Materials used may fall under the Copyright Act. Violations of said Act may subject the user and/or the College to sanctions.

**Statement on Disabilities:** Any student who requires reasonable accommodations related to a disability should inform the course instructor and the Coordinator of Specialized Services (Room 138 in Kee Hall; phone 419-755-4727).

Students who encounter difficulty in any of their courses are encouraged to visit the Tutoring Resource Center (Room 119 in Fallerius Technical Education Center) for tutoring assistance, and the Student Success Center (Room 136 in Kee Hall) for academic assistance, advising services, referrals for personal counseling and Learning Disability (LD) Testing.

**Statement on Withdrawals:** As a student, you are expected to attend class. If you are unable or choose not to attend class, or if for whatever reason you are unable to keep up with the requirements of a course, you need to officially drop the class at the Student Records Office. Refund dates and withdrawal dates will vary slightly from term to term. Contact the Student Records Office for applicable dates. Additionally these dates are posted on the academic calendar available on the college’s website, www.ncstatecollege.edu, under the Academics heading on the home page and are available at the Student Records Office in Kee Hall. Students should go to the Student Records Office (Room 142 in Kee Hall) to process their withdrawal from any class.

If you choose to walk away from your class without officially withdrawing from it, the faculty member teaching the class must grade your classroom performance on the material available to him or her. This normally results in an "F" grade. An "F" grade can lower your grade point average considerably depending on the total credits accumulated.