Tompkins Cortland Community College

Master Course Syllabus

Course Discipline and Number: ELEC126 **Year: 2025-2026**

Course Title: Fundamentals of Electricity I **Credit Hours: 4**

I. Course Description: This course is designed to educate the student in direct current electric circuit fundamentals. This course is the foundation and prerequisite for multiple electrical and electronic courses. The course begins with the coverage of SI units, scientific notation, and electrical quantities. It proceeds with Ohm's law, electrical power, series, parallel, and series-parallel circuits, which are the backbone of electric circuit theory. The course concludes with an introduction to Magnetism and Electromagnetism. The lab component will include testing, measurement, and troubleshooting of DC electrical circuits. Computer simulation will also be used to make predictions about circuit's behavior. Prerequisites: None. 4 Cr. (3 Lec., 3 Lab.) Fall semesters.

II. Additional Course Information:

1. This course is prerequisite for ELEC127 course
2. This course is a technical elective for the Applied Science and Technology A.A.S.
3. This course fulfills the requirement of the SUNY GED ED Natural Science Elective, Lab Science
4. Lectures cover theory and computation techniques. Problem work sessions will be used to practice performing circuit calculations. During the lab sessions, students will build, test, and troubleshoot circuits.
5. This course requires a minimum of 3 hours of lecture and 3 hours of lab per week for a 15-week semester
6. This course has a course fee to cover the cost of lab materials and software license.

III. Student Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Utilize scientific notation, engineering notation, and appropriate prefixes to express electrical quantities with the SI system.
2. Identify and calculate the current, voltage, resistance, and power, in a series, parallel, or series-parallel DC resistive circuits. The mathematical manipulations will involve Kirchhoff's Laws and Ohm's Law.
3. In more complex DC resistor networks, apply electrical science concepts and models like branch, mesh, or nodal analysis, or superposition, Thevenin's or Norton's theorem, to predict values of any circuit current or voltage.
4. Explain the properties of a magnetic field and electromagnetism. Explain the operation of various electromagnetic devices.
5. Make predictions about circuit behavior by developing hypotheses based on the scientific principles learned in class. Check the accuracy of these predictions using computer simulation, then conduct experiments and collect data to identify and explain any discrepancies between the methods.

IV. Tompkins Cortland Institutional Learning Outcomes; Program Learning Outcomes; SUNY General Education Competencies and Knowledge and Skills Areas

Tompkins Cortland ILOs

Complete this section for "service" courses only (e.g., courses that are required of all students; courses that are not program specific but satisfy liberal arts requirements; or commonly used in multiple academic programs to meet non-program-specific requirements). Check only Institutional Learning Outcomes (ILOs) that are meaningfully developed and assessed in this course. For each ILO chosen, include the SLO to which it aligns.

Students will:
☐ Communicate effectively, in oral and written forms, taking into consideration audience and purpose.

☐ Apply principles and methods of scientific inquiry and quantitative reasoning appropriate to their discipline.

☐ Use information, critical thinking, and the creative process to solve problems and reach conclusions.

☐ Use technology appropriate to their discipline.

☐ Describe the ways in which social, economic, or environmental sustainability depends on their own and the collective contributions of a diversity of ideas and people.

Program Learning Outcomes

Complete this section for program-specific courses (e.g., those that share the same discipline code as the academic program or satisfy requirements in related programs). List the academic program(s) here and note which Student Learning Outcomes align to specific Programmatic Learning Outcomes. Please see the MCS Instructions for more details.

Specify the Academic Program: **Applied Science and Technology A.A.S.**

List the PLO(s) that are meaningfully developed and assessed in this course AND the specific SLO(s) through which the development and assessment will occur.

PLO5: Practice of professional skills as applied to a technical area of expertise

SLOs:

1. Utilize scientific notation, engineering notation, and appropriate prefixes to express electrical quantities with the SI system
2. Identify and calculate the current, voltage, resistance, and power, in a series, parallel, or series-parallel DC resistive circuits. The mathematical manipulations will involve Kirchhoff's Laws and Ohm's Law.
3. In more complex DC resistor networks, employ branch, mesh, or nodal analysis, or superposition, Thevenin's or Norton's theorem, to predict values of any circuit current or voltage
4. Explain the properties of a magnetic field and electromagnetism. Explain the operation of various electromagnetic devices.
5. Perform computer circuit simulation to make predictions about circuits behavior, which will provide a check of calculations and/or measurements performed in the laboratory exercises.

SUNY General Education Competencies

If this course assesses a SUNY GEN ED Competency, check all that apply and indicate which course outcome(s) address each checked item:

☐ CRITICAL THINKING & REASONING- Students will:

a. clearly articulate an issue or problem;

b. identify, analyze, and evaluate ideas, data, and arguments as they occur in their own or others' work; acknowledge limitations such as perspective and bias; and
c. develop well-reasoned (logical) arguments to form judgments and/or draw conclusions.

Course SLO(s):

☐ INFORMATION LITERACY - Students will:

a. locate information effectively using tools appropriate to their need and discipline; evaluate information with an awareness of authority, validity, and bias; and demonstrate an understanding of the ethical dimensions of information use, creation, and dissemination.

Course SLO(s):

☒ SUNY GENERAL EDUCATION KNOWLEDGE AND SKILLS AREA(s):

Natural Sciences (and Scientific Reasoning)
For courses that are approved to meet one (or more) of the ten SUNY General Education Knowledge and Skills Areas, indicate which area the course fulfills, and which outcome(s) are aligned with the SUNY outcomes for that area:

Students will demonstrate scientific reasoning applied to the natural world, including

- an understanding of the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of data analysis or mathematical modeling; and;

  SLO #5: Make predictions about circuit behavior by developing hypotheses based on the scientific principles learned in class. Check the accuracy of these predictions using computer simulation, then conduct experiments and collect data to identify and explain any discrepancies between the methods.

- application of scientific data, concepts, and models in one of the natural (or physical) sciences.

  SLO #3: In more complex DC resistor networks, apply electrical science concepts and models like branch, mesh, or nodal analysis, or superposition, Thevenin's or Norton's theorem, to predict values of any circuit current or voltage.

☐ This course does not address any of the above Tompkins Cortland ILOs, PLOs, or SUNY General Education Competencies or Knowledge and Skills Areas.

V. Essential Topics/Themes

1. Electrical Quantities and Units
2. Voltage, Current, and Resistance
3. Ohm's Law
4. Energy and Power
5. Series, Parallel, and Series-Parallel Circuits
6. Circuits Theorems and Conversions
7. Branch, Loop, and Node Analysis
8. Magnetism and Electromagnetism

VI. Methods of Assessment/Evaluation

Method	**% Course Grade**
1. Quizzes	20-40%
2. Homework	0-20%
3. Lab Reports	20-40%
4. Lab Performance Exams	0-20%
5. Comprehensive Final Exam	20-30%

VII. Texts – ☒ Required ☐ Recommended ☐ Used for more than one course (list courses)

High school instructors may consult with staff in the CollegeNow office for additional information and guidance.

	OER
1. Textbook (Required. Used for ELEC 126 and ELEC 127) *Principles of Electric Circuits: Conventional Current Version, 10th edition.* Authors: Thomas L Floyd, David M. Buchla Published by Pearson (August 1st 2021) - Copyright © 2020 ISBN-13: 9780137408993	☐
2. Lab Manual (optional, supplemental) *Experiments in Basic Circuits: Theory and Application, 10th edition* Authors: Thomas L Floyd, David M. Buchla Published by Pearson (June 18, 2019) © 2020 ISBN-13: 9780134879987	☐

Editions listed are current as of date of syllabus. More recent editions may be used.

VIII. Bibliography of Supplemental Materials

IX. Other Learning Resources

Audiovisual:

1. "Introduction to Electrical Engineering" by Khan Academy
   https://www.khanacademy.org/science/electrical-engineering/introduction-to-ee
2. "Circuit Analysis" by Khan Academy
   https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic

Electronic:

1. Digital Resource: www.pearsonhighered.com/careersresources/

   "This section offers students an online study guide that they can check for conceptual understanding of key topics. Also available on the student resources website are multiple-choice, true/false, fill-in-the-blanks, and circuit analysis tests that can be used for additional reinforcement of your grasp of the topics in the textbook."

2. DesignSoft TINA and TINACloud simulation software documentation
   https://www.tina.com/document/

Other:

Attendance Policy: *To maintain good grades, regular attendance in class is necessary. Absence from class is considered a serious matter and absence never excuses a student from class work. It is the responsibility of all instructors to distribute reasonable attendance policies in writing during the first week of class. Students are required to comply with the attendance policy set by each of their instructors. Students are not penalized if they are unable to attend classes or participate in exams on particular days because of religious beliefs, in accordance with Chapter 161, Section 224-a of the Education Law of the State of New York. Students who plan to be absent from classroom activity for religious reasons should discuss the absence in advance with their instructors. See college catalog for more information.*

Services for Students with Disabilities: *It is the College's policy to provide, on an individual basis, appropriate academic adjustments for students with disabilities, which may affect their ability to fully participate in program or course activities or to meet course requirements. Students with disabilities should contact the Coordinator of Access and Equity Services, to discuss their particular need for academic adjustments. All course materials are available in alternate formats upon request.*

Academic Integrity: *Every student at Tompkins Cortland Community College is expected to act in an academically honest fashion in all aspects of their academic work: in writing papers and reports, in taking examinations, in performing laboratory experiments and reporting the results, in clinical and cooperative learning experiences, and in attending to paperwork such as registration forms.*
Any written work submitted by a student must be their own. If the student uses the words or ideas of someone else, they must cite the source by such means as a footnote. Our guiding principle is that any honest evaluation of a student's performance must be based on that student's work. Any action taken by a student that would result in misrepresentation of someone else's work or actions as the student's own — such as cheating on a test, submitting for credit a paper written by another person, or forging an advisor's signature — is intellectually dishonest and deserving of censure.
Several degree programs offer student learning opportunities (such as internships, field work, and clinical experiences) outside the standard classroom setting. As part of the learning process, students must understand and engage in conduct that adheres to principles guiding employment within the professional workplace. These behaviors include, but are not limited to, academic integrity, accountability, reliability, respect, use of appropriate language and dress, civility, professional ethics, honesty, and trustworthiness. Disciplinary action may be initiated for inappropriate conduct occurring while participating in any course-related project or event.